DRAFT

Environmental Assessment

for

Small Unit Inland Training in the Virginia Capes Range Complex

April 2018

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Abstract

Designation:	Draft Environmental Assessment
Title of the Proposed Action:	United States Fleet Forces Command Small Unit Inland Training in the Virginia Capes Range Complex
Project Location:	Inland areas of the Virginia Capes Range Complex of the Hampton Roads fleet concentration area in southeastern Virginia
Lead Agency for the EA:	Department of the Navy
Cooperating Agency:	None
Affected Region:	Southeastern Virginia
Action Proponent:	United States Fleet Forces
Point of Contact:	Naval Facilities Engineering Command, Atlantic Attn: Code EV22 (Virginia Capes Inland Training EA Project Manager) 6506 Hampton Blvd Norfolk, VA 23508-1278
Date:	April 2018

The United States Department of the Navy has prepared this Environmental Assessment (EA) to analyze the potential impacts of the Proposed Action to conduct United States Fleet Forces (USFF) expeditionary training events in the inland areas of the Virginia Capes Range Complex in southeastern Virginia. While many of these training events are independent activities, they are considered together in this EA for administrative convenience and to facilitate the consideration of cumulative impacts on the study area.

The purpose for the Proposed Action is to maintain Navy readiness by continuing to execute current types of inland training (land-based and inland waterway) at current levels and in current locations; accommodate changes in annual frequency of training; support future training requirements; achieve and sustain readiness of ships and squadrons; and support the acquisition and implementation of advanced military technology into the fleet. The need for the Proposed Action is to prepare combat-capable forces that are ready to deploy worldwide for prompt and sustained combat incident to operations at sea consistent with Title 10 United States Code section 5062.

This EA evaluates the No Action Alternative (i.e., continuing with the current types and annual frequency of inland training events) and two action alternatives. Alternative 1 analyzes all the current training events described in the No Action Alternative and considers the addition of new training events. Alternative 2 (Preferred Alternative) includes the same training events that occur on the Navy-owned and non-Navy owned training areas in Alternative 1, plus conducting certain events in new Navy locations.

The Proposed Action would not have significant impacts on the environment. Preparation of an Environmental Impact Statement is not required. This EA evaluates the potential environmental consequences on the following resource areas: air quality (including climate change and greenhouse gases); water resources; biological resources; cultural resources; noise; public health and safety;

hazardous materials and waste; and socioeconomics. In addition, a Consistency Determination is being completed under the Coastal Zone Management Act.

EXECUTIVE SUMMARY

ES.1 Proposed Action

The United States (U.S.) Department of the Navy (Navy) has prepared this Environmental Assessment (EA) to analyze the potential impacts of the Proposed Action to conduct U.S. Fleet Forces (USFF) expeditionary training events in the inland areas of the Virginia Capes (VACAPES) Range Complex in southeastern Virginia. This EA analyzes small unit training that predominantly occurs on federal installations. These events are not necessarily tied or related to one another, but instead represent a collection of individual small-scale training events that occur in the Hampton Roads and middle Atlantic area. Although generally unrelated, they are analyzed collectively in one document for administrative efficiency. The majority of activities have minimal to no impact off federal property. Those impacts that do extend off federal property are insignificant. A large percentage of the activities analyzed are similar in nature to civilian activities, such as small boat operations, individual movement of personnel on terrain, and operation of vehicles on established roadways or trails. Nearly all the activities represent training that has been ongoing at consistent levels for many years, and often decades, without any appreciable impact on the environment or civilian communities.

The study area encompasses 10 primary training locations in southeastern Virginia, including Navy installations as well as other Department of Defense (DoD) and non-DoD properties.

USFF is the action proponent and will determine whether the Proposed Action will have a significant effect on the human environment.

This EA was prepared in accordance with the National Environmental Policy Act (NEPA) (Title 42 United States Code [U.S.C.] sections 4321–4370h); the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [CFR] parts 1500–1508); and Chief of Naval Operations Manual 5090.1.

ES.2 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to maintain Navy readiness by continuing to execute current types of inland training at current levels and in current locations; accommodate changes in annual frequency of training; support future training requirements; achieve and sustain readiness of ships and squadrons; and support the acquisition and implementation of advanced military technology into the fleet. The need for the Proposed Action is to prepare combat-capable forces that are ready to deploy worldwide for prompt and sustained combat incident to operations at sea consistent with 10 U.S.C. section 5062. The Navy meets that mandate, in part, by conducting inland training and by ensuring that naval forces have access to the required training environments on land, in the water, and in the air where the Navy can develop and maintain skills for military missions.

ES.3 Alternatives Considered

USFF developed and applied three screening criteria to determine which training events to analyze. This EA analyzes inland training events that:

- are conducted by USFF-subordinate units,
- occur inside the study area (inland areas of the VACAPES Range Complex in the Hampton Roads fleet concentration area), and
- have not already been analyzed in currently valid or pending NEPA documents.

The Navy is considering two action alternatives that meet the purpose and need for the Proposed Action and a No Action Alternative. The Navy developed its action alternatives by considering the operational and support requirements necessary to meet the purpose and need for the Proposed Action. In developing the action alternatives, the Navy considered such factors as access to "backyard" or local training areas for all types of training from individual unit level to multiple unit level; range locations that minimize impacts on equipment and personnel (e.g., transportation and increased maintenance costs) and maximize training time (closer ranges allow for more training time "on station") as well as reuse of existing infrastructure and ranges as dictated by Secretary of the Navy and DoD policies; the ability to train in realistic environments; and sufficient range capacity to support future training requirements, new equipment, and potential changes in operational tempos to respond to emerging world events. Alternatives analyzed in this EA are:

- **No Action Alternative** – The No Action Alternative is to continue the current level and intensity of inland training events within the study area (i.e., baseline/continuing training events).
- **Alternative 1** – Alternative 1 includes the events analyzed under the No Action Alternative as well as additional Explosive Ordnance Disposal (EOD), maritime prepositioning, expeditionary, and mine countermeasure training required to meet emerging training requirements. The events under Alternative 1 would occur at the same locations as the events in the No Action Alternative. Including these additional events would meet Navy readiness requirements into the foreseeable future.
- **Alternative 2 (Preferred Alternative)** – Alternative 2 includes the same training events that occur on the training areas under Alternative 1 as well as training events at additional, Navy-owned locations. The alternate locations used in Alternative 2 would provide increased flexibility and diversity of training environments throughout the Hampton Roads fleet concentration area and would meet Navy readiness requirements into the foreseeable future.

ES.4 Summary of Environmental Resources Evaluated in the EA

The Council on Environmental Quality regulations, NEPA, and Navy instructions for implementing NEPA, specify that an EA should address resource areas that are potentially subject to impacts. In addition, the level of analysis should be commensurate with the anticipated level of environmental impact. Biological and cultural resources analysis presented in this EA incorporates regulatory agency consultation. Summary of associated regulatory requirements related to these consultation efforts is included below.

Endangered Species Act. The following federally protected species could occur in the study area training locations: small whorled pogonia, piping plover, red knot, roseate tern, northern long-eared bat, Atlantic sturgeon, West Indian manatee, and nesting loggerhead sea turtle, green sea turtle, and Kemp's ridley sea turtle. The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) Consultation (Consultation Code: 05E2VA00-2015-SLI-3232) for this project was completed and submitted to the USFWS with a self-certification letter and project review package on August 25, 2017. After that submittal, the Navy was advised that a Memorandum of Understanding between the Navy and USFWS for sea turtle management at Joint Expeditionary Base (JEB) Fort Story was being canceled for the upcoming 2018 season. Therefore, the Navy is updating its USFWS consultation to account for this change. Effects on these protected species were analyzed under the Endangered Species Act (ESA). Summary evaluations are presented in Table ES-1. In compliance with ESA section 7, the Navy consulted with the National Marine Fisheries Service (NMFS) via letter dated August 17, 2017, with supplemental documents on December 15, 2017. Via letter dated December 19, 2017, NMFS concurred with the Navy's determination that small unit inland training activities in the VACAPES Range Complex are not likely to adversely affect any NMFS ESA-listed species, and NMFS clarified that effects from a temporary

increase in turbidity are not likely to adversely affect sturgeon because any effects on sturgeon caused by the temporary disturbance of habitat are extremely unlikely, and, therefore, discountable (see Appendix A, Agency Correspondence).

Marine Mammal Protection Act. The following federally protected marine mammals could occur in the study area training locations: West Indian manatee, Atlantic bottlenose dolphin, and harbor seal. Effects to these protected aquatic species were analyzed under the Marine Mammal Protection Act (MMPA). Summary evaluations are presented in Table ES-1.

Magnuson-Stevens Fishery Conservation and Management Act. The Navy prepared an Essential Fish Habitat (EFH) Assessment and delivered its assessment to NMFS via letter dated June 28, 2017. Anticipated impacts to EFH resulting from Navy training activities along the Southern Branch of the Elizabeth River include increased turbidity in the water column and impacts to subtidal and intertidal sediments, benthos and fringe marsh habitat. All potential impacts resulting from training activities are anticipated to be temporary and relatively minor in nature. Via letter dated December 8, 2017, NMFS concurred with the Navy's determination that small unit inland training activities along the Southern Branch of the Elizabeth River will not substantially adversely affect EFH, or sandbar shark and summer flounder habitat area of particular concern and had no conservation recommendations to provide (see Appendix A, Agency Correspondence).

National Historic Preservation Act. The Navy has consulted with the State Historic Preservation Officer on the Proposed Action. No adverse effects on historic properties are expected to result from the noise and physical disturbance generated by current and proposed training activities. The State Historic Preservation Officer concurred that the project will not have adverse effects on historic resources via letter dated July 7, 2017 (see Appendix A, Agency Correspondence).

Coastal Zone Management Act. The Navy submitted a Coastal Zone Consistency Determination for the Proposed Action. The Virginia Department of Environmental Quality concurred with the Navy's determination that the Proposed Action is consistent to the maximum extent practicable with the Coastal Zone Management Program, provided all applicable permits and approvals are obtained.

The following resource areas have been addressed in this EA: air quality, water resources, biological resources, cultural resources, noise, public health and safety, hazardous materials and waste, and socioeconomics. Because potential impacts were considered to be negligible or non-existent, the following resources were not evaluated in this EA: infrastructure and utilities, geology/soils, environmental justice, and land use.

ES.5 Summary of Potential Environmental Consequences of the Action Alternatives

Air Quality. All counties and cities within the Hampton Roads Intrastate Air Quality Control Region have been determined by the U.S. Environmental Protection Agency to be in attainment for all criteria pollutants. Under the No Action Alternative, the highest criteria pollutant emissions are nitrogen oxides and carbon monoxide at 3.40 and 2.47 percent of the regional air emissions, respectively.

As USFF inland training has been ongoing for decades, regional emissions would remain consistent with existing conditions, and no significant impacts are anticipated from the No Action Alternative. Any effects of the No Action Alternative on regional air quality are reflected in the current ambient criteria air pollutant concentrations and, as previously stated, the region is in attainment for all criteria pollutants.

Table ES-1. Effect Determinations for Protected Species in the Study Area Under All Alternatives

Species	*JEB Little Creek*	*JEB Fort Story*	*Dam Neck Annex and Camp Pendleton*	*NALF Fentress*	*Northwest Annex*	*St. Juliens Creek Annex*	*NWS Yorktown*	*Cheatham Annex*	*First Landing State Park*	*Southern Branch of the Elizabeth River*
Species Listed Under the Endangered Species Act										
Northern long-eared bat	MA/NLAA	MA/NLAA	MA/NLAA	MA/NLAA	MA/NLAA	MA/NLAA	MA/NLAA	MA/NLAA	NE	MA/NLAA
Small whorled pogonia	NP	NP	NP	NP	NP	NP	NE	NE	NP	NP
Piping plover	NE	MA/NLAA	MA/NLAA	NP	NP	NP	NP	NP	NP	NP
Red knot	NE	MA/NLAA	MA/NLAA	NP	NP	NP	NP	NP	NP	NP
Roseate tern	NE	NE	NE	NP	NP	NP	NP	NP	NP	NP
Atlantic sturgeon	NP	NP	NP	NP	NP	NP	NP	NP	NP	MA/NLAA
Loggerhead sea turtle	NE	MA/NLAA	MA/NLAA	NP	NP	NP	NP	NP	NP	NP
Green sea turtle	NE	NE	MA/NLAA	NP	NP	NP	NP	NP	NP	NP
Kemp's ridley sea turtle	NE	MA/NLAA	MA/NLAA	NP	NP	NP	NP	NP	NP	NP
West Indian manatee	NP	NP	NP	NP	NP	NP	NP	NP	NP	NE
Species Listed Under the Marine Mammal Protection Act										
Atlantic bottlenose dolphin	NP	NP	NP	NP	NP	NP	NP	NP	NP	NT
West Indian manatee	NP	NP	NP	NP	NP	NP	NP	NP	NP	NT
Harbor seal	NT	NT	NT	NP	NP	NP	NP	NP	NT	NT

Key: LAA = Likely to Adversely Affect; MA/NLAA = May Affect, Not Likely to Adversely Affect; NE = No Effect; NP = Not Present; NT = No Take;
JEB = Joint Expeditionary Base; NALF = Naval Auxiliary Landing Field; NWS = Naval Weapons Station.

Under Alternative 1 and Alternative 2, emissions for all criteria pollutants represent slight increases from the baseline (i.e., No Action Alternative) levels. Under Alternative 1, emissions increases of the highest criteria pollutants are 0.02 percent of the regional air emissions for nitrogen oxides and 0.09 percent for carbon monoxide. Under Alternative 2, emissions increases of the highest criteria pollutants are 0.19 percent of the regional air emissions for nitrogen oxides and 0.22 percent for carbon monoxide. Because the entire region of influence is in attainment, the General Conformity Rule does not apply under either action alternative. However, it is noted that annual emissions of all criteria pollutants would still be well below the General Conformity Rule *de minimis* thresholds.

Greenhouse gas emissions under the No Action Alternative represent approximately 0.55 percent of the regional greenhouse gas emissions, which is nominal. Greenhouse gas emissions would increase by 0.03 percent under Alternative 1 and 0.05 percent under Alternative 2, so climate change would be negligibly impacted by implementation of either action alternative.

Water Resources. Under all alternatives, water and sediment quality would remain unchanged. No change in existing National Pollutant Discharge Elimination System permits would be required. Surface water impacts from physical disturbance would not be significant because training activities would not release pollutants or increase turbidity to receiving waters. Wetland areas are present within and adjacent to training areas; however, destruction or modification of wetlands would not occur. Some shorelines are within a coastal flood zone with velocity hazard but training events would not impact that status. In addition, shorelines along the Southern Branch of the Elizabeth River would not be altered by training events because the activities primarily occur within the water and do not result in degradation of the shoreline. Soils present within the training areas have varying potential for runoff; beach/dune areas have the greatest potential for erosion. The Navy manages beach/dune areas to minimize erosion and maintain shorelines for training events. Sediments within the Southern Branch of the Elizabeth River may temporarily experience physical disturbance but the sandy substrate resettles quickly. To the maximum extent practicable, brass casings are recovered on land or captured in vessels. Uncaptured brass casings are expected to deteriorate and may disperse with tidal flow; periodic dredging may further remove casings from the sediment. As a result, there would be no significant impacts on water resources.

Biological Resources. All proposed training at the installations would occur within existing training locations. Training at non-installation sites would utilize existing facilities and adhere to all applicable federal/state/local laws, regulations, and rules. No new infrastructure or any other development would be required for any of the alternatives considered. The following provides a summary of the biological resources analysis for all alternatives, unless otherwise specified.

While physical disturbance associated with beach landings, personnel movement, vehicle movement, and explosives on land have the potential to disturb individual plants and soils, which could degrade habitats over time, training that utilizes beach habitats is typically restricted to unvegetated portions of the beach, and vehicles training at inland areas typically use existing roads and trails.

Physical strike associated with beach landings, personnel movement, vehicle movement, explosives on land and weapons firing – non-lethal training ammunition has the potential to impact wildlife. However, most mammals, reptiles, amphibians, and birds are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, invertebrates, less mobile reptiles, and amphibians, would move into a protected location, such as a burrow or vegetation, for cover. Weapons firing – blank-fire results in expended brass casings; however, the casings are picked up by the Navy and

do not pose a strike risk as they are expended in close proximity to the weapon, where wildlife would not be expected to occur. Integrated Natural Resources Management Plans (INRMPs) for each study area installation contain measures benefiting wildlife such as projects that enhance and restore native habitats. Noise associated with vehicle movement, operation of generators, use of explosives, and simulated weapons fire all have the potential to disturb wildlife to varying degrees; however, most noise events would be localized and occur for a relatively short period of time (minutes to hours).

Training operations would not have a significant impact on Migratory Bird Treaty Act (MBTA)-protected species at the population level. The Navy has determined that the Proposed Action may result in the "take" of migratory birds. The term "take," as defined by the USFWS for purposes of the MBTA, means to "pursue, hunt, shoot, wound, kill, trap, capture, or collect" (50 CFR part 10.12). The Proposed Action, however, is a military readiness activity; therefore, "take" is in compliance with the MBTA. Under the MBTA regulations applicable to military readiness activities (50 CFR Part 21), the USFWS has promulgated a rule that authorizes the incidental take of migratory birds, provided it does not result in a significant adverse effect on a population of a migratory bird species. These proposed training activities would not result in a significant adverse impact on a population of a migratory bird species.

Large wooded tracts within the study area offer potential habitat for northern long-eared bats, which has been documented at many of the installations addressed in this document. Although remote, physical disturbance/strike and noise are potential stressors. The Proposed Action may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat at all study area locations except First Landing State Park. The Proposed Action would have a no effect on the northern long-eared bat at First Landing State Park.

Under the ESA, the final 4(d) rule for the northern long-eared bat prohibits incidental take for activities that occur within 0.25 mile of any known hibernacula at any time of year or activities that involve cutting or destroying known maternity roost trees or any other trees within a 150-foot radius during the pup season (June 1 through July 31). All other incidental take is allowed. This project does not propose any tree removal, is not located within a 150-foot radius of any documented maternity roost trees, and does not occur within 0.25 mile of any hibernacula. Based on the stressors of physical strike and noise associated with Proposed Action primary training event activities, the Proposed Action may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat throughout the study area (except at First Landing State Park).

Birds are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. Although JEB Little Creek, JEB Fort Story, and Dam Neck Annex include appropriate foraging habitats and are in the range of the piping plover, red knot, and roseate tern, it is likely that any individuals observed on-site would be rare occurrences and considered transient individuals. No federally threatened or endangered bird species have been documented at JEB Little Creek. Bird surveys conducted in the spring of 2013 at JEB Fort Story and Dam Neck Annex documented one transient piping plover at each installation. No roseate terns have been observed at any of the study area installations, but red knots have been observed in the Tidewater area during Christmas bird counts and at Dam Neck Annex. Therefore, the Navy has determined that the Proposed Action would have no effect on the roseate tern. The Navy further determined that the Proposed Action would have no effect on the piping plover and red knot at JEB Little Creek; and may affect, but is not likely to adversely affect, the piping plover and red knot at JEB Fort Story and Dam Neck Annex.

Naval Weapons Station (NWS) Yorktown and Cheatham Annex are in the historical range of the small whorled pogonia, and both installations contain appropriate habitats for the species. Though within the historical range, the species has not been confirmed present at NWS Yorktown or Cheatham Annex. And, though no formal critical habitat has been designated at NWS Yorktown or Cheatham Annex, a number of ecologically significant communities that support or have the potential to support rare or at-risk species have been identified (Navy, 2010a). These communities, as well as existing information on rare species have formed the basis for the designation of eight ecological areas that merit conservation and protection at NWS Yorktown and Cheatham Annex. Six of the ecological areas are located at NWS Yorktown and three at Cheatham Annex. Delineating these areas and implementing the specific habitat management measures described in the INRMP ensures the continued protection of the natural heritage resources. Therefore, the Navy has determined that the Proposed Action would have no effect on the small whorled pogonia.

There is no historical evidence of nesting sea turtles at JEB Little Creek; therefore, the Navy has determined that the Proposed Action would have no effect on loggerhead, green, and Kemp's ridley sea turtles at JEB Little Creek. At JEB Fort Story and Dam Neck Annex offshore occurrences of loggerhead and Kemp's ridley sea turtles have been documented and they may potentially nest at these locations. Green sea turtles were not detected during acoustic and satellite tagging studies conducted offshore of JEB Fort Story and, thus, they are not expected to nest on JEB Fort Story beaches. However, one green sea turtle nest was documented on Sandbridge Beach, a few miles south of Dam Neck Annex; based on this proximity, green sea turtles may potentially nest on Dam Neck Annex. Given the very low density of historical loggerhead and Kemp's ridley sea turtle nesting in the study area and the low probability that green sea turtles would be encountered during a training activity, the potential for impacts to loggerhead, green, and Kemp's ridley sea turtles would not be significant. Implementation of sea turtle management measures at JEB Fort Story and Dam Neck Annex in accordance with their INRMPs would reduce the potential for impacts to loggerhead, green, and Kemp's ridley sea turtles. Therefore, the Navy has determined that the Proposed Action would have no effect on green sea turtles at JEB Fort Story, but may affect, but is not likely to adversely affect, green sea turtles at Dam Neck Annex. Additionally, the Navy has determined that the Proposed Action may affect, but is not likely to adversely affect, loggerhead and Kemp's ridley sea turtles at JEB Fort Story and Dam Neck Annex. The Navy initiated informal consultation with the USFWS.

Under all alternatives, the West Indian manatee, harbor seal, and Atlantic bottlenose dolphin may occur in areas of vessel activity along the Southern Branch of the Elizabeth River, thus incurring risk of collision or strike. The Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water. Therefore, the Navy has determined that the Proposed Action would have no effect on the West Indian manatee. In addition, the Navy has determined that the Proposed Action would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

Under all alternatives, hauled-out harbor seals at JEB Little Creek, JEB Fort Story, First Landing State Park, and Dam Neck Annex may react to the presence of people, amphibious craft, and vehicles and temporarily return to the water. Since the species is likely to return to the water when people, amphibious craft, or vehicles are present or approaching, strikes of hauled-out seals typically would not occur and this disturbance is unlikely to result in more than short-term interference with resting activities of seals. The Navy uses highly qualified operators on amphibious craft to maintain awareness

of the surrounding environment. As a result, the Navy has determined that the Proposed Action would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

Under all alternatives, remotely operated vehicles that are deployed in Jones Pond would have the potential to strike fish or disturb fish as a result of noise. Strikes of juvenile or adult fish would be unlikely because of their ability to detect and move away from the vehicles. Strike potential would mostly be limited to larval fish or eggs. The potential for direct strikes is decreased by the dispersed distribution of fish, infrequent use of the water body, and slow operational speed/ hydrodynamic shape of the remotely operated vehicles. Fish that detect noise from remotely operated vehicles could exhibit behavioral responses such as avoidance, altered swimming speed and direction, and physiological stress. Impacts would be limited to fish located near the vehicles, and disturbance would be short-term, as individuals would likely resume normal activities after encountering an underwater vehicle. The potential for disturbance is decreased by the dispersed distribution of fish and infrequent use of remotely operated vehicles. Overall, there would be no discernible impact to populations of any fish species.

Under all alternatives, vessels operated on the Southern Branch of the Elizabeth River could strike fish located near the water surface. Vessels generally do not collide with adult fish because of their ability to detect and avoid the threat. Many species that occur in the live-fire training area are small and highly mobile. Strike potential for most species would be primarily associated with larvae and juveniles, which are numerous and experience high natural mortality rates. Vessel noise may disturb fish and cause physiological or behavioral impacts, particularly when vessel speed and the resulting sound levels change frequently. Most individuals would likely resume normal activities soon after the noise ceases, although some fish may be exposed to noise multiple times during a training event. Some individuals may be habituated to vessel noise. Overall, although individuals would be affected by vessel noise, the number of fish impacted would not likely result in lasting impacts on survival, growth, recruitment, or reproduction of fish populations. Small-caliber shell casings could be ingested by fish that forage on the bottom. Ingestion potential would be limited to large fish that consume an item and experience injurious effects. The number of fish impacted would likely be low compared to population numbers, and population-level effects would not be expected due to ingestion. The Navy consulted with NMFS regarding potential impacts to EFH. Via letter dated December 8, 2017, NMFS concurred with the Navy determination that the Proposed Action activities in the Southern Branch of the Elizabeth River will not substantially adversely affect EFH, or sandbar shark and summer flounder habitat area of particular concern and had no conservation recommendations (Appendix A, Agency Correspondence).

Under all alternatives, Atlantic sturgeons could be affected by vessel strikes or ingestion of shell casings in the Southern Branch of the Elizabeth River. Although available data suggest the likelihood of occurrence is low, there is potential for juvenile, subadult, and adult Atlantic sturgeons to occur in the blank-fire training area. Individuals located near the surface could be struck by moving vessels. Individuals could also ingest small-caliber shell casings that sink to the bottom. An encounter with a casing would not necessarily lead to ingestion, and ingestion would not necessarily cause injury or mortality. However, ingested casings may potentially cause cuts or obstruction in the mouth or digestive system. Overall, the number of individuals negatively affected would presumably be low compared to population levels. Based on available information, vessel strikes and ingestion may affect, but are not likely to adversely affect, Atlantic sturgeons. Consultation with NMFS is complete. NMFS concurrence

with the Navy determination is contained in Appendix A, Agency Correspondence. Shortnose sturgeons are considered extralimital in the Southern Branch of the Elizabeth River and are highly unlikely to be affected by training activities.

ESA determinations are included in Table ES-1.

Cultural Resources. For each training location, the area of potential effects (APE) for direct impacts (effects) is defined as the boundary of the training area where the training activities are/would be conducted; the APE for indirect impacts (effects) is the boundary of the installation, park, or waterway.

Under the No Action Alternative, analysis of potential impacts to cultural resources by existing training activities with a potential ground disturbance component resulted in identification of no significant impacts to National Register of Historic Places (NRHP)-listed or -eligible architectural or archaeological resources at any of the training installations. However, training activities with a potential ground disturbance component will also continue to be conducted in areas identified by the Navy as having the potential to contain undiscovered intact archaeological resources. The subsurface disturbance potential of these existing training activities will not exceed pre-military plow zone depth (i.e., the top layer of soil presumed to have been previously disturbed) in any areas that have not been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy would manage these resources in accordance with the National Historic Preservation Act (NHPA) and other federal and state laws, Navy, and DoD regulations and instructions, and DoD American Indian and Alaska Native Policy. Therefore, training activities with a potential ground disturbance component are not anticipated to have any adverse effect on cultural resources.

Analysis of potential impacts to cultural resources by existing training activities with a potential noise-induced impact also resulted in identification of no significant impacts to NRHP-listed or -eligible architectural or archaeological resources at any of the small unit inland training installations. Significant resources include the Camp Pendleton Historic District, Fort Story Historic District, the St. Juliens Creek Annex Historic District, and the Colonial Parkway (a contributing resource to the Colonial National Historic Park). No direct adverse impacts on NRHP-listed or -eligible architectural or archaeological resources are expected to result from the noise and vibration generated by any of the training activities (equipment use, vehicle movement, vessel movement, explosives on land, weapons firing – non-lethal training ammunition, and weapons firing – blank-fire). With the extensive history of military activities, and earlier industrial activities at all of the training installations, noise associated with military activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for NRHP listing. While noise from the existing training activities may be audibly noticeable, the resulting discernible effect has not been, and would not be, so great as to impair the integrity of any of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Therefore, no adverse effect on any historic properties, direct and indirect, are expected to result from the noise and vibration generated by existing training activities. Thus, there would be no significant impact on any significant cultural resources with implementation of the No Action Alternative.

In accordance with NHPA Section 106, the Navy has determined there would be no adverse effects to historic properties by USFF training at all of the small unit inland training installations with implementation of the No Action Alternative.

Under Alternative 1, Navy training at JEB Little Creek, JEB Fort Story, and Dam Neck Annex and Camp Pendleton, with few exceptions, would increase in tempo over the training activities that are already

conducted at the installations. Given the nature of the impact stressors for cultural resources and their proximity to known NRHP-listed or –eligible cultural resources or sensitive areas, the incremental increases in training activities would not introduce any significant impacts to the cultural resources in the respective APE. Therefore, there would be no significant impact on cultural resources with implementation of Alternative 1.

In accordance with NHPA Section 106, the Navy has determined that there would be no adverse effects to historic properties by USFF training with implementation of Alternative 1.

Similar to Alternative 1, the marginal increases in training-related impact stressors for cultural resources under Alternative 2 would not result in any impacts to the cultural resources in the APE. Therefore, there would be no significant impact on cultural resources with implementation of Alternative 2. In accordance with NHPA Section 106, the Navy has determined that there would be no adverse effects to historic properties with implementation of Alternative 2.

Ambient Noise. Under all alternatives, noise effects would be produced by platform movement, equipment use, and munitions/ordnance. Proposed noise-generating training activities would take place in the Hampton Roads region, which has hosted a large number of military units for centuries. Some level of military training noise has been a part of the existing sound environment in the region of influence for decades.

Use of equipment such as generators under the No Action and action alternatives results in elevated noise levels near the equipment, but, at distances of more than about 600 feet, noise levels would not interrupt normal speech communication. In accordance with Department of Defense Design Criteria Standard Noise Limits published at Military Standard (MIL-STD)-1474E, military equipment is designed to minimize noise levels to the extent practicable through use of elements such as mufflers. Generators and other equipment would be used in the context of an active military installation where activities (e.g., jet aircraft) generate noise on a regular basis as part of the baseline sound environment. Neither the continued use of equipment at St. Juliens Creek Annex, NWS Yorktown, and Cheatham Annex under the No Action Alternative, nor the additional use of equipment at Naval Auxiliary Landing Field (NALF) Fentress under Alternative 2 would result in significant noise impacts.

Explosives training at JEB Fort Story EOD Range 1 and the NWS Yorktown EOD range under the No Action Alternative generates noise levels that are associated with a moderate risk of complaints (i.e., between 115 and 130 decibels, unweighted peak noise level [dBP]) at the closest noise-sensitive locations. Under Alternative 1, two explosives training events per year would be conducted at the JEB Little Creek EOD pit resulting in noise levels between 115 and 130 dBP at the closest residences. At the JEB Fort Story EOD Range 1, detonations would become more frequent under Alternatives 1 and 2, but charges would be of equal or smaller size to those used under the No Action Alternative. Detonations conducted at JEB Fort Story Building 900 under Alternative 1 would result in noise levels between 115 and 130 dBP at a nearby campground. Under all alternative and at all locations, noise levels above 140 dBP, which have the potential to be harmful to hearing, would remain within installation boundaries and portions of the Chesapeake Bay that would be confirmed to be clear of non-participants. Although detonations could be disturbing particularly when they occur at night, individual detonation event peak noise levels at EOD Range 1 would not exceed those generated under the No Action Alternative, and detonations conducted at Building 900 would be relatively infrequent (76 per year). No significant noise impacts would occur under the No Action Alternative, Alternative 1, or Alternative 2.

LCAC amphibious craft operations at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton under the No Action Alternative result in temporary elevated noise levels at noise-sensitive locations that could be disturbing, but events are spatially distributed within training areas such that most LCAC amphibious craft training is conducted at locations in the training area that are much further away, generating lower noise levels. A slight increase in the number of LCAC amphibious craft training events per year at JEB Fort Story would occur under Alternative 1, but the noise level of individual events would not change and noise impacts would not be significant.

Tactical and non-tactical (non-amphibious) vehicle operations generate noise levels similar to civilian vehicles of comparable size and horsepower. Civilian traffic noise is a component of the noise environment under baseline conditions at all study area locations and continuation of vehicle operations would not result in changes to the existing noise environment or result in significant noise impacts.

Blank weapons are only fired when people are equipped with hearing protection who would otherwise be exposed to peak noise levels that could be harmful to hearing (i.e., 140 dBP). Under the No Action Alternative, blank weapons fire at St. Juliens Creek Annex (Building 277), Cheatham Annex (Training Area F), and the Southern Branch of the Elizabeth River (blank-fire area) could generate noise levels at residences exceeding 104 dBP. These noise levels have a high likelihood of being disturbing, particularly when they occur late at night. Blank-fire at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton, St. Juliens Creek Annex, NWS Yorktown, Cheatham Annex, and the Southern Branch of the Elizabeth River results in noise levels at residences of greater than 87 dBP, which are associated with a lesser likelihood of disturbance. At Dam Neck Annex and Camp Pendleton, the number of blank rounds fired annually would increase under Alternative 1, but no new or additional off-installation locations would be exposed to noise levels greater than 87 dBP. At JEB Fort Story and NALF Fentress, the number of blank rounds would increase under Alternative 2, and residences currently exposed at below 87 dBP would be exposed to between 87 and 104 dBP. In the context of ongoing noise events, blank-fire under the No Action and action alternatives would not result in significant noise impacts. Use of practice grenades at NWS Yorktown under the No Action Alternative, Alternative 1, and Alternative 2 could affect a short segment of the Colonial Parkway at peak noise levels exceeding 130 dBP but not 140 dBP. The potentially affected segments are used primarily by people who are in moving cars and, therefore, only exposed to the noise for a few seconds as they pass the area.

Non-lethal training ammunition would not result in significant noise impacts. Shotgun slug noise at JEB Fort Story could exceed 104 but not 140 dBP at residences, and when combined with other blank-fire noise at this same level, adjacent residences may experience noise levels greater than 104 dBP more frequently over several days. Firing of paintball rounds is quiet compared to blank rounds, would be fired only in locations where blank rounds would also be fired, and would not result in noise impacts off-station.

Under all alternatives, underwater noise in the Southern Branch of the Elizabeth River is generated by small vessel movement. Vessel movements involve straight-line transits and training maneuvers. Small boats produce low levels of noise at higher frequencies (up to several kilohertz). Underwater noise in this location is chronic and long-term due to the level of human activity. There are no anticipated impacts to the human environment due to underwater noise; impacts to aquatic biological resources are discussed in the Biological Resources section.

Public Health and Safety. Under all alternatives, public interaction from vessel movement is unlikely and public interaction from weapons firing – blank-fire does not occur. Blank-fire training either occurs

within Navy installation boundaries or from Navy vessels only if non-participants are greater than 200 feet from the vessels. Vessel movement during training events is conducted by trained Navy personnel, practicing safe navigation. As a result, there are no significant impacts on public health and safety under the No Action Alternative, Alternative 1, or Alternative 2.

Hazardous Materials and Waste. Under all alternatives, some of the proposed training activities would require the use of hazardous materials, and would generate hazardous constituents. These materials/ constituents would be managed according to established procedures. Under the Resource Conservation and Recovery Act, the Military Munitions Rule identifies when conventional and chemical military munitions are considered solid waste. Military munitions are not considered solid waste based on two conditions stated in 40 CFR section 266.202(a)(1)(i-iii). Specifically, munitions are not considered hazardous waste when they are (1) used for their intended purpose, including training of military personnel and explosive emergency response specialists, research and development activities, and recovery, collection, and destruction during range clearance events and (2) unused and being repaired, reused, recycled, reclaimed, disassembled, reconfigured, or subjected to other material recovery activities. These two conditions cover the uses of munitions included in the Proposed Action; therefore, the Resource Conservation and Recovery Act does not apply with regard to residues from munitions use. No new regulatory thresholds would be exceeded and no new hazardous materials reporting would be required. Proposed activities would not disturb Environmental Restoration Program sites or interfere with existing land use controls (where applicable) on these sites. Consequently, there would be no impacts from hazardous materials, hazardous constituents, or Environmental Restoration Program sites under the No Action Alternative, Alternative 1, or Alternative 2.

Socioeconomics. Under all alternatives, Navy vessel traffic is consistent with commercial and recreational vessel traffic within the Southern Branch of the Elizabeth River.

In addition, the Navy adheres to standard operating procedures during training activities involving weapons firing – blank-fire and vessel movement, which reduce the potential for interaction between the public and the Navy. Therefore, noise and public interaction associated with vessel movement and blank weapons firing from USFF training along the Southern Branch of the Elizabeth River does not impact commercial and recreational traffic and fishing in the region.

Noise from beach landings, equipment use, explosives on land, vehicle movement, vessel movement, weapons firing – blank-fire and weapons firing – non-lethal training ammunition would primarily occur within Navy installation boundaries and, therefore, is not anticipated to be disruptive to recreational users in the surrounding area. However, vehicle movement, vessel movement, weapons firing – blank-fire and weapons firing – non-lethal training ammunition occur on beach/dune training areas or in a water training area where recreational users of the adjacent waterways may hear noise associated with these training events. In general, the number of training events spread across the year in the region is small. In addition, recreational boaters are likely present along the shoreline of beach/dune training areas for a brief period of time and are exposed to existing vessel traffic noise as part of the ambient noise environment; therefore, under the No Action Alternative, Alternative 1, or Alternative 2, there would be no significant impact on recreational activities.

ES.6 Public Involvement

For this EA, the Navy will involve the public and federal and state agencies as required by NEPA and other planning and environmental review procedures required by state and federal law. USFF advertised notice of availability of the Draft EA in *The Virginian-Pilot* and has made the Draft EA available for review and comment by the public and interested groups via a website and at 10 local libraries. Public

comments received by USFF will be considered before making a findings determination. All required federal, state, and local natural resource agency coordination, consultation, and permit applications were undertaken by the Navy. The correspondence with these entities is presented in Appendix A (Agency Correspondence). A Coastal Consistency Determination is included in Appendix B. The Navy delivered the Coastal Consistency Determination for Alternative 2 to the Virginia Department of Environmental Quality via letter dated August 17, 2017, and invited concurrence from the Commonwealth of Virginia. On October 25, 2017, the Virginia Department of Environmental Quality concurred with the Navy's determination that the Proposed Action is consistent to the maximum extent practicable with the Coastal Zone Management Program, provided all applicable permits and approvals are obtained.

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Environmental Assessment

for

Atlantic Fleet Inland Training in the Virginia Capes Range Complex

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Abbreviations and Acronyms

AFTT	Atlantic Fleet Training and Testing
APE	area of potential effects
BMP	best management practice
°C	Celsius
CAA	Clean Air Act
CFR	Code of Federal Regulations
CHRIMP	Consolidated Hazardous Material Reutilization and Inventory Management Program
CWA	Clean Water Act
dB	decibels
dB re 1 µPa	decibels referenced to 1 micropascal
dBA	A-weighted decibels
dBC	C-weighted decibels (impulsive noise)
dBP	decibels, unweighted peak noise level
DEQ	Department of Environmental Quality
DoD	Department of Defense
EA	Environmental Assessment
EFH	essential fish habitat
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive Ordnance Disposal
ERP	Environmental Restoration Program
ESA	Endangered Species Act
°F	degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FR	*Federal Register*
GHG	greenhouse gas
HAPC	Habitat Area of Particular Concern
Hz	hertz
INRMP	Integrated Natural Resources Management Plan
IPaC	Information for Planning and Conservation
JEB	Joint Expeditionary Base
kHz	kilohertz
LCAC	Landing Craft, Air Cushion
Lmax	maximum sound level
µPa	micropascals
MBTA	Migratory Bird Treaty Act
MIL-STD	Military Standard
mm	millimeters
MMPA	Marine Mammal Protection Act
MS4	Municipal Separate Storm Sewer Systems
° N	degrees North
NAAQS	National Ambient Air Quality Standards
NALF	Naval Auxiliary Landing Field
NAS	Naval Air Station
Navy	Department of the Navy
NEPA	National Environmental Policy Act
NEW	net explosive weight
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWS	Naval Weapons Station
pH	potential of hydrogen (acidity)
ppb	parts per billion
PTEA	primary training event activity
SHPO	State Historic Preservation Officer
SOP	standard operating procedure
SWPPP	Storm Water Pollution Prevention Plan
TA	Training Area
TMDL	total maximum daily load
TRI	Toxic Release Inventory
U.S.	United States
U.S.C.	United States Code
ULT	unit level training
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USFF	United States Fleet Forces
USFWS	U.S. Fish and Wildlife Service
VACAPES	Virginia Capes
VADCR	Virginia Department of Conservation and Recreation
VDGIF	Virginia Department of Game and Inland Fisheries
VE	coastal flood zone with velocity hazard
VPDES	Virginia Pollutant Discharge Elimination System

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1 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

The United States (U.S.) Department of the Navy (Navy) has prepared this Environmental Assessment (EA) to analyze the potential impacts of the Proposed Action to conduct U.S. Fleet Forces (USFF) expeditionary training events in the inland areas of the Virginia Capes (VACAPES) Range Complex in southeastern Virginia (hereinafter referred to as "VACAPES inland training"). This EA analyzes small unit training that predominantly occurs on federal installations. These events are not necessarily tied or related to one another, but instead represent a collection of individual small-scale training events that occur in the Hampton Roads and middle Atlantic area. Although generally unrelated, they are analyzed collectively in one document for administrative efficiency. The majority of activities have minimal to no impact off federal property. Those impacts that do extend off federal property are insignificant. A large percentage of the activities analyzed are similar in nature to civilian activities, such as small boat operations, individual movement of personnel on terrain, and operation of vehicles on established roadways or trails. Nearly all the activities represent training that has been ongoing at consistent levels for many years, and often decades, without any appreciable impact on the environment or civilian communities.

The study area encompasses 10 primary training locations in southeastern Virginia, including Navy installations as well as other Department of Defense (DoD) and non-DoD properties. USFF training in the study area is conducted by various USFF subordinate commands. Within the study area, the commands conduct unit level training (ULT) involving an individual amphibious craft or vehicle and coordinate ULT exercises involving two or more units as well as beach training associated with Expeditionary Strike Groups. Additional background on Navy training is provided in the subsections below.

This EA was prepared in accordance with the National Environmental Policy Act (NEPA) (Title 42 United States Code [U.S.C.] sections 4321–4370h); the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations parts 1500–1508); and Chief of Naval Operations Environmental Readiness Program Manual 5090.1 series.

1.1.1 Purpose and Need

The purpose for the Proposed Action is to maintain Navy readiness by continuing to execute current types of inland (land-based and inland waterway) training at current levels and in current locations; accommodate changes in annual frequency of training; support future training requirements; achieve and sustain readiness of naval forces; and support the acquisition and implementation of advanced military technology into the fleet. In 10 U.S.C. section 5062, Congress has provided that "The Navy shall be organized, trained, and equipped primarily for prompt and sustained combat incident to operations at sea." The need for the Proposed Action is to prepare combat-capable forces that are ready to deploy worldwide for prompt and sustained combat incident to operations at sea consistent with 10 U.S.C. section 5062. The Navy meets that mandate, in part, by conducting inland training and by ensuring that naval forces have access to the required training environments where the Navy can develop and maintain skills for military missions. In addition, the Navy initiated the Optimized Fleet Response Plan in December 2014.

The Optimized Fleet Response Plan reinforces the Chief of Naval Operations tenets of "Warfighting First – Operate Forward – Be Ready" by better aligning manning distribution with operational requirements;

optimizing maintenance and modernization plans; improving the overall quality of work and life for personnel; and ensuring forces deploy with the right capabilities, trained to a single high-end standard and equipped to meet strategic readiness objectives. The availability of trained, ready Navy forces is achieved in part by conducting training within the VACAPES inland training study area (Section 1.2, Study Area Overview).

Naval forces must be ready for a variety of military operations—from large-scale conflict to maritime security and humanitarian assistance/disaster relief—to deal with the dynamic, social, political, economic, and environmental issues that occur in today's world. The Navy supports these military operations through its continuous presence on the world's oceans. Personnel must prepare for combat and real-world situations by training with the equipment and systems that they will use, and they must train with this equipment under realistic conditions and in realistic settings, so they are intimately familiar with the equipment, their own personal limitations, and the tactics, techniques, and procedures that they will use as individuals or fighting units.

The Navy uses a building-block approach where initial basic training complements later phases of more complex training, with each phase building upon the skills obtained in the previous phase. The training events that occur in each of these phases are designed to prepare sailors for the multitude of contingencies they may face while forward deployed. To ensure sailors can perform the variety of missions they could face, the training building blocks are designed to maximize their effectiveness at meeting the mission safely and professionally. Military readiness training must be as realistic as possible to provide the experiences that are essential to success and survival. While simulators and synthetic training are critical elements of training—to provide early skill repetition and to enhance teamwork—there is no substitute for live training in a realistic environment.

1.1.2 USFF Participants

The two USFF commands that conduct training analyzed in this EA are Navy Expeditionary Combat Command and Naval Surface Force, Atlantic. Within the study area, these commanders conduct basic, coordinated unit level field training exercises, as well as integrated unit training.

Command names and/or chain of command relationships change and, therefore, the description of alternatives in Chapter 2 (Description of Proposed Action and Alternatives), focuses on the activities associated with each training event, rather than the particular unit that conducts them.

1.1.2.1 Navy Expeditionary Combat Command

The mission of Navy Expeditionary Combat Command is to organize, man, train, equip, and sustain Navy Expeditionary Combat Forces to execute combat, combat support, and combat service support missions. These missions cross the full spectrum of naval, joint, and combined operations, which enable access from the sea and freedom of action throughout the sea-to-shore and inland operating environments. Navy Expeditionary Combat Command serves as the single functional command for the Navy's expeditionary forces and manages the readiness, resources, manning, training, and equipping of those forces. The subordinate units compose a core expeditionary force that performs a variety of missions such as:

- antiterrorism, ashore and at sea
- force protection
- theater security cooperation and engagement

- humanitarian assistance and disaster relief
- supplementing other governmental agencies for homeland security, upon official tasking

The Navy Expeditionary Combat Command subordinate units with training events in the study area analyzed in this EA include: Explosive Ordnance Disposal (EOD) Group Two, Coastal Riverine Group Two, Navy Expeditionary Intelligence Command, and Naval Expeditionary Logistics Support Group.

- EOD Group Two provides deployable command and control for expeditionary/combat EOD and salvage operations as joint, naval or combined task force commanders. EOD Group Two comprises approximately 65 platoons (eight personnel per platoon) that conduct training within the study area.
- Coastal Riverine Group Two operates in harbors, rivers, bays, across the littorals, and ashore with the primary mission to conduct maritime security operations across all phases of military operations.
- Navy Expeditionary Intelligence Command provides tactical indications and warning and force protection intelligence, enabling Navy and joint commanders to conduct missions across the full spectrum of expeditionary operations.
- Naval Expeditionary Logistics Support Group provides expeditionary logistics capabilities for the Navy, primarily within the littorals, and conducts surface and air cargo handling missions, cargo terminal and warehouse operations, fuels distribution, and expeditionary communications.

1.1.2.2 Commander, Naval Surface Force, Atlantic

The mission of Commander, Naval Surface Force, Atlantic is to provide combat-ready ships and other vessels to the Fleets, and to ensure that those ships and vessels are supplied the leadership, manpower, equipment, maintenance, training, and material needed to quickly achieve decisive victory at and from the sea. Commander, Naval Surface Force, Atlantic oversees all of the ships in Atlantic Fleet training area, with exception of aircraft carriers (overseen by Commander, Naval Air Force, Atlantic), submarines (Commander, Submarine Force, Atlantic), submarine support ships, and Military Sealift Command vessels. Commander, Naval Surface Force, Atlantic also includes special mission and fleet support units. The subordinate units with training events that will be analyzed in the study area include Assault Craft Unit Two; Assault Craft Unit Four; and Beachmaster Unit Two.

- Assault Craft Unit Two provides combat-ready landing craft to operational commanders in support of amphibious and Maritime Pre-positioning Force operations and training.
- Assault Craft Unit Four operates 39 of the Navy's Landing Craft, Air Cushion (LCAC) platforms. The LCAC's main mission is to transport equipment and personnel from amphibious landing ships to the beach.
- Beachmaster Unit Two controls traffic in the surf zone and provides salvage and communications support in conjunction with expeditionary forces. Beachmaster Unit Two forces also facilitate the landing and movement over the beach of troops, equipment, and supplies, as well as the evacuation of casualties, prisoners of war, and non-combatants.

1.2 Study Area Overview

1.2.1 Hampton Roads

The study area is located in southeastern Virginia in a region known as Hampton Roads. Considering all Hampton Roads area localities, 9 percent of the land area is owned by the federal government.

The study area comprises the inland areas of the VACAPES Range Complex in the Hampton Roads fleet concentration area and includes Navy installations and non-Navy–owned training areas that support USFF training requirements. The EA study area includes eight Navy-owned training areas as listed below:

- Joint Expeditionary Base (JEB) Little Creek
- JEB Fort Story
- Dam Neck Annex (and neighboring Camp Pendleton State Military Reservation)
- Naval Auxiliary Landing Field (NALF) Fentress
- Northwest Annex
- St. Juliens Creek Annex
- Naval Weapons Station (NWS) Yorktown
- Cheatham Annex

Inland training events occur at all of the Navy installations listed above. The non-Navy–owned training areas that support USFF training requirements in the study area are listed below:

- First Landing State Park
- Southern Branch of the Elizabeth River

The subsections that follow provide a description of the Navy installations and non-Navy–owned training locations where Navy inland training occurs in the study area.

1.2.2 Joint Expeditionary Base Little Creek-Fort Story

On October 1, 2009, the JEB Little Creek-Fort Story was established as the first joint base in Hampton Roads. JEB Little Creek-Fort Story consists of two non-contiguous sites: JEB East (Fort Story) and West (Little Creek), approximately 8 miles apart.

1.2.2.1 Joint Expeditionary Base Little Creek

JEB Little Creek is located along the southern shoreline of the Chesapeake Bay in the City of Virginia Beach, Virginia (Figure 1-1). The site covers approximately 2,380 acres and is bordered by the Chesapeake Bay to the north, Shore Drive to the south, Lake Bradford and Chubb Lake to the east, and Virginia Beach's boundary with the City of Norfolk to the west.

JEB Little Creek is the major operating station for the amphibious forces of the Navy and is the largest joint expeditionary base in the world. It provides on-base logistics, facilities, and other support services as required to local commands, organizations, other United States and allied units, homeported ships, and commands of the operating forces.

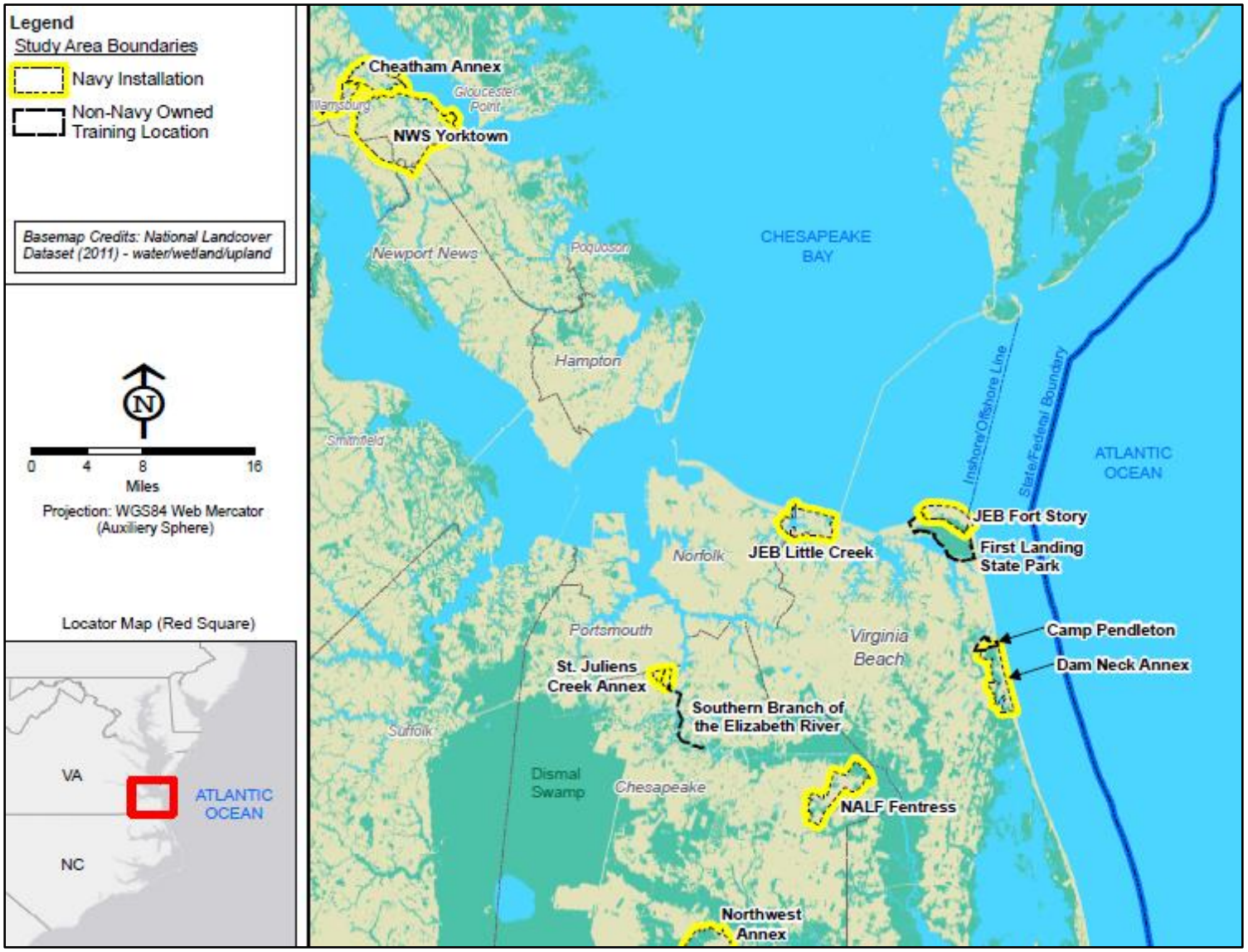


Figure 1-1. VACAPES Small Unit Inland Training Study Area

For the EA analysis, training areas at JEB Little Creek include dunes, beaches, and mudflats. USFF subordinate units that train at JEB Little Creek are the Assault Craft Unit Two, Assault Craft Unit Four, Beachmaster Unit Two, Coastal Riverine Group Two, Explosives Ordnance Disposal Group Two, and Navy Expeditionary Intelligence Command.

1.2.2.2 Joint Expeditionary Base Fort Story

JEB Fort Story is located on Cape Henry in the City of Virginia Beach, Virginia, at the mouth of the Chesapeake Bay (Figure 1-1). The site covers approximately 1,458 acres and is bounded by the Atlantic Ocean to the northeast, the Chesapeake Bay to the northwest, and First Landing State Park and the City of Virginia Beach on its remaining sides.

The mission of JEB Fort Story is to provide joint service, Navy and Army logistical training, and amphibious operations as well as explosive ordnance demolitions and special operations training. EOD Training and Evaluation Unit Two is the only USFF subordinate unit stationed at JEB Fort Story. For the EA analysis, training areas at JEB Fort Story are an EOD demolition range and multiple, designated training areas, which include beaches, a constructed military operations in urban terrain village, a wilderness area, and a small arms test and evaluation site. USFF subordinate units that train at JEB Fort Story are the Assault Craft Unit Two, Assault Craft Unit Four, Beachmaster Unit Two, Coastal Riverine Group Two, Explosives Ordnance Disposal Group Two, Naval Beach Group Two, and Navy Expeditionary Intelligence Command.

1.2.3 Dam Neck Annex and Surrounding Area (Camp Pendleton)

1.2.3.1 Dam Neck Annex

Dam Neck Annex is a satellite installation of Naval Air Station (NAS) Oceana. It is located on the Atlantic coast in the City of Virginia Beach, south of Camp Pendleton and approximately 2 miles east of NAS Oceana (Figure 1-1). Dam Neck Annex includes 3.2 miles of beach front encompassing approximately 1,490 acres. The mission of Dam Neck Annex is to provide the facilities and resources needed to support the land, sea, and air training and operations of tenant commands.

For the EA analysis, training areas at Dam Neck Annex are beaches and military operations on an urban terrain village. USFF subordinate units that train at Dam Neck Annex are the Assault Craft Unit Two, Assault Craft Unit Four, Beachmaster Unit Two, Explosives Ordnance Disposal Group Two, and Navy Expeditionary Intelligence Command.

1.2.3.2 Camp Pendleton

Camp Pendleton, a state-owned facility, occupies approximately 330 acres and is located on the Atlantic coast in the City of Virginia Beach adjacent to the northern border of Dam Neck Annex (Figure 1-1). Officially known as a state military reservation, Camp Pendleton serves primarily to train personnel of the Virginia National Guard. No USFF subordinate units are stationed at Camp Pendleton; components of the Virginia National Guard are the main tenants at Camp Pendleton. For the EA analysis, training areas at Camp Pendleton are beaches and a shipboard trainer. USFF subordinate units that train at Camp Pendleton are the Assault Craft Unit Two, Assault Craft Unit Four, Beachmaster Unit Two, Explosives Ordnance Disposal Group Two, and Navy Expeditionary Intelligence Command. Camp Pendleton is included in the Dam Neck Annex section because the majority of USFF training that occurs along the beach area overlaps both installation boundaries.

1.2.4 Naval Auxiliary Landing Field Fentress

NALF Fentress is under the command of NAS Oceana and is located within the City of Chesapeake, Virginia, approximately 9 miles southwest of NAS Oceana (Figure 1-1). The total area of NALF Fentress is 2,578 acres, with an additional 9,921 acres composed of restrictive easements.

The installation is used by squadrons stationed at NAS Oceana and Naval Station Norfolk for fixed-wing aircraft operations such as field carrier landing practice, and it is also used for various helicopter tactics and maneuver training by Commander, Helicopter Sea Combat Wing, Atlantic Fleet squadrons stationed at Naval Station Norfolk. Currently, NALF Fentress does not host any tenant.

For the EA analysis, training areas at NALF Fentress are bunkers, landing zones, and abandoned runways. USFF subordinate units that train at NALF Fentress are the Coastal Riverine Group Two and Explosives Ordnance Disposal Group Two.

1.2.5 Northwest Annex

Northwest Annex is part of the Naval Support Activity Hampton Roads and is located in southern Chesapeake, Virginia, on the border of North Carolina, approximately 35 miles south of Naval Station Norfolk (Figure 1-1). Northwest Annex consists of 3,600 acres of farm, wood, and swamplands, of which 2,300 acres are forested. The mission of Northwest Annex is to coordinate and provide multi-service shore activity support for tenant commands.

Navy Information Operations Command Suitland, Maryland (reports to United States Fleet Cyber Command) is the only USFF subordinate unit stationed at Northwest Annex. For the EA analysis, the training area at Northwest Annex is the Munro Village, used for simulation and tactical training. USFF subordinate units that train at Northwest Annex are the Coastal Riverine Group Two and Explosives Ordnance Disposal Group Two.

1.2.6 St. Juliens Creek Annex

St. Juliens Creek Annex is a component of Norfolk Naval Shipyard located approximately 1.5 miles south of Norfolk Naval Shipyard in Chesapeake, Virginia, and occupies approximately 490 acres (Figure 1-1). The St. Juliens Creek Annex mission is to provide support for nearby Norfolk Naval Shipyard and other local naval activities (Navy, 2017a).

No USFF subordinate units are stationed at St. Juliens Creek Annex. For the EA analysis, training areas at St. Juliens Creek Annex are the Building 277 fenced compound and the area surrounding the communications tower. USFF subordinate units that train at St. Juliens Creek Annex are the Coastal Riverine Group Two and Explosives Ordnance Disposal Group Two.

1.2.7 Naval Weapons Station Yorktown

The NWS Yorktown Complex occupies 13,557 acres and encompasses three formerly separate activities: NWS Yorktown, Cheatham Annex, and Yorktown Fuel Terminal. NWS Yorktown is located in Yorktown within York and James City Counties (Figure 1-1). NWS Yorktown also shares almost 14 miles of the York River shoreline with the United States National Park Service (about half of York County's York River shoreline and wetlands) (Navy, 2010a). NWS Yorktown is the Navy's major east coast ordnance and ammunition storage site and distribution center. Ordnance is stored in more than 200 munitions storage magazines at NWS Yorktown.

The mission of NWS Yorktown is to provide ordnance logistics, technical, and related services to the Navy. Navy Expeditionary Combat Command's EOD Mobile Unit 2 Detachment Yorktown is the only USFF subordinate unit stationed at NWS Yorktown. For the EA analysis, training areas at NWS Yorktown are an EOD demolition range, home station training lanes for improvised explosive devices training, and a designated training area. USFF subordinate units that train at NWS Yorktown are the Coastal Riverine Group Two, Explosives Ordnance Disposal Group Two, and Navy Expeditionary Intelligence Command.

1.2.8 Cheatham Annex

Cheatham Annex is a component of the NWS Yorktown Complex and occupies 2,298 acres north of NWS Yorktown within York County (Figure 1-1). Cheatham Annex comprises two parcels separated by Colonial Parkway: the main base and the Jones Millpond tract (Navy, 2010a). Cheatham Annex provides complete retail supply support services, including custody asset storage for large, bulky, and unique Navy material.

For the EA analysis, training areas at Cheatham Annex that are included in the EA analysis are one pier, multiple training areas, and Jones Pond. USFF subordinate units that train at Cheatham Annex are the Coastal Riverine Group Two, Explosives Ordnance Disposal Group Two, Naval Expeditionary Logistics Support Group, and Navy Expeditionary Intelligence Command.

1.2.9 First Landing State Park

First Landing State Park is located on Cape Henry in North Virginia Beach, Virginia, and is bordered to the north by JEB Fort Story (Figure 1-1). First Landing State Park encompasses 2,888 acres, including 19 miles of trails and 1.25 miles of beach. There is a single boat launch that offers direct access to Linkhorn and Broad Bays. Broad Bay and the landlocked Linkhorn Bay are connected by a constricted waterway called the Narrows. The entire park is a National Natural Landmark and National Historic Landmark. For the EA analysis, the training area at the First Landing State Park is the park trails. The USFF subordinate unit that trains at First Landing State Park is the Coastal Riverine Group Two.

1.2.10 Southern Branch of the Elizabeth River

The Elizabeth River is a tidal estuary of the Chesapeake Bay, located along the southern side of the mouth of the James River. The estuary is divided into three main branches referred to as the eastern, southern, and western branches of the Elizabeth River. The Southern Branch of the Elizabeth River is part of the greater Atlantic Intracoastal Waterway, which stretches from Norfolk, Virginia, to southern Florida. Only a portion of the Southern Branch of the Elizabeth River is included in the analysis of this EA (Figure 1-1). The USFF subordinate unit that trains on the Southern Branch of the Elizabeth River is the Coastal Riverine Group Two.

1.3 Scope of Inland Training

In this EA, training events are exercises intended to introduce, build, and maintain skills necessary for meeting the expeditionary combat mission safely and professionally. USFF developed and applied the following screening criteria to identify training events that will be analyzed in this EA:

- **The activity is a USFF training event.** Training events conducted by Navy commands other than USFF and its subordinate units or other DoD /federal agencies are not included in the Proposed Action but will be considered in Chapter 5 (Cumulative Impacts), as appropriate.

- **The training event occurs inside the study area.** Study area training events were identified and validated by USFF and the relevant commanders (defined in Section 1.1.2, USFF Participants). Inland (land-based and inland waterway) training events occurring in other fleet concentration areas (e.g., Northeast Atlantic Coast, Southeast Atlantic Coast, or Gulf Coast) have been excluded from the Proposed Action in this EA because these activities are not interconnected or interdependent and are so geographically remote from the study area that their impacts are not reasonably expected to be relevant to this EA.
- **The training event has not been analyzed in existing or pending NEPA documents.** The Proposed Action does not include USFF training events in the vicinity of the study area that have already been analyzed in existing or pending NEPA documents (Section 1.6, Related Environmental Planning Documents in the Vicinity of the Study Area); however, such training events will be included in Chapter 5 (Cumulative Impacts), as appropriate. USFF has reviewed the existing and pending NEPA documents identified in Section 1.6 and determined that the existing NEPA analysis continues to be valid, and that the activities analyzed in those NEPA documents are independent activities, not connected to the activities that are analyzed in this EA.

  Some USFF training events include land- and water-based training activities. In an effort to capture the combined impacts to mobile marine species, the water-based training activities that occur within the Atlantic Fleet Training and Testing (AFTT) Environmental Impact Statement (EIS)/Overseas EIS study area, which analyzes all Navy at-sea training and testing along the east coast of the United States and Gulf of Mexico, will be analyzed in that document. As a result, the USFF training activities analyzed in this EA will be limited to land-based training events and certain inland water-based training events that occur outside the AFTT EIS/Overseas EIS Study Area.

1.4 Environmental Planning Process

1.4.1 The National Environmental Policy Act

NEPA requires environmental analysis for major federal actions that may affect the quality of the human environment. The Council on Environmental Quality defines major federal actions subject to NEPA evaluation to include continuing activities in addition to new projects or programs.

An EA is a concise public document that provides sufficient analysis for determining whether the potential environmental impacts of a proposed action are significant, which would require the preparation of an EIS, or not significant, in which case the agency could prepare a finding of no significant impact. Thus, if the Navy were to determine that the Proposed Action would have a significant impact on the quality of the human environment, an EIS would be prepared, leading to a Record of Decision. Both an EA and an EIS should include the following: brief discussions of the purpose and need for the proposal, the proposed action, the alternatives, the affected environment, the environmental impacts of the proposed action and alternatives, a listing of agencies and persons consulted, and a discussion of the cumulative impacts associated with the alternatives.

USFF, the action proponent, will determine whether the Proposed Action will have a significant effect on the human environment. USFF's determination will be made available to the public.

1.4.2 Other Environmental Requirements Considered

In addition to NEPA, other federal environmental statutes and executive orders may be applicable to the Proposed Action, including those identified in Table 1-1.

Table 1-1. Major Federal Environmental Statutes and Executive Orders

Environmental Resources	*Statute or Executive Order*
Air quality	Clean Air Act (42 U.S.C. sections 7401–7671q)
Hydrology and Water Quality	Clean Water Act of 1977 (33 U.S.C. sections 1251–1376)
Coastal zone	Coastal Zone Management Act of 1972 (16 U.S.C. sections 1451–1464)
Biological resources	Marine Mammal Protection Act of 1972 (16 U.S.C. sections 1361–1407); Migratory Bird Treaty Act of 1918 (16 U.S.C. sections 703–712); Sikes Act of 1960 (16 U.S.C. sections 670a–670o); Endangered Species Act of 1973 (16 U.S.C. sections 1531–1544); Magnuson-Stevens Fishery Conservation and Management Act of 1996 (16 U.S.C. sections 1801–1882); Bald and Golden Eagle Protection Act (16 U.S.C. sections 668–668d); Responsibilities of Federal Agencies to Protect Migratory Birds (EO 13186)
Wetlands and Floodplains	Section 401 and 404 of the Clean Water Act of 1977 (33 U.S.C. sections 1251–1376); Floodplain Management-1977 (EO 11988); Protection of Wetlands-1977 (EO 11990)
Cultural resources	National Historic Preservation Act (54 U.S.C. 300101 et seq.) 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 (42 U.S.C. section 1996); Antiquities Act of 1906 (16 U.S.C. sections 431–433); American Indian Religious Freedom Act of 1979 (42 U.S.C. section 1996); Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001 et seq.); 1987 Abandoned Shipwreck Act (43 U.S.C. sections 2010–2106); Protection of Historic Properties (36 Code of Federal Regulations 800); Preserve America (EO 13287); and Archeological Resources Protection Act (16 U.S.C. section 470)
Hazardous and Toxic Substances and Waste	Resource Conservation and Recovery Act of 1976 (42 U.S.C. section 6901 et seq.); Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. section 9601 et seq.); Emergency Planning and Community Right-to-Know Act (42 U.S.C. section 11001 et seq.); Federal Compliance with Pollution Control Standards-1978 (EO 12088); Superfund Implementation (EO 12580)

Key: EO = Executive Order; U.S.C. = United States Code.

1.4.3 Public and Agency Involvement

For this EA, the Navy will involve the public and federal and state agencies as required by NEPA and other planning and environmental review procedures required by state and federal law.

1.4.3.1 Public Outreach Efforts

USFF will make the Draft EA available for review and comment by the public and interested groups. Public comments received by USFF will be considered as part of the NEPA process.

1.4.3.2 Agency Coordination and Permit Requirements

All required federal, state, and local natural resource agency coordination, consultation, and permit applications were undertaken by the Navy. The correspondence with these entities is presented in

Appendix A (Agency Correspondence). A Coastal Consistency Determination and associated agency correspondence is also included in Appendix B. The Navy delivered the Coastal Consistency Determination for Alternative 2 to the Virginia Department of Environmental Quality via letter dated August 17, 2017, and invited concurrence from the Commonwealth of Virginia. On October 25, 2017, the Virginia Department of Environmental Quality concurred with the Navy's determination that the Proposed Action is consistent to the maximum extent practicable with the Coastal Zone Management Program, provided all applicable permits and approvals are obtained.

In response to the review of the Coastal Consistency Determination, agency comments recommended that the Navy contact the City of Virginia Beach to determine if the proposed activities require local review. In addition, the Virginia Department of Environmental Quality encouraged implementation of pollution prevention principles. The Virginia Department of Conservation and Recreation's Division of Natural Heritage noted that Darlington's oak and Bluejack oak have been documented within the project site at JEB Little Creek and the agency recommends that to minimize impacts to these species, the Navy avoid soil disturbance, vegetation removal, or any herbicide use in areas known to support these natural heritage resources. The Virginia Department of Conservation and Recreation's Division of Natural Heritage also noted that the Eastern big-eared bat and the S-banded tiger beetle have been documented within the project site at JEB Fort Story and habitat for the S-banded tiger beetle may occur at Dam Neck Annex and Camp Pendleton. The division recommends restricting beach exercises to existing trails and avoiding the occurrences of S-banded tiger beetle if possible. The Virginia Department of Conservation and Recreation's Division of Natural Heritage also recommends avoiding removal of trees, especially larger, older trees that may act as maternity colonies for rare bats, and surveys for bat colonies in buildings and structures used for training prior to initiation of training exercises. The Virginia Department of Conservation and Recreation's Division of Natural Heritage noted that the Canebrake rattlesnake has been documented at NALF Fentress and the potential exists for rare bats within the project site, the Canebrake rattlesnake has been documented within the project site at Northwest Annex, and Bog twayblade has been documented within the project site at Cheatham Annex. To minimize impacts to the Bog twayblade, the Virginia Department of Conservation and Recreation's Division of Natural Heritage recommends avoiding soil disturbance, vegetation removal, or any herbicide use in areas where Bog twayblade is present.

The Virginia Department of Game and Inland Fisheries recommends that training activities adhere to the currently approved Integrated Natural Resources Management Plans and that the Navy coordinate with National Oceanic and Atmospheric Administration Fisheries and the U.S. Fish and Wildlife Service. The Virginia Department of Health Office of Drinking Water noted the presence of public drinking water sources and their proximity to training areas.

All existing Navy permits, consultations, NEPA documentation, and related documents were collected and reviewed for relevance to this Proposed Action.

1.5 Scope of Environmental Analysis

This EA evaluates the potential environmental impacts on the following resource areas:

- air quality (including climate change and greenhouse gases)
- water resources
- biological resources (habitats, vegetation and wildlife, sea turtles, invertebrates, fish, and threatened and endangered species)
- cultural resources (architectural, archeological, and Native American resources)
- ambient noise (airborne noise [vehicle, vessel, munitions/EOD, and equipment] and underwater noise [vessel and unmanned underwater vehicle])
- public health and safety (water and land safety [ranges/training areas])
- hazardous materials and waste, including munitions constituents and military expended materials
- socioeconomics (commercial and recreational transportation and fishing and other recreational activities)

This EA does not evaluate the following resource areas because the Proposed Action has no potential to affect them:

- Infrastructure and utilities typically includes electricity, potable water, wastewater, and buildings and would not be impacted because the Proposed Action does not involve changes to personnel, which could affect utility use or new construction that would require demands on the existing utility infrastructure.
- Geology/soils are typically defined in terms of drainage capacity, erodibility, composition, and topography, and while ground disturbance is anticipated in some locations as a result of the Proposed Action, no change in topography or soil compaction would occur. Disturbed soils are already impacted by existing training activities such as personnel and vehicle movement. The potential to affect drainage capacity and erodibility is included in the water resources analysis.
- Land use typically includes human modification of land for a specific purpose and whether the use is consistent with local ordinances/zoning restrictions. The Proposed Action does not include changes to land that are not currently under military use. The relevant land use of areas within noise contours will be included in the ambient noise section.

1.6 Other Environmental Planning Documents in the Study Area

The Proposed Action does not include USFF training events in the study area that have already been analyzed in existing or pending NEPA documents. Those training events are summarized below and are included in Chapter 5 (Cumulative Impacts), as appropriate.

1.6.1 *Joint Logistics Over-The-Shore Environmental Assessment*

The *Joint Logistics Over-the-Shore EA* analyzed impacts from joint training exercises that include the Navy, Marines, and Army. The exercises include the movement of cargo from ship-to-shore, the construction of temporary piers, the transfer of liquids to shore, and the establishment of tent encampments. These proposed Joint Logistics Over-the-Shore training exercises are conducted on the beaches and near-shore areas of JEB Little Creek-Fort Story. The finding of no significant impact was signed on June 8, 2015.

1.6.2 *United States Marine Corps Small Arms Range at Naval Weapons Station Yorktown Environmental Assessment*

The Proposed Action analyzed the development of an accessible, multipurpose small arms range facility a short distance from its primary user group—the Marine Corps Security Force Regiment stationed at NWS Yorktown. Construction of the facility resulted in approximately 26 acres of land disturbance (for both the pistol range and rifle range), and approximately 5 acres of land disturbance from the proposed transportation and utility system upgrades.

Range support facilities associated with the Proposed Action included an operations building for range administration and instruction, an armory for weapons storage, designated areas for weapons maintenance, a covered briefing area for on-site instruction, and a shop for target storage and assembly. The rifle range was equipped with both fixed targets and a movable-target system (i.e., running man); the pistol range included fixed target mounts. The Proposed Action also included covered firing positions for the pistol range and an additional target storage facility behind the rifle range target area. The finding of no significant impact was signed on February 11, 2015.

1.6.3 *Atlantic Fleet Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement*

The 2013 *Atlantic Fleet Training and Testing EIS*/*Overseas EIS* analyzed impacts from conducting at-sea training and testing along the east coast of the United States and Gulf of Mexico and is in the process of being updated. As part of the update, the study area has been expanded to include inland water-based training areas, such as the lower Chesapeake Bay as well as the York and James Rivers, in an effort to capture the majority of in-water impacts to mobile species that inhabit these areas. A record of decision is anticipated in autumn 2018.

1.6.4 *Environmental Assessment for Small Arms Testing and Evaluation Compound, US Army Transportation Center – Fort Story, Virginia Beach, Virginia*

The *EA for Small Arms Testing and Evaluation Compound – Fort Story, Virginia Beach* evaluated impacts from constructing and operating a small arms testing and evaluation compound for exclusive use by the Naval Special Warfare Development Group. The compound supports testing and evaluation of new weapons and breaching systems in simulated realistic urban combat environments. Operations involve reconnaissance and surveillance, forced entry, dynamic and static combat scenarios, and over-the-beach operations as well as use of training ammunition (blanks) and small explosives. The finding of no significant impact was signed on July 10, 2006.

1.7 Other Related Planning Documents

This section describes another planning document considered in preparation of this document. Typically, these documents are plans, studies, reports, and other documents used to support the analysis in this EA.

1.7.1 Virginia Capes/Northeast Range Complex Management Plan (2013)

The *Virginia Capes/Northeast Range Complex Management Plan* describes the range complexes and outlines a plan to ensure that each complex is sustainable and capable of supporting Navy readiness training for a 10-year planning horizon. Range operations, encroachment, environmental planning, and funding are also described.

1.8 Organization of Document

This EA is organized as follows:

- Chapter 1 describes the purpose and need for the Proposed Action and introduces the study area.
- Chapter 2 describes the Proposed Action, alternatives carried forward for analysis in the EA, and the alternatives considered but eliminated from detailed analysis.
- Chapter 3 describes the existing conditions of the affected environment.
- Chapter 4 addresses the potential environmental consequences associated with implementation of the Proposed Action and each alternative.
- Chapter 5 provides an analysis of cumulative impacts, which are the impacts of the Proposed Action when added to past, present, and reasonably foreseeable future actions.
- Chapter 6 describes other considerations required by NEPA, such as consistency with other regulations and the relationships between short-term use of the environment and long-term productivity.
- Chapter 7 lists the reference documents used in the preparation of this EA.
- Chapter 8 lists the preparers of this EA.
- Appendices provide technical supporting information.

2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The Proposed Action is to conduct United States (U.S.) Fleet Forces (USFF) expeditionary training events in the inland areas of the Virginia Capes (VACAPES) Range Complex in the Hampton Roads fleet concentration area located in southeastern Virginia. The Council on Environmental Quality's regulations implementing NEPA provide guidance on the consideration of alternatives to a proposed federal action and require rigorous exploration and objective evaluation of reasonable alternatives as well as alternatives that were considered but eliminated from detailed analysis. To be considered reasonable, an alternative must meet the stated purpose and need for the Proposed Action.

As noted in Section 1.3 (Scope of Inland Training), training events are exercises intended to introduce, build, and maintain skills necessary for meeting the mission safely and professionally. Each training event includes one or more elements referred to as activities in this Environmental Assessment (EA).

The consolidated, detailed list of training events analyzed in this EA is provided in Appendix C (USFF Training Included in the Proposed Action and Alternatives). The annual frequency of each training event represents the typical annual number of events for each location. These values were provided by each USFF subordinate unit as an annual representative number of each training event currently conducted or anticipated and can fluctuate based on real world events. The Navy developed a range of reasonable alternatives by considering the operational and support requirements necessary to meet the purpose and need for the Proposed Action. These considerations included access to "backyard" or local water- and land-based training areas for all types of training from individual unit level to multiple unit level; range locations that minimize impacts on equipment and personnel (e.g., transportation and increased maintenance costs) and maximize training time (closer ranges allow for more training time "on station") as well as reuse of existing infrastructure and ranges as dictated by Secretary of the Navy and Department of Defense policies; the ability to train in realistic environments; and sufficient range capacity to support future requirements and equipment and changes in operational tempos to support rapidly emerging world events. Alternatives analyzed in this EA are:

- **No Action Alternative** – The No Action Alternative is to continue the current level and intensity of inland training events within the study area (i.e., baseline/continuing training events).
- **Alternative 1** – Alternative 1 includes the events analyzed under the No Action Alternative as well as additional Explosive Ordnance Disposal (EOD), maritime prepositioning, expeditionary and mine countermeasure training required to meet emerging training requirements. The events analyzed under Alternative 1 would occur at the same locations as the events in the No Action Alternative. Including these additional events would meet Navy readiness requirements into the foreseeable future.
- **Alternative 2 (Preferred Alternative)** – Alternative 2 includes the same training events under Alternative 1 as well as training events at additional, Navy-owned locations. The alternate locations used in Alternative 2 would provide increased flexibility and diversity of training environments throughout the Hampton Roads fleet concentration area, and would meet Navy readiness requirements into the foreseeable future.

2.1 Organization of Training Events for Analysis

This section describes how the training events identified in Appendix C (USFF Training Included in the Proposed Action and Alternatives), have been organized for analysis given the wide-ranging nature of the types of activities involved.

Some of the training events can be conducted by different subordinate commands, each with unique operational requirements. For example, "Integrated Beach Training" can be conducted by Assault Craft Unit Two as well as by Assault Craft Unit Four. To account for and represent this variation in training aspects and perspectives, training events like this will be represented as "Training Event Name - subordinate command" (e.g., "Integrated Beach Training - Assault Craft Unit Two" and "Integrated Beach Training - Assault Craft Unit Four").

Identifying the potential impacts from each training event individually would result in the repeated duplication of analysis, and doing so would potentially ignore the impacts from the combination of these events. Therefore, the Navy developed a process to group the training events by location and activity type to efficiently present the analysis of potential impacts in this EA.

First, each training event carried forward as part of the Proposed Action was grouped by areas with typically similar environmental characteristics: land areas – beaches/dunes, land areas – non-beaches/dunes, and water areas with adjacent shorelines. Next, the types of activities that could occur in the various training events were identified. For example, many individual training events have a vehicle movement component or a personnel movement component. These types of activities are called *primary training event activities* (PTEAs) in this EA and are described in Table 2-1. Each individual training event was analyzed to determine which PTEAs apply to that event at each location. The PTEAs identified for each inland training event are shown in the tables of Sections 2.2 (No Action Alternative) through 2.4 (Alternative 2) and will be used throughout this EA to help identify and group potential impacts for all applicable resource areas.

The PTEAs in the Proposed Action may create one or more stimuli that may cause stress on a resource area. To complete the Navy's grouping process, each PTEA was examined to determine its potential environmental stressors. Not all PTEAs produce all environmental stressors and not all environmental stressors affect every resource area. The environmental stressors associated with implementation of the Proposed Action are identified and described in Table 2-2.

Table 2-1. Primary Training Event Activities

Primary Training Event Activity	*Description*
Beach landings	The landing of vessels, movement of troops, and use of equipment on the beach or dunes.
Equipment use	Use of equipment (e.g., generators) to support training; only equipment producing emissions or noise are analyzed (i.e., handheld devices not included).
Explosives on land	Detonations occurring on land, primarily for explosive ordnance disposal (EOD) training. Detonations only occur within existing, authorized bermed areas (Navy, 2017b).
Personnel movement	Movement of troops in undeveloped areas, either in and around a training area or between training areas. Does not include troops aboard a vessel or aircraft or moving on foot along established roads.
Underwater movement	Movement of devices that operate underwater (e.g., remotely operated vehicles [controlled remotely by a human operator]). Submarine training is included in the Atlantic Fleet Training and Testing Environmental Impact Statement/Overseas Environmental Impact Statement.
Vehicle movement	Movement of land tactical vehicles to and from a training location and vehicle use at the training location. Vehicle movement primarily occurs on existing roads and trails.
Vessel movement	Movement of motorized vessels to and from a training location and motorized vessel use at the training location. Does not include non-motorized vessel movement such as kayaks and canoes.
Weapons firing – blank-fire	Firing of small (.50 caliber or less) and medium (greater than .50 caliber and up to 56 millimeter) arms weapons using cartridges that contain gunpowder but no bullet or projectile; a shell is expended at the point of fire. There is a 200-foot stand-off distance from boats and personnel during all training events when using blank fire.
Weapons firing – non-lethal training ammunition	Firing of non-lethal training ammunition (e.g., marking cartridges). Does not include use of explosives.

Table 2-2. Stressors Analyzed

Stressors	*Description*
Physical disturbance	Ground/soil disturbance that potentially disrupts cultural or biological resources such as habitats (e.g., personnel/vehicle movement over unimproved surfaces or explosives ordnance disposal [EOD] training).
Physical strike	Strike from vessel, vehicle, or military expended material on biological resources (i.e., wildlife in the training areas).
Public interaction	Interaction of vessel, vehicle, or military expended material with the public.
Noise	Sound from vessels, vehicles, weapons firing, explosives, or equipment that is louder than ambient levels and disruptive or causes annoyance (typically based on decibel level and duration) to biological resources, cultural resources, and sensitive receptors such as children or disproportionately impacting minority populations.
Ingestion	The potential for biological resources to ingest military expended materials (e.g., brass).
Pollutants	Substances that are generated by the operation of vessels, vehicles, and equipment and by operations such as small arms and EOD that may impact air and water quality as well as the management of hazardous materials and waste. Potential substances include air emissions (criteria pollutants), stormwater discharges, and explosives/munitions and their byproducts.

The environmental stressors associated with PTEAs at each location are summarized in Section 2.5 (Summary of Proposed Action and Alternatives for Analysis). The environmental stressors associated with each resource area are used in Chapter 4 (Environmental Consequences) to present the potential impacts analysis for each action alternative.

2.2 No Action Alternative

The No Action Alternative is to continue the current level and intensity of inland training events within the study area (i.e., baseline), but this alternative will not allow USFF to support emerging training requirements or respond to emerging threats. It will also not allow USFF increased flexibility to train in alternate locations in the Hampton Roads fleet concentration area. Therefore, the No Action Alternative is not considered a reasonable alternative for satisfying the purpose and need of the Proposed Action. However, it does provide a baseline against which to measure the potential impacts of the other alternatives. This section includes separate figures for each installation and non-installation training area and a corresponding table with information about the training events.

2.2.1 Inland Training Events Overview

USFF subordinate units conduct a wide variety of training events utilizing many different training platforms. Appendix D (Platform Glossary) depicts and defines these military platforms.

Figure 2-1 depicts an overview of the training areas in the study area. Note that the following sections provide closer views of the different training areas.

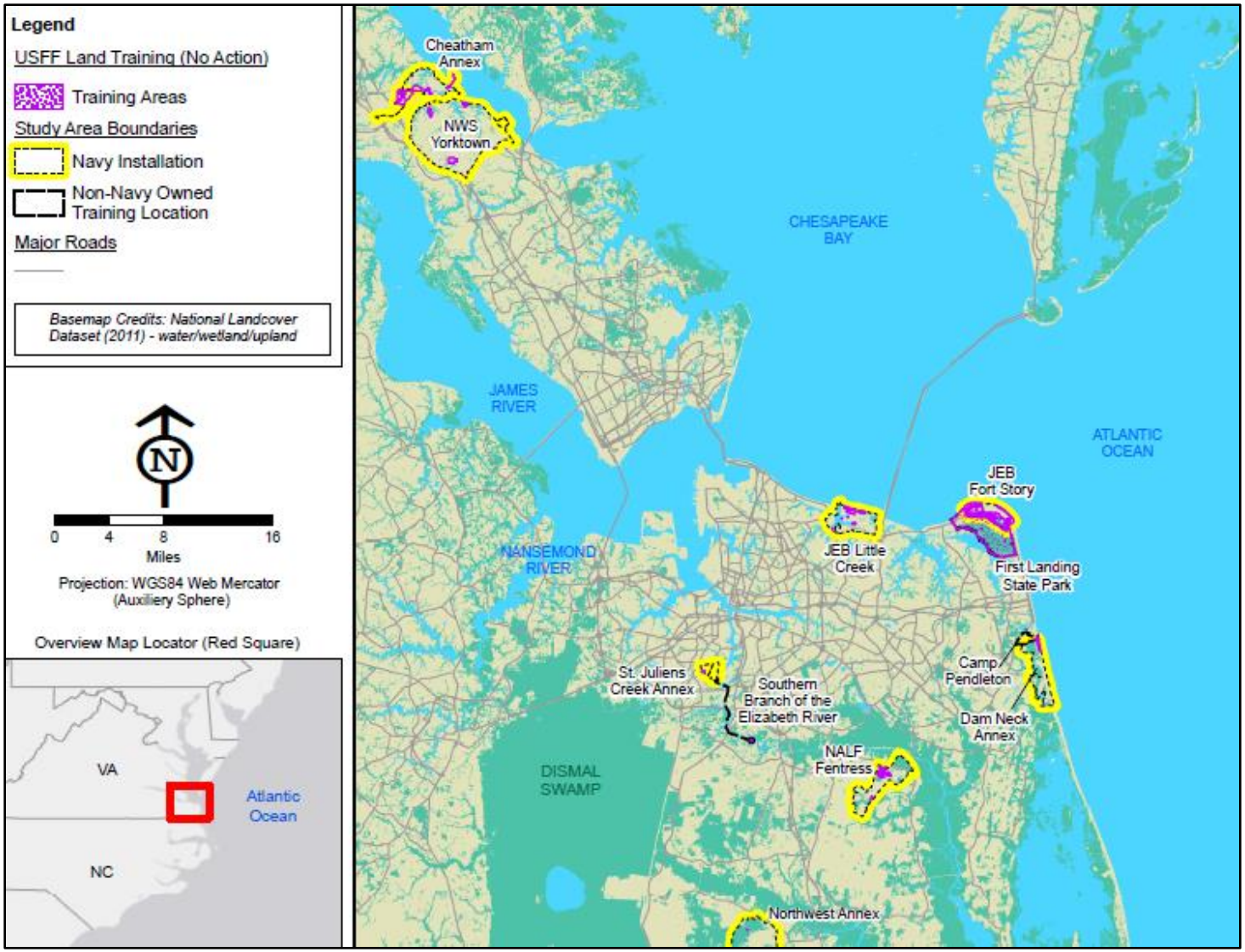


Figure 2-1. Study Area Training Activity Locations

2.2.2 Joint Expeditionary Base Little Creek: No Action Alternative Training

No Action Alternative locations at Joint Expeditionary Base (JEB) Little Creek are depicted on Figure 2-2, and the corresponding training events are described in Table 2-3.

Table 2-3. Joint Expeditionary Base Little Creek: USFF No Action Alternative Training Events

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
Beach Survey	Personnel conduct pre-landing surveys of beaches and landing sites to determine ability to support amphibious operations.	TA Anzio Beach 2 and 4	128	Personnel movement, vehicle movement
		TA Mud Flats	64	Personnel movement
Surface Observations	Personnel conduct observation of local surf conditions to determine the ability of landing forces to safely conduct ship-to-shore movement.	TA Anzio Beach 2 and 4	508	Personnel movement, vehicle movement
Conduct Beach Master Ops	Personnel provide beach and surf zone salvage and facilitate the landing and movement on the beach of troops, equipment, and supplies in support of amphibious operations.	TA Anzio Beach 2 and 4	27	Personnel movement, vehicle movement
		TA Mud Flats	64	Personnel movement, vehicle movement
Explosives Handling Training	Personnel conduct explosives handling training, to include loading ordnance onto small boats.	Desert Cove - Piers 54 & 55	10	Vehicle movement
EOD Drills	Personnel conduct field training, normally by one platoon, to exercise tactics, techniques, and procedures as a small unit of action. Scenarios such as simulating improvised explosive devices, surface ordnance, chemical, nuclear, and biological weapons may be included.	TA Alpha, Bravo, and Charlie Dunes	170	Personnel movement, vehicle movement
Integrated Beach Training - Assault Craft Unit Two	Personnel conduct amphibious assaults via ship-to-shore movement by landing amphibious assault craft on the beach to on- and off-load troops, cargo, and vehicles.	TA Anzio Beach 2 and 4	4	Beach landings
Integrated Beach Training - Assault Craft Unit Four	Personnel conduct amphibious assaults via ship-to-shore movement by landing amphibious assault craft on the beach to on- and off-load troops, cargo, and vehicles.	TA Anzio Beach 2 and 4	4	Beach landings

Table 2-3. Joint Expeditionary Base Little Creek: USFF No Action Alternative Training Events [Continued]

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
Unit Level Training (ULT) Readiness Assessment-Certification Full Mission Profile	Personnel train in landings of small boats while deploying ground forces during insertion and extraction exercises.	TA Anzio Beach 1,2, and 3; TA Signal Point Field	30	Beach landings, personnel movement
Coastal Riverine Squadron ULT	Personnel conduct ULT for entry control point teams and tactical operations center watch teams as part of the basic phase of the Optimized Fleet Response Plan.	TA Signal Point Field, TA Iwo Jima Field, and TA Rodriguez Field.	6	Personnel movement, weapons firing – blank-fire
MDSU Salvage De-Beaching Ops	Personnel conduct de-beaching procedures to remove stranded inert/non-explosive objects from the shore.	TA Mud Flats	12	Beach landing, personnel movement

Key: EOD = Explosive Ordnance Disposal; MDSU = Mobile Diving and Salvage Unit; Ops = Operations; TA = training area; ULT = Unit Level Training.
Note: Additional training event details are in Appendix C.

Figure 2-2. Joint Expeditionary Base Little Creek No Action Alternative Training Areas

2.2.3 Joint Expeditionary Base Fort Story: No Action Alternative Training

No Action Alternative training locations at JEB Fort Story are depicted on Figure 2-5 and the corresponding training events are described in Table 2-4. Training assets such as the Urban Warfare Village and EOD Range 1 (Figure 2-3 and Figure 2-4) are used by USFF to conduct training events at JEB Fort Story.

Table 2-4. Joint Expeditionary Base Fort Story: USFF No Action Alternative Training Events

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
Beach Survey	Personnel conduct pre-landing surveys of planned beaches and landing sites to determine ability to support amphibious operations.	TA Utah Beaches I and II	28	Personnel movement, vehicle movement
Surface Observations	Personnel conduct observation of local surf conditions to determine the ability of landing forces to safely conduct ship-to-shore movement.	TA Utah Beaches I and II	Up to 115	Personnel movement, vehicle movement
Conduct Beach Master Ops	Personnel provide beach and surf zone salvage and facilitate the landing and movement on the beach of troops, equipment, and supplies in support of amphibious operations.	TA Utah Beaches I and II	27	Personnel movement, vehicle movement
Maritime Prepositioning Squadron - Deep Draft Ship Anchored Off-Shore*	Naval Beach Group personnel conduct beach surveys and surf observations in support of Maritime Prepositioning Squadron Forces.	TA Utah Beaches I and II	1	Beach landings, personnel movement, vehicle movement
Advanced ULT Riverine Security Team Land Navigation/Tactical Site Exploitation	Personnel conduct land navigation, patrolling, and Tactical Site Exploitation. No weapons firing.	TA Wilderness	10	Personnel movement
Land Navigation and Tent encampments	Personnel conduct land navigation, establish tent encampments, and patrol the training area. No weapons firing.	TA Inchon Beach	22	Personnel movement
EOD Drills	Personnel conduct field training, normally by one platoon, to exercise tactics, techniques, and procedures as a small unit of action. Scenarios such as simulating improvised explosive	JEB Fort Story - All explosive TAs	170	Personnel movement, vehicle movement

Table 2-4. Joint Expeditionary Base Fort Story: USFF No Action Alternative Training Events [Continued]

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
	devices, surface ordnance, chemical, nuclear, and biological weapons may be included.			
EOD and Mobile Diving and Salvage ULT Demolition Training	Personnel practice new tactics and techniques in reporting, locating, identifying, neutralizing, raising-towing to the beach, rendering safe, collecting intelligence, and disposing of underwater ordnance.	JEB Fort Story - All explosive TAs	80	Explosives on land, personnel movement, vehicle movement, weapons firing – blank-fire
EOD Drills Field Training Exercise	Personnel conduct field training, normally by four platoons, to exercise tactics, techniques, and procedures as a small unit of action. Scenarios such as simulating improvised explosive devices, surface ordnance, chemical, nuclear, and biological weapons may be included.	Range 1 - Navy EOD Demo	28	Explosives on land, personnel movement, vehicle movement, weapons firing – blank-fire
		TA Nike Site	28	Personnel movement, vehicle movement, weapons firing – blank-fire, weapons firing – non-lethal training ammunition
		JEB Fort Story – Building 807 (casemate)	28	Vehicle movement, weapons firing – blank-fire, weapons firing – non-lethal training ammunition
		TA Small Arms Testing and Evaluation Compound	28	Personnel movement, vehicle movement, weapons firing – blank-fire, weapons firing – non-lethal training ammunition
		TA Omaha Beach and Building 900	28	Personnel movement, vehicle movement weapons firing – blank-fire, weapons firing – non-lethal training ammunition
Expeditionary Training in Urban Setting	Personnel observe, gather intelligence, and develop sources in an urban terrain environment.	TA Urban Warfare Village	2	Personnel movement
Integrated Beach Training - Assault Craft Unit Two	Personnel conduct amphibious assaults via ship-to-shore movement by landing amphibious assault	TA Utah Beaches I and II	4	Beach landings

Table 2-4. Joint Expeditionary Base Fort Story: USFF No Action Alternative Training Events [Continued]

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
	craft on the beach to on- and off-load troops, cargo, and vehicles.			
Integrated Beach Training - Assault Craft Unit Four	Personnel conduct amphibious assaults via ship-to-shore movement by landing amphibious assault craft on the beach to on- and off-load troops, cargo, and vehicles.	TA Utah Beaches I and II	6	Beach landings
ULT Readiness Assessment-Certification (Full Mission Profile)	Personnel train in landings of small boats while deploying ground forces during insertion and extraction exercises.	TA Inchon Beach	30	Beach landings, personnel movement
Mobile Diving and Salvage Unit, Salvage De-Beaching Ops	Personnel conduct de-beaching procedures to remove stranded inert/non-explosive objects from the shore.	TA Omaha Beach; TA Utah Beaches I and II	4	Beach landings, personnel movement
EOD ULT Small Boat Ordnance Loading and Mine Countermeasures Training	Personnel trans-load (i.e., transfer a shipment from one mode of transportation to another) mine countermeasures supplies.	TA Omaha Beach; TA Utah Beaches I and II	40	Beach landings, Personnel movement, vehicle movement

*Events may include incidental support from non-USFF assets
Key: EOD = Explosive Ordnance Disposal; JEB = Joint Expeditionary Base; Ops = Operations; TA = training area; ULT = Unit Level Training.
Note: Additional training event details are in Appendix C.

Figure 2-3. Joint Expeditionary Base Fort Story Urban Warfare Village

Figure 2-4. Joint Expeditionary Base Fort Story Explosive Ordnance Disposal Range 1

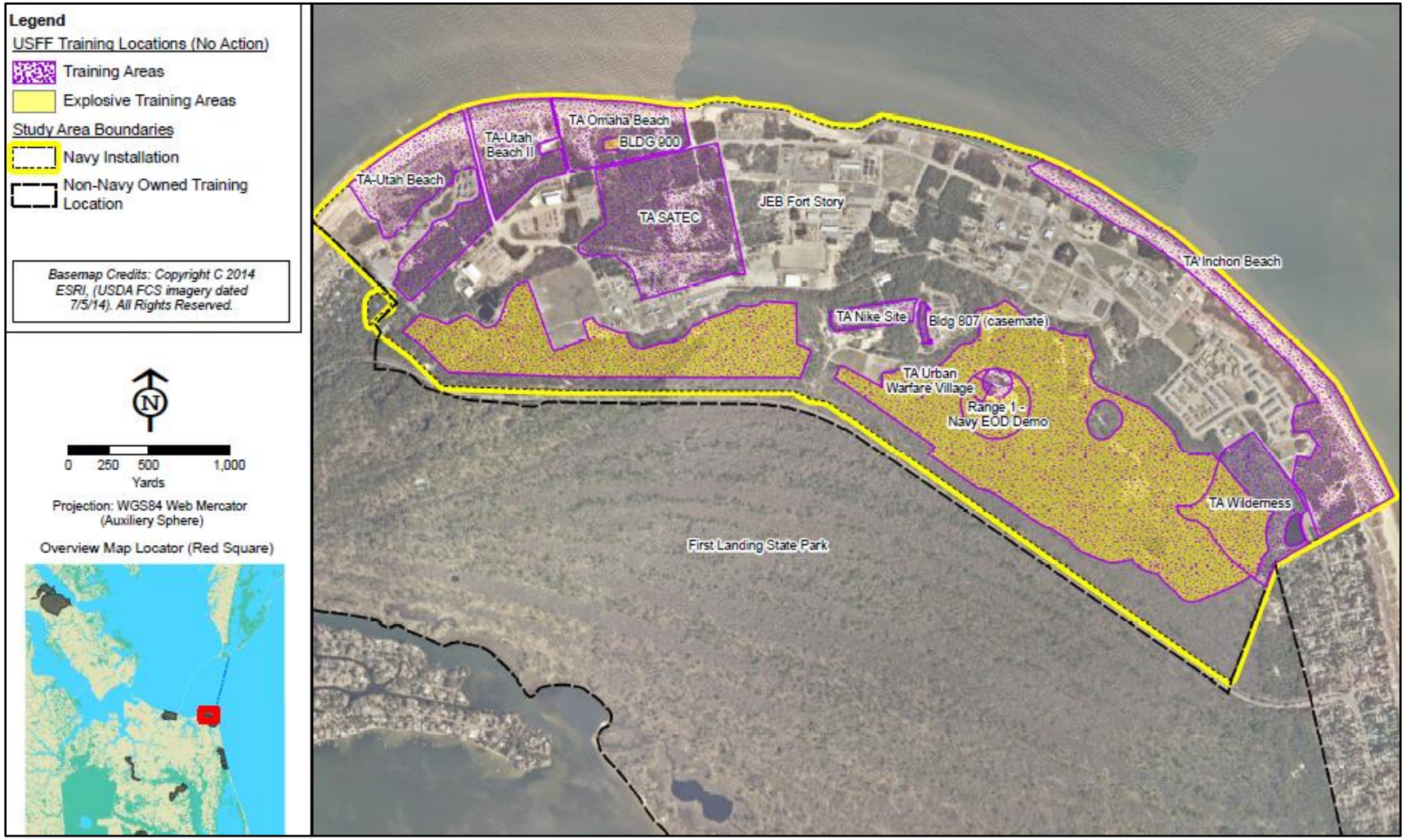


Figure 2-5. Joint Expeditionary Base Fort Story No Action Alternative Training Areas

2.2.4 Dam Neck Annex and Camp Pendleton: No Action Alternative Training

No Action Alternative training locations at Dam Neck Annex and Camp Pendleton are depicted on Figure 2-7 and the corresponding training events are described in Table 2-5. An example of training events conducted at Dam Neck Annex includes overland training by USFF (Figure 2-6).

Table 2-5. Dam Neck Annex and Camp Pendleton: USFF No Action Alternative Training Events

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
Landing Craft Air Cushion (LCAC) Overland Training Maneuvers – Assault Craft Unit Four	Crews navigate amphibious assault craft from sea to shore, drive up on the beach, turn the craft parallel or perpendicular to the surf, and then head back out to sea.	Dam Neck Annex North Beach; Camp Pendleton Beach	12	Beach landings
LCAC Overland Training Maneuvers – Beachmaster Unit Two*	Personnel direct sea-to-shore movement of amphibious assault craft on the beach in support of amphibious operations.	Dam Neck Annex North Beach; Camp Pendleton Beach	12	Personnel movement, vehicle movement
Beach Survey	Personnel conduct pre-landing surveys of planned beaches and landing sites to determine ability to support amphibious operations.	Dam Neck Annex North Beach; Camp Pendleton Beach	10	Personnel movement, vehicle movement
Surface Observations	Personnel observe and report local surf conditions to determine the ability of landing forces to safely conduct ship-to-shore movement.	Dam Neck Annex North Beach; Camp Pendleton Beach	Up to 39	Personnel movement
Conduct Beach Master Ops	Personnel provide beach and surf zone salvage and facilitate the landing and movement on the beach of troops, equipment, and supplies in support of amphibious operations.	Dam Neck Annex North Beach; Camp Pendleton Beach	12	Personnel movement, vehicle movement
EOD Drills Field Training Exercise	Personnel conduct field training, normally by four platoons, to exercise tactics, techniques, and procedures as a small unit of action. Scenarios such as simulating improvised explosive devices, surface ordnance, chemical, nuclear, and biological weapons may be included.	Camp Pendleton Shipboard Trainer; Baum Village	28	Personnel movement, vehicle movement, weapons firing – blank-fire
Integrated Beach Training - Assault Craft Unit Two	Personnel conduct amphibious assaults via ship-to-shore movement by landing amphibious assault craft on the beach to on- and off-load troops, cargo, and vehicles.	Dam Neck Annex North Beach; Camp Pendleton Beach	4	Beach landings
Integrated Beach Training - Assault Craft Unit Four	Personnel conduct amphibious assaults via ship-to-shore movement by landing amphibious assault craft	Dam Neck Annex North Beach; Camp Pendleton Beach	6	Beach landings

Table 2-5. Dam Neck Annex and Camp Pendleton: USFF No Action Alternative Training Events [Continued]

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
	on the beach to on- and off-load troops, cargo, and vehicles.			
EOD ULT Mine Countermeasures Beaching Ops	Personnel conduct inspection and disarming procedures utilizing inert naval mines on the beach.	Dam Neck Annex North Beach; Camp Pendleton Beach	30	Personnel movement, vehicle movement

*Event may include incidental support from non-USFF assets
Key: EOD = Explosive Ordnance Disposal; LCAC = Landing Craft, Air Cushion; Ops = Operations; ULT = Unit Level Training.
Note: Additional training event details are in Appendix C.

Figure 2-6. Landing Craft, Air Cushion Overland Training at Dam Neck Annex

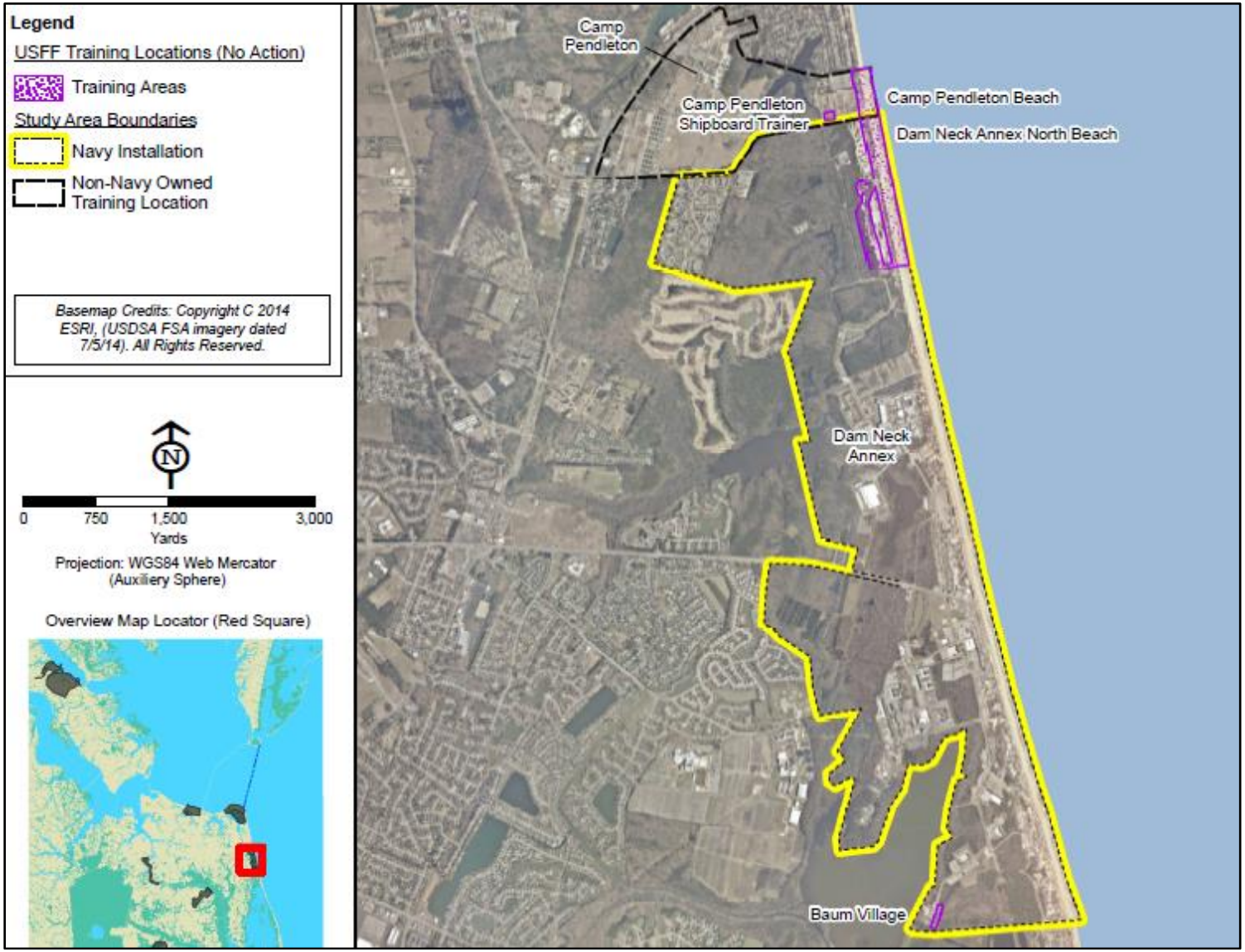


Figure 2-7. Dam Neck Annex and Camp Pendleton No Action Alternative Training Areas

2.2.5 Naval Auxiliary Landing Field Fentress: No Action Alternative Training

No Action Alternative training locations at Naval Auxiliary Landing Field (NALF) Fentress are depicted on Figure 2-8 and the corresponding training events are described in Table 2-6.

Table 2-6. Naval Auxiliary Landing Field Fentress: USFF No Action Alternative Training Events

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
EOD Drills	Personnel conduct field training, normally by one platoon, to exercise tactics, techniques, and procedures as a small unit of action. Scenarios such as simulating improvised explosive devices, surface ordnance, chemical, nuclear, and biological weapons may be included.	Bunkers; all landing zones can be scheduled for camping; abandoned runways for convoys	90	Personnel movement, vehicle movement, weapons firing – blank-fire, weapons firing – non-lethal training ammunition

Key: EOD = Explosive Ordnance Disposal
Note: Additional training event details are in Appendix C.

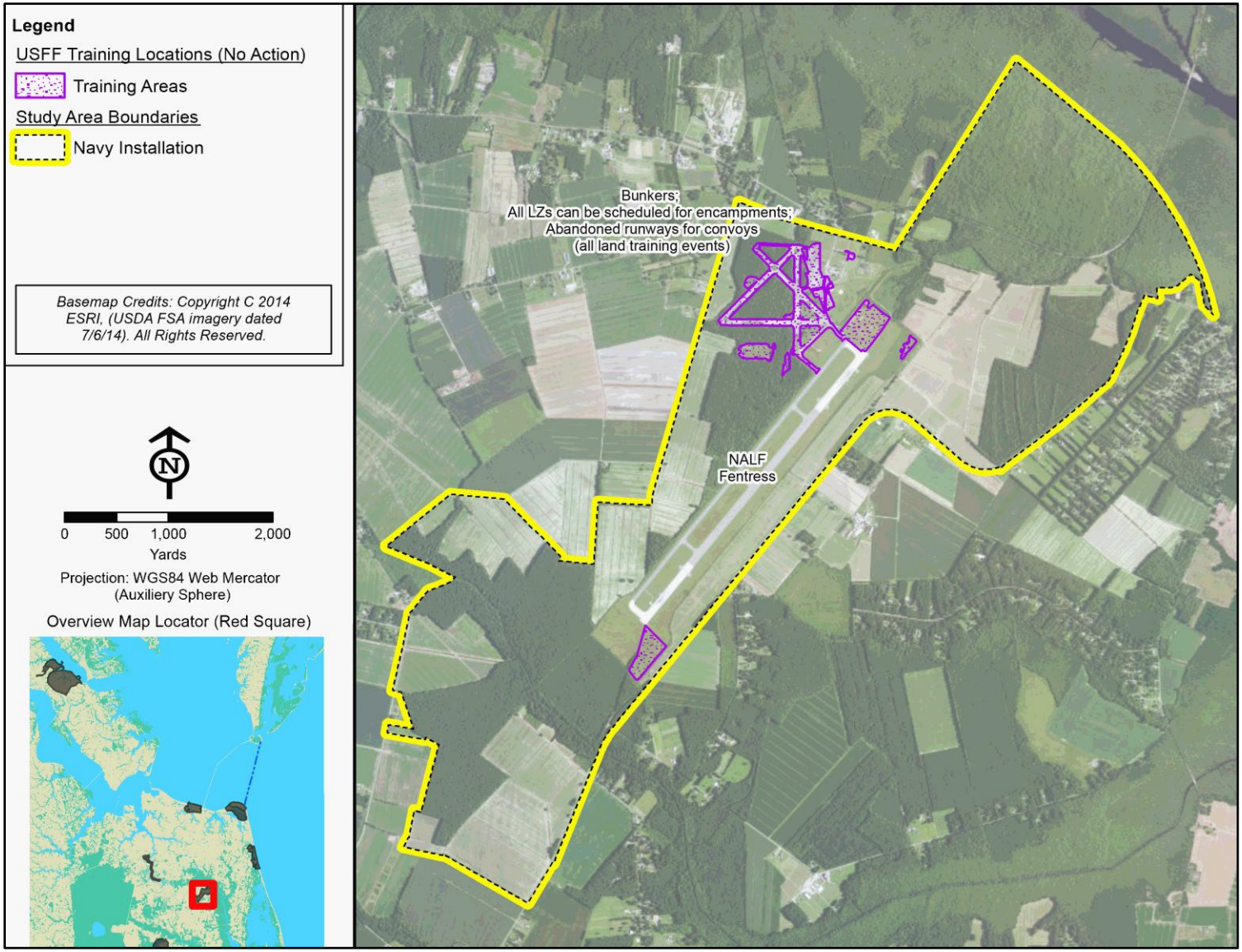


Figure 2-8. Naval Auxiliary Landing Field Fentress No Action Alternative Training Areas

2.2.6 Northwest Annex: No Action Alternative Training

No Action Alternative training locations at Northwest Annex are depicted on Figure 2-10 and the corresponding training events are described in Table 2-7. Training assets such as the Munro Village (Figure 2-9) are used by USFF to conduct training events at Northwest Annex.

Table 2-7. Northwest Annex: USFF No Action Alternative Training Events

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
EOD Drills	Personnel conduct field training, normally by one platoon, to exercise tactics, techniques, and procedures as a small unit of action. Scenarios such as simulating improvised explosive devices, surface ordnance, chemical, nuclear, and biological weapons may be included.	Marine Corps Fleet Anti-Terrorism Security Team Urban Training Facility - Munro Village	170	Personnel movement, vehicle movement

Note: Additional training event details are in Appendix C.

Figure 2-9. Munro Village, Urban Training Facility at the Northwest Annex

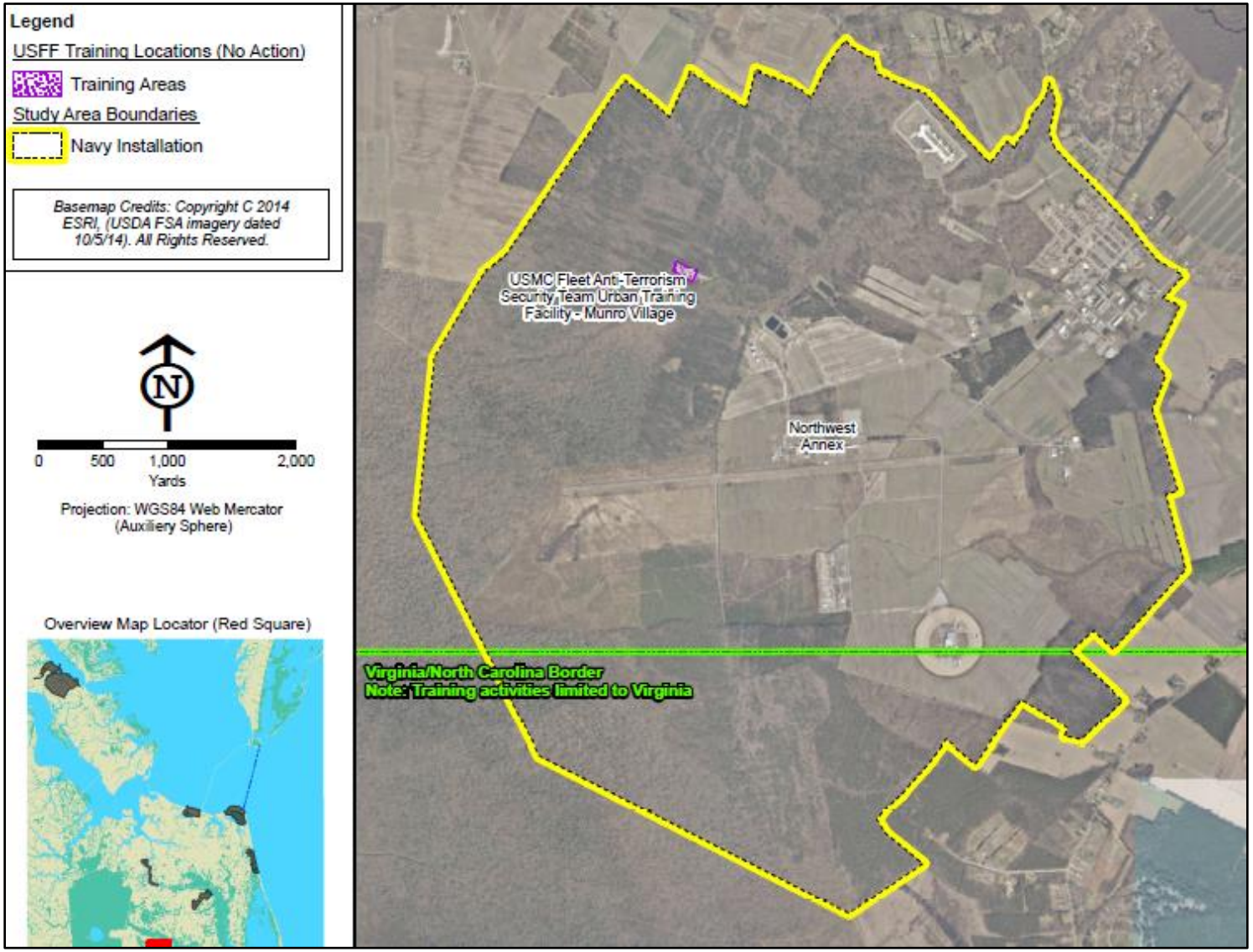


Figure 2-10. Northwest Annex No Action Alternative Training Areas

2.2.7 St. Juliens Creek Annex: No Action Alternative Training

No Action Alternative training locations at St. Juliens Creek Annex are depicted on Figure 2-11 and the corresponding training events are described in Table 2-8.

Table 2-8. St. Juliens Creek Annex: USFF No Action Alternative Training Events

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
ULT Readiness Assessment (Field Training Exercises for 450 personnel)	Multi-day training where up to 450 personnel achieve security team certifications while in a temporary encampment.	St. Juliens Creek Annex Building 277 fenced compound	Up to 6	Equipment use, personnel movement, vehicle movement
ULT Readiness Assessment (Field Training Exercises for 143 personnel)	Multi-day training where up to 143 personnel achieve security team certifications while in a temporary encampment.	St. Juliens Creek Annex Building 277 fenced compound	1	Equipment use, personnel movement, weapons firing – blank-fire
Navy Expeditionary Ops	Personnel conduct Field and Maritime Antiterrorism/Force Protection scenarios against various simulated types of improvised explosive devices, chemical, biological, radiological, nuclear, and high-yield explosives.	St. Juliens Creek Annex Building 277 fenced compound	10	Equipment use, vehicle movement, personnel movement, weapons firing – blank-fire

Note: Additional training event details are in Appendix C.

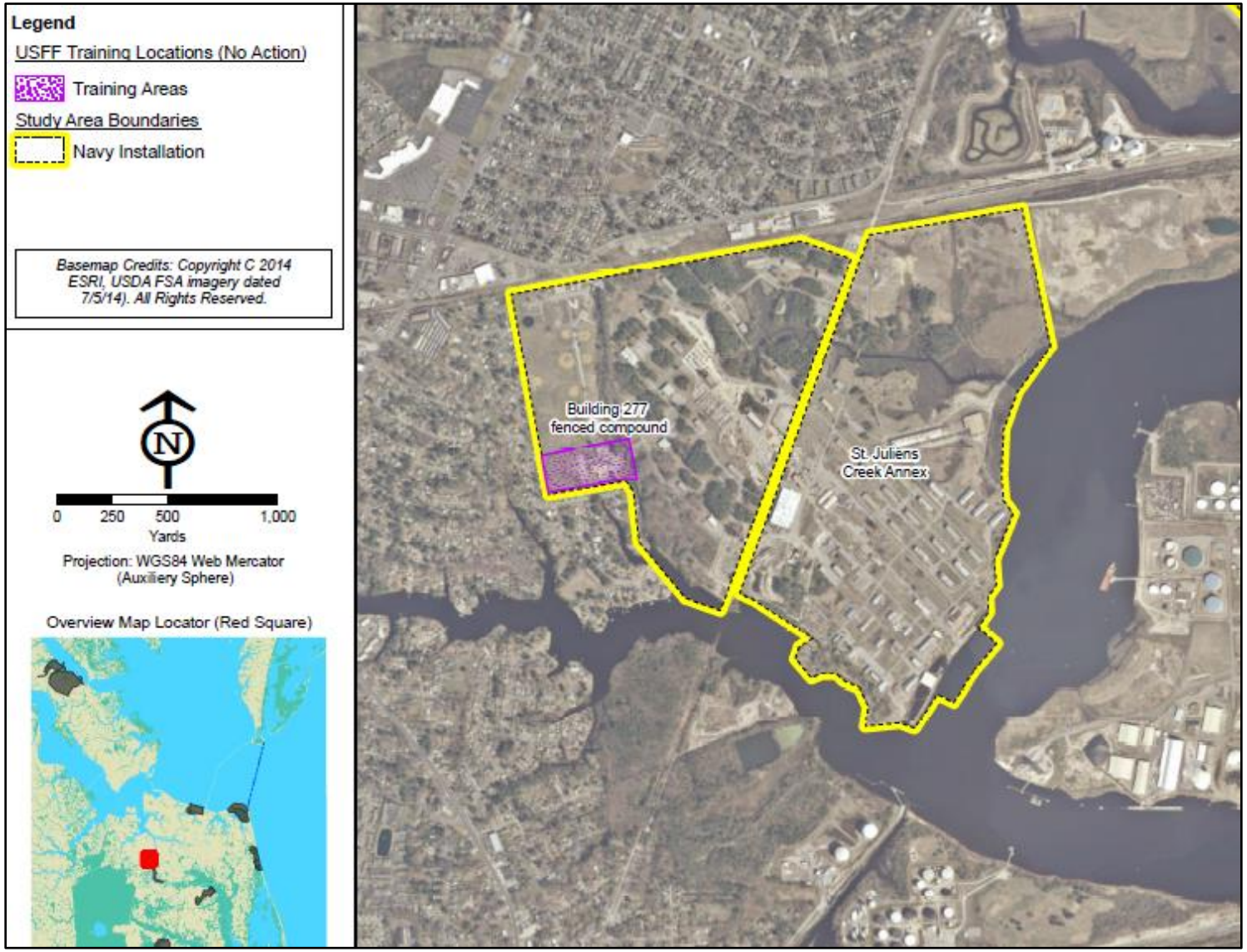


Figure 2-11. St. Juliens Creek Annex No Action Alternative Training Areas

2.2.8 Naval Weapons Station Yorktown: No Action Alternative Training

No Action Alternative training locations at Naval Weapons Station Yorktown are depicted on Figure 2-12 and the corresponding training events are described in Table 2-9.

Table 2-9. Naval Weapons Station Yorktown: USFF No Action Alternative Training Events

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
ULT Readiness Assessment (Field Training Exercise for 200 personnel)	Multi-day training where up to 200 personnel achieve security team certifications while in a temporary encampment.	Home Station Training Lanes	8	Equipment use, weapons firing – blank-fire
Convoy Ops	Personnel operate trucks and equipment during convoy movement and operations simulating combat operations.	TA A (Driving Course)	60	Vehicle movement
Convoy Counter-Improvised Explosive Device Training	Personnel identify homemade bombs constructed and deployed in ways other than in conventional military action.	Home Station Training Lanes	14	Vehicle movement
EOD and Mobile Diving and Salvage ULT Demolition Training	Personnel practice new tactics and techniques in reporting, locating, identifying, neutralizing, raising-towing to the beach, rendering safe, collecting intelligence, and disposing of underwater ordnance.	Yorktown EOD Demolition Range	104	Explosives on land, personnel movement, vehicle movement, weapons firing – blank-fire
EOD Drills Field Training Exercise	Personnel conduct field training, normally by four platoons, to exercise tactics, techniques, and procedures as a small unit of action. Scenarios such as simulating improvised explosive devices, surface ordnance, chemical, nuclear, and biological weapons may be included.	Home Station Training Lanes	50	Vehicle movement, weapons firing – blank-fire, weapons firing – non-lethal training ammunition

Key: EOD = Explosive Ordnance Disposal; Ops = Operations; TA = training area; ULT = Unit Level Training.
Note: Additional training event details are in Appendix C.

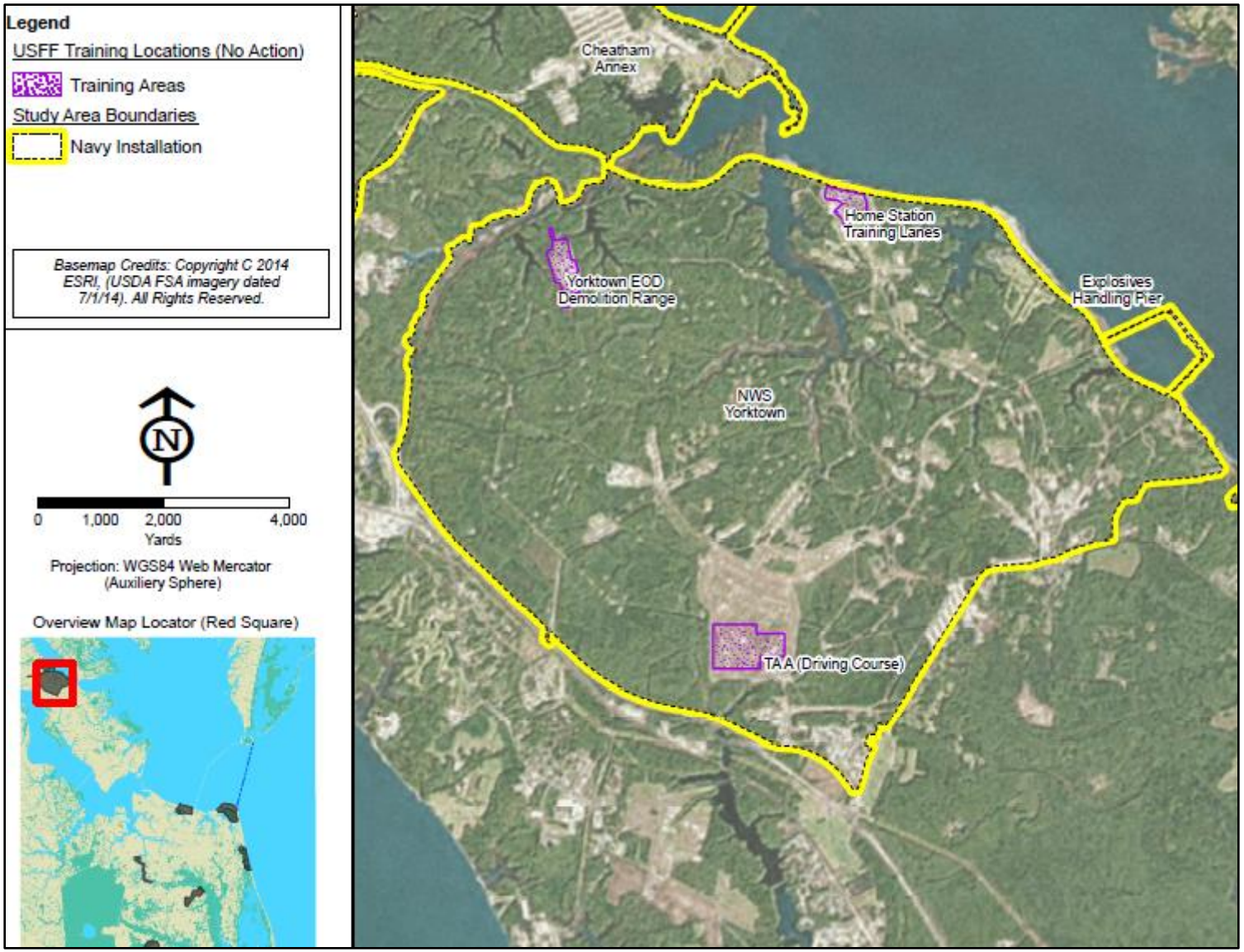


Figure 2-12. Naval Weapons Station Yorktown No Action Alternative Training Areas

2.2.9 Cheatham Annex: No Action Alternative Training

No Action Alternative training locations at Cheatham Annex are depicted on Figure 2-13 and the corresponding training events are described in Table 2-10.

Table 2-10. Cheatham Annex: USFF No Action Alternative Training Events

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
Aircraft Security Team Unit Level & Certification	Personnel conduct Aircraft Security training on mockup aircraft utilizing small arms (blank fire).	C-130 Cargo Load Trainer (Zone J)	20	Weapons firing – blank-fire
Military Fly Away System Terminal/Radar Sonar Surveillance Center/Super High Frequency ULTRA	Personnel conduct command and control training for setting up and testing communication equipment and systems.	Cheatham Annex Field TAs (Cheatham Annex Zones C, D, F, H, I, and L)	20	Personnel movement, vehicle movement
ULTRA (Field Training Exercises for 450 personnel)	Multi-day training where up to 450 personnel achieve security team certifications while in a temporary encampment.	Cheatham Annex Field TAs (Cheatham Annex Zones C, D, H, I, and L)	3	Equipment use, personnel movement, vehicle movement, weapons firing – blank-fire
ULTRA (Field Training Exercises for 143 personnel)	Multi-day training where up to 143 personnel achieve security team certifications while in a temporary encampment.	Cheatham Annex Field TAs (Cheatham Annex Zones C, D, H, I, and L)	1	Equipment use, personnel movement, vehicle movement, weapons firing – blank-fire
ULT (Surface/Air Cargo Handling)	Personnel conduct field training on surface and air cargo handling, tent camp fundamentals, command and control, field communications, cargo transfer, and equipment operation.	Cheatham Annex Field TAs (Cheatham Annex Zones C, D, F, H, I, and L), Crane Training Site (Zone K), auxiliary crane ship (T-ACS) for training (pierside) Cheatham Annex Pier (CAD A), C-130 Cargo Load Trainer (Zone J)	8	Equipment use, personnel movement, vehicle movement
ULTRA (Navy Cargo Handling Battalion's Readiness)	Battalions conduct multi-day training where events such as loading and unloading of equipment are performed using various platforms such as cranes and cargo loading vehicles.	Cheatham Annex Field TAs (Cheatham Annex Zones C, D, F, H, I, and L); T-ACS (pierside) for training	4	Equipment use, personnel movement, vehicle movement, weapons firing – blank-fire

Table 2-10. Cheatham Annex: USFF No Action Alternative Training Events [Continued]

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
Shipboard Cargo	Personnel conduct basic and advanced training toward qualification in various shipboard cargo handling positions and equipment license requirements.	T-ACS (pierside) for training	5	Vehicle movement
Shipboard Cargo (Basic/Advanced Class)	Personnel conduct the basic and advanced training in maritime cargo handling positions, safety, ship configuration, and operations, loading, unloading, stowage, and transfer of cargo using shipboard cargo handling equipment.	T-ACS (pierside) for training	16	Vehicle movement
Air Cargo	Personnel conduct the basic training in various air cargo loading, unloading, and handling procedures.	C-130 Cargo Load Trainer (Zone J)	5	Equipment use, vehicle movement
Air Cargo (Basic/Advanced Class)	Personnel conduct the basic and advanced training in air cargo handling, loading, unloading, stowage, and transfer of cargo using material handling equipment.	C-130 Cargo Load Trainer (Zone J)	4	Vehicle movement
Hiking, Kayaking, Communications Training, Land Navigation, Confidence Training, First Aid Training	Personnel hike and kayak as well as practice communications training, land navigation, confidence training, and first aid.	Jones Pond (Cheatham Annex Training Zone F)	1	Personnel movement, vehicle movement
Underwater Search Procedures	Personnel utilize a tethered remotely operated vehicle with camera deployed from a boat ramp to practice underwater search procedures.	Jones Pond (Cheatham Annex Training Zone F)	1	Underwater movement

Key: CAD A = Cheatham Annex Pier (formerly Cheatham Annex Depot) training location; TA = training area; T-ACS = auxiliary crane ship; ULT = Unit Level Training; ULTRA = Unit Level Training Readiness Assessment.
Note: Additional training event details are in Appendix C.

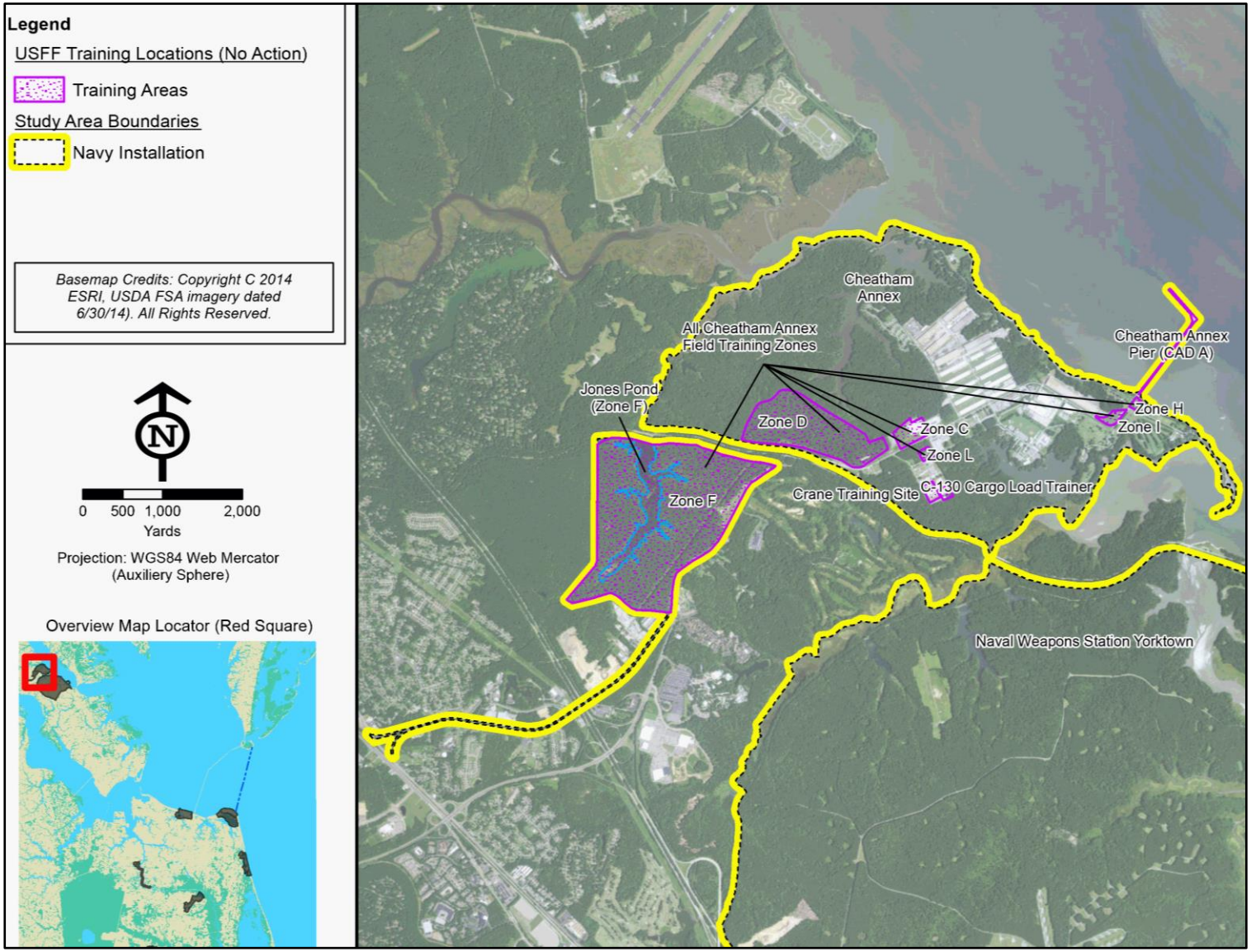


Figure 2-13. Cheatham Annex No Action Alternative Training Areas

2.2.10 First Landing State Park: No Action Alternative Training

No Action Alternative training locations at First Landing State Park are depicted on Figure 2-14 and the corresponding training events are described in Table 2-11.

Table 2-11. First Landing State Park: USFF No Action Alternative Training

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
Land Navigation	Personnel utilize various vehicles to conduct land navigation, patrols, and tactical site exploitation.	Main Gate to access park trails	8	Personnel movement
Physical Training	Personnel conduct physical fitness training along trails.	park trails	4	Personnel movement

Note: Additional training event details are in Appendix C.

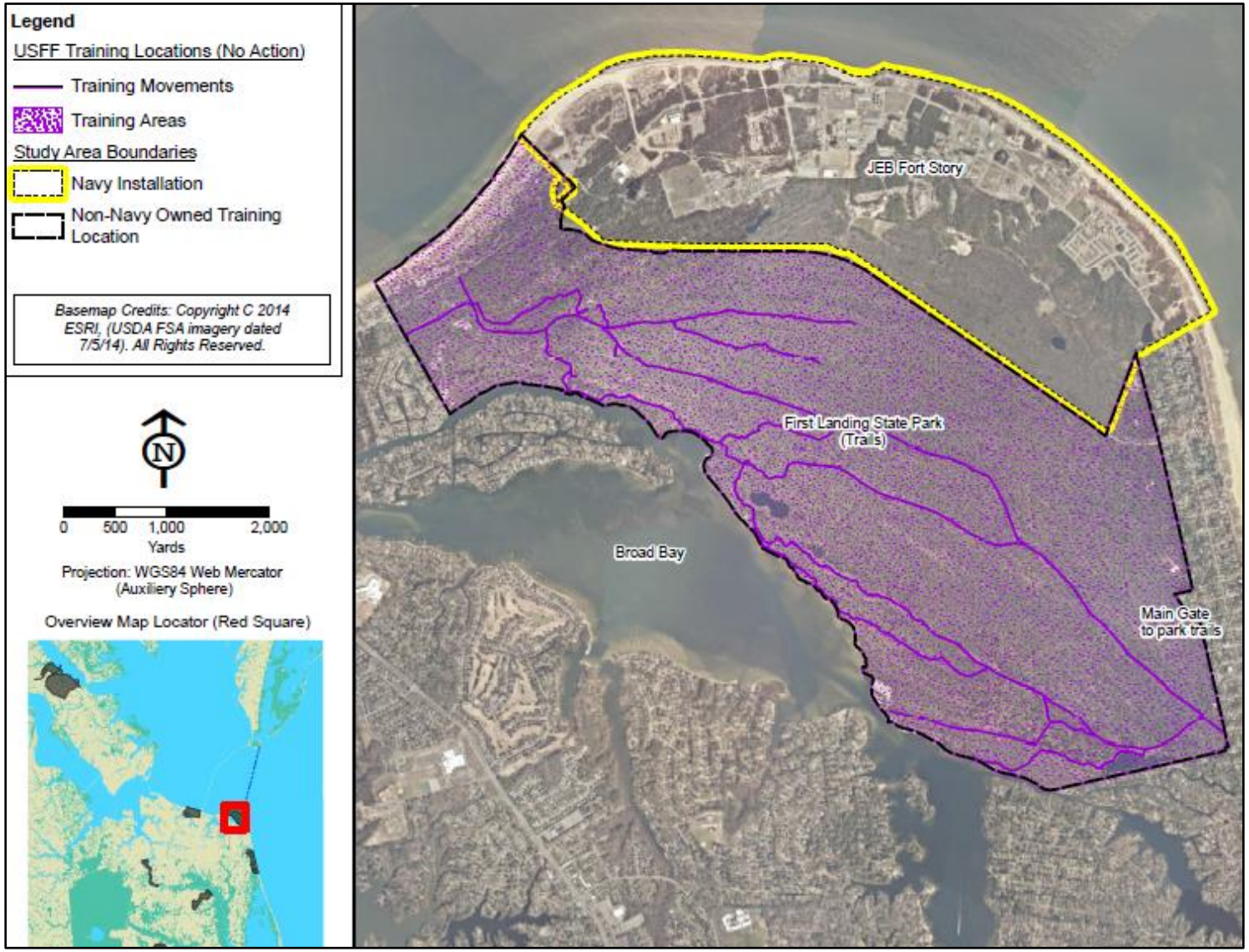


Figure 2-14. First Landing State Park No Action Alternative Training Areas

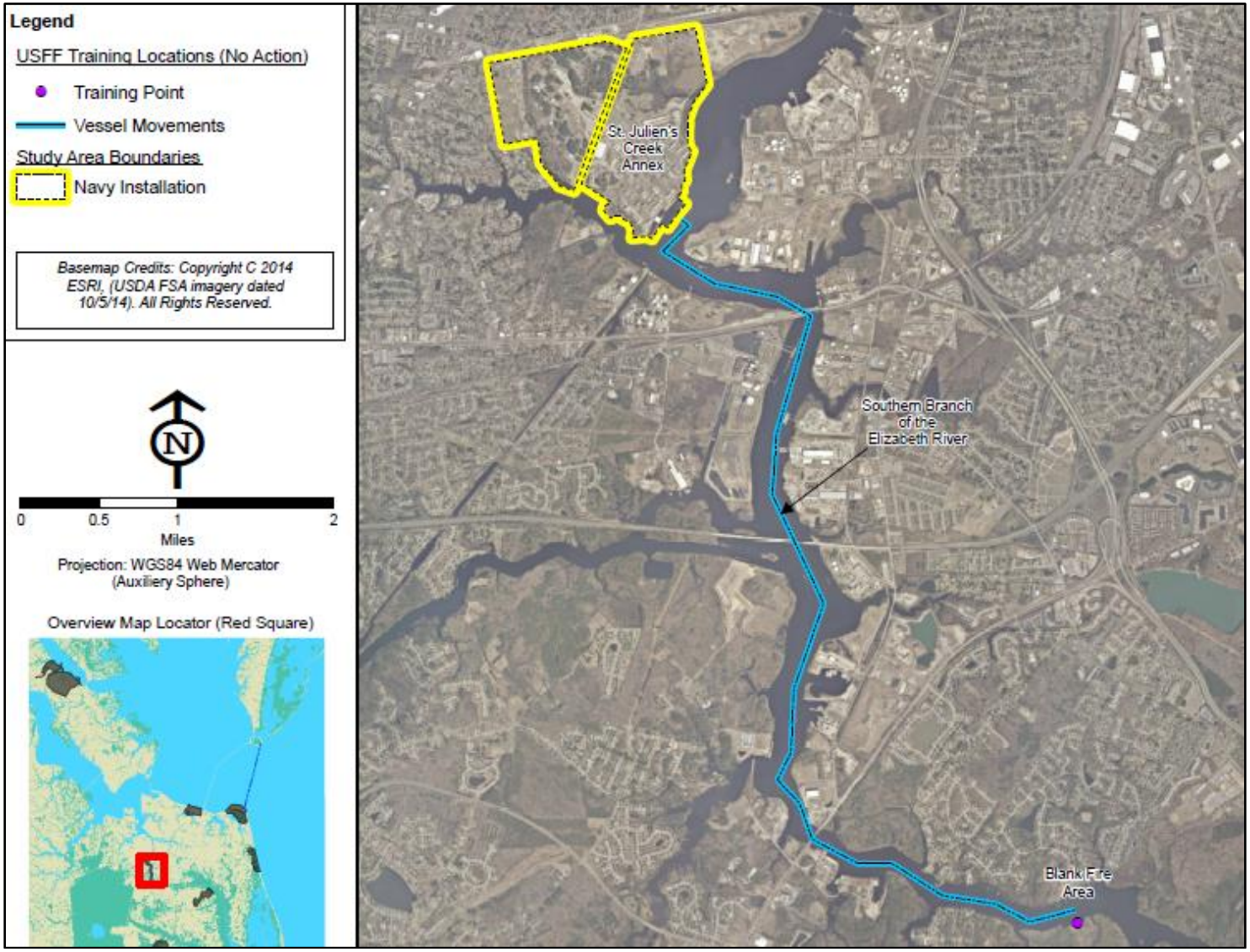
2.2.11 Southern Branch of the Elizabeth River: No Action Alternative Training

No Action Alternative training locations in the Southern Branch of the Elizabeth River are depicted on Figure 2-15 and the corresponding training events are described in Table 2-12. Navy riverine units conduct training exercises along the Southern Branch of the Elizabeth River in Chesapeake. Exercises take place primarily along the waterway between St. Juliens Creek Annex and an area designated for blank fire.

Table 2-12. Southern Branch Elizabeth River: USFF No Action Alternative Training Events

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
ULT Readiness Assessment-Certification (Full Mission Profile)[1]	Personnel train in high-speed, defensive tactical boat maneuvers while deploying landside security to conduct entry control point exercises.	Southern Branch of the Elizabeth River	30	Personnel movement, vessel movement (water), weapons firing – blanks

Key: ULT = Unit Level Training
Note: Additional training event details are in Appendix C.
[1] During the insertion/extraction portion of the exercise, forces egress from the vessel into shallow water without moving onto the shore and then ingress back into the vessel.



Vessel movements follow navigation channels where possible. The movement routes depicted here are typical or generalized.

Figure 2-15. Southern Branch of the Elizabeth River No Action Alternative Training Areas

2.2.12 No Action Alternative Training Not Carried Forward for Analysis

Within the No Action Alternative, the Navy determined that a number of training events, such as classroom training, simulated training, training at indoor shooting ranges or indoor swimming pools, do not affect the quality of the human environment in that they do not create one or more stimuli that may cause stress on a resource area. These activities are part of the Proposed Action and are included in Table 2-13; however, they do not have PTEAs or associated stressors and therefore would not have impacts on any resource areas. Because these events do not have PTEAs or associated stressors, they would not have direct or cumulative impacts on any resource areas. Therefore, these events are not carried forward for further analysis.

Table 2-13. Additional Training Locations: USFF No Action Alternative Training Events

Training Event	*Event Description*	*Location*	*No. of Events Per Year*
Weapons Training	Personnel conduct small arms weapons sustainment training utilizing protective positions, measures, or equipment.	Other (Shooting Ranges)	45
EOD Drills	Personnel conduct field training, normally by one platoon, to exercise tactics, techniques, and procedures as a small unit of action.	C2 Shooting Center	5
Small Arms Weapons Qualification (9 mm and 5.56 mm)	Personnel conduct small arms weapons training with handguns for marksmanship qualifications.		40
Shipboard Aircraft Fire Fighting	Personnel complete training in aircraft fire fighting procedures.	Naval Station Norfolk	49
Air Capable Helo Team Training Fire Fighting	Shipboard crews and flight deck personnel train in the proper methods and techniques in extinguishing aviation fires.		40
General Shipboard Fire Fighting Self-Contained Breathing Apparatus	Personnel train on firefighting equipment, fire party positions and responsibilities and damage control procedures through classroom training and fire demonstrations.		140
Shipboard Fire Fighting Team Trainer	Personnel conduct integrated team training in advanced firefighting techniques and management of on-scene fire party personnel in a shipboard environment.		31
Advanced Shipboard Fire Fighting	Personnel train in advanced firefighting techniques and management of on-scene personnel in a shipboard environment.		10
Shipboard Damage Control	Teams train in investigating, reporting, repairing structural damage, pipe patching and plugging, and to control/stop flooding.		71
Foam Generation	Personnel train on the operation and maintenance of various firefighting foam generation systems.		9
Repair Party Leader	Personnel train in advanced damage control theory and techniques for management of repair party personnel in casualty situations.		12
Water Tight Closures	Personnel train to perform inspection, maintenance and repairs on shipboard watertight closures.		16

Table 2-13. Additional Training Locations: USFF No Action Alternative Training Events [Continued]

Training Event	*Event Description*	*Location*	*No. of Events Per Year*
Gas Free Engineering	Personnel conduct training in certifying a confined space as being safe to enter without the use of an air-purifying or supplied air respirator.		19
Junior Reserve Officer Training Corps Buttercup	Junior Reserve Officer Training Corps conduct team training while investigating, reporting and repairing structural damage as it pertains to shipboard damage control.		Varies
Medical Training	Personnel training to manage trauma patients, manage patients prior to medical evacuation, and provide basic medical care to team members.	JEB Little Creek	3
Tactical Communications	Personnel train on basic familiarization of communications gear.		3
Mission Planning Troop Leading Procedures	Personnel conduct training on basic mission planning, and warning order development, mission building and execution.		3
Mission Planning Military Decision Making Process	Personnel conduct training on advanced mission planning, and course of action analysis and order issuance for headquarters element and company leadership.		3
Language Recognition	Personnel conduct language recognition training encountered during deployments and cultural awareness exercises.		3
Combat Water Survival	Personnel conduct water survival training wearing tactical gear.		3
ULT Readiness Assessment (Preparation for Final Evaluation Phase)	Personnel complete a classroom assessment prior to entering the intermediate/advanced phases of training.		100–124
ULT Readiness Assessment (Preparation for Final Evaluation Phase)	Personnel complete a classroom assessment prior to entering the intermediate/advanced phases of training.	JEB Fort Story	100–124
ULT Readiness Assessment (Administrative and Proficiency)	Personnel are placed in various local geographic locations to collect intelligence information and then information assessed.		100
Final Evaluation Phase	Personnel demonstrate the required levels of tactical proficiency and warfare knowledge with a demonstrated focus on the collection of human intelligence and tactical electronic warfare.		100–124
ULT Readiness Assessment (Preparation for Final Evaluation Phase)	Personnel complete a classroom assessment prior to entering the intermediate/advanced phases of training.	Dam Neck Annex and Camp Pendleton	100–124

Table 2-13. Additional Training Locations: USFF No Action Alternative Training Events [Continued]

Training Event	*Event Description*	*Location*	*No. of Events Per Year*
ULT Readiness Assessment (Preparation for deployment)	Personnel complete a classroom assessment and walk through scenario prior to deployment.		100–124
Final Evaluation Phase	Personnel demonstrate the required levels of tactical proficiency and warfare knowledge with a demonstrated focus on the collection of human intelligence and tactical electronic warfare.		100–124
Visit, Board, Search and Seizure	Personnel train on a static model to become proficient in maritime boarding actions and tactics.	Northwest Annex	20
Mine-Resistant Ambush Protected Egress Trainers	Personnel conduct training for multiple Mine-Resistant Ambush Protected simulated land and water egress scenarios within simulators.	NWS Yorktown	varies
Counter-Improvised Explosive Device Training	Personnel complete classroom instruction in convoy operations on how to identify, map, and target insurgent networks with reactions to improvised explosive device attacks.		10
ULT Readiness Assessment (Preparation for Final Evaluation Phase)	Personnel complete a classroom assessment prior to entering the intermediate/advanced phases of training.	Cheatham Annex	100–124
Final Evaluation Phase	Personnel demonstrate the required levels of tactical proficiency and warfare knowledge with a demonstrated focus on the collection of human intelligence and tactical electronic warfare.		100–124

Key: C2 = Command and Control; mm = millimeter; EOD = Explosive Ordnance Disposal; ULT = Unit Level Training.
Note: Additional training event details are in Appendix C.

2.3 Alternative 1

Alternative 1 includes the training events analyzed in the No Action Alternative plus the addition of six newly proposed events and a change in the annual frequency of one baseline event. These additional changes would meet Navy readiness requirements into the foreseeable future. The six newly proposed training events would occur at JEB Little Creek, JEB Fort Story, and Dam Neck Annex, as described below. The one change in annual frequency to an existing event would occur at JEB Fort Story. This section includes tables describing these training events and includes separate Alternative 1 figures showing their locations.

2.3.1 Joint Expeditionary Base Little Creek: Alternative 1 Training

Alternative 1 training events are described in Table 2-14 and the corresponding locations at JEB Little Creek are depicted on Figure 2-16. EOD events currently occur at Training Area Normandy/Training Area Delta Dunes and do not exceed 1.4 pounds net explosive weight (NEW); however, USFF would use up to 1.25 pounds NEW during training events.

Table 2-14. Joint Expeditionary Base Little Creek: USFF Alternative 1 Training Events

Alternative 1 Type	*Training Event*	*Event Description*	*Location*	*No. of Events Per Year*		*Primary Training Event Activities*
				Alt. 1	No Action	
New training	EOD Mine Countermeasures ULT (Team Training Phase)	Personnel conduct mine countermeasure training to explosively exploit various mine shapes.	TA Normandy; TA Delta Dunes	1	None	Explosives on land, personnel movement, vehicle movement
New training	EOD ULT (Team Training Phase)	Personnel exercise tactics, techniques, and procedures as a small unit of action. May include Mobile Diving and Salvage team demolition training.	TA Normandy; TA Delta Dunes	1	None	Explosives on land, personnel movement

Key: EOD = Explosive Ordnance Disposal; TA = training area; ULT = Unit Level Training.
Note: Additional training event details are in Appendix C.

Figure 2-16. Alternative 1 – Joint Expeditionary Base Little Creek Training Area

2.3.2 Joint Expeditionary Base Fort Story: Alternative 1 Training

Alternative 1 training events are described in Table 2-15 and the corresponding locations at JEB Fort Story are depicted on Figure 2-17.

Table 2-15. Joint Expeditionary Base Fort Story: USFF Alternative 1 Training Events

Alternative 1 Type	*Training Event*	*Event Description*	*Location*	*No. of Events Per Year*		*Primary Training Event Activities*
				Alt. 1	*No Action*	
Increase in annual frequency	Maritime Prepositioning Squadron - Deep Draft Ship Anchored Off-Shore*	Naval Beach Group personnel conduct beach surveys and surf observations in support of Maritime Pre-positioning Squadron Forces.	TA Utah Beaches I and II	4	1	Beach landings, personnel movement, vehicle movement
New training	EOD and Mobile Diving and Salvage ULT Demolition Training	Personnel practice new tactics and techniques in reporting, locating, identifying, neutralizing, raising-towing to the beach, rendering safe, collecting intelligence, and disposing of underwater ordnance.	Range 1 - Navy EOD Demo	240	None	Explosives on land, personnel movement, vehicle movement, weapons firing – blank-fire
New training	EOD ULT Demolition/ Detonation Training (Utilizing Explosive Hydro-Jet technology)	Personnel conduct simulated improvised explosive device detonation training utilizing explosive hydro-jet and mineral water bottles technologies.	JEB Fort Story - All explosive TAs	240	None	Explosives on land, personnel movement, weapons firing – blank-fire
New training	Expeditionary Training in Urban Setting on Beach	New personnel observe, gather intelligence, and develop sources in an urban environment.	TA Omaha Beach and Building 900	76	None	Explosives on land (Building 900), vehicle movement, personnel movement, weapons firing – blank-fire, weapons firing – non-lethal training ammunition

*Event may include incidental support from non-USFF assets.
Key: EOD = Explosive Ordnance Disposal; JEB = Joint Expeditionary Base; TA = training area; ULT = Unit Level Training.
Note: Additional training event details are in Appendix C.

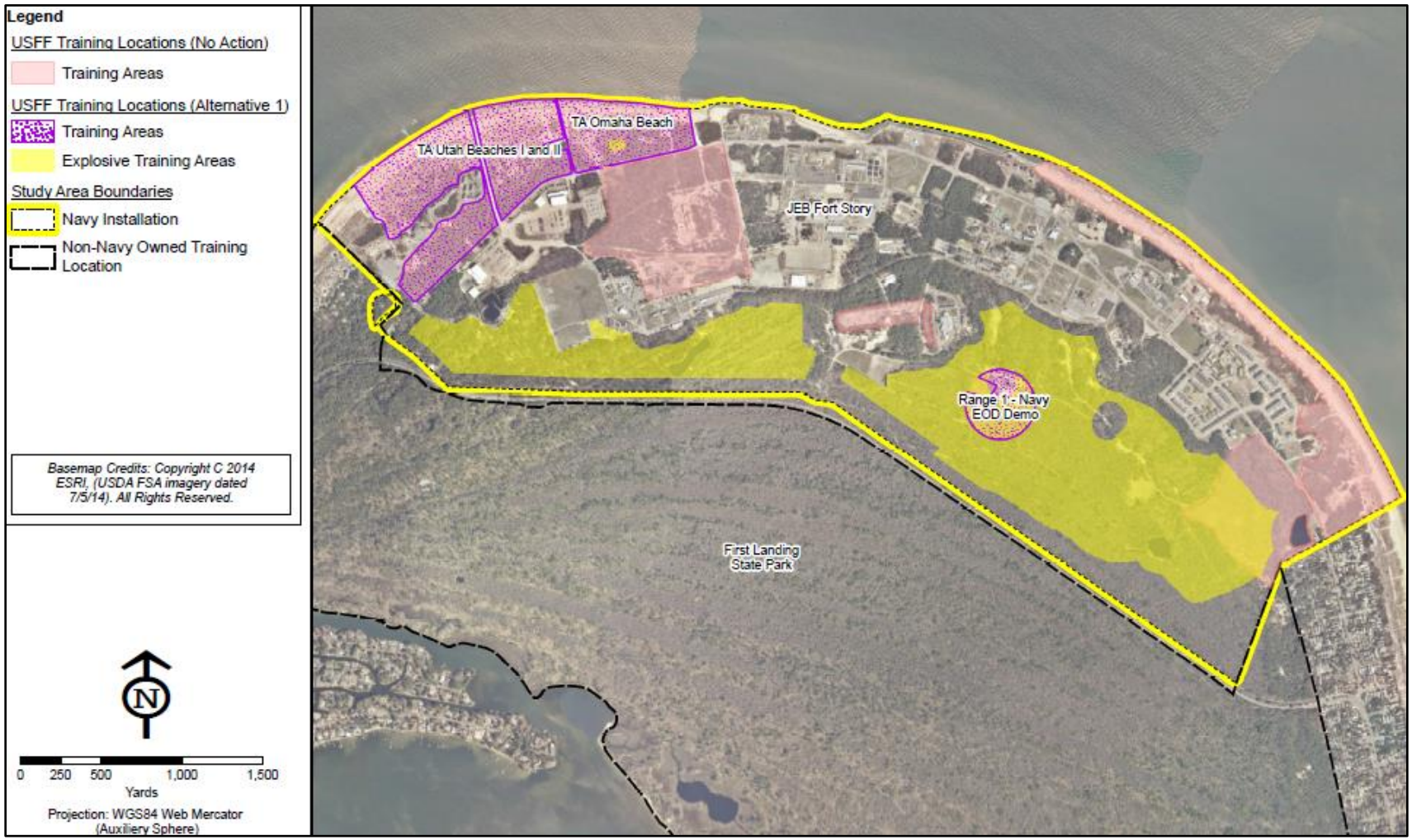


Figure 2-17. Alternative 1 – Joint Expeditionary Base Fort Story Training Areas

2.3.3 Dam Neck Annex: Alternative 1 Training

Alternative 1 training events are described in Table 2-16 and the corresponding locations at Dam Neck Annex are depicted on Figure 2-18.

Table 2-16. Dam Neck Annex: USFF Alternative 1 Training Events

Alternative 1 Type	*Training Event*	*Event Description*	*Location*	*No. of Events Per Year*		*Primary Training Event Activities*
				Alt. 1	*No Action*	
Land-Based Training						
New training	Mine Countermeasures Beach and Exploitation Ops	Personnel practice disarming inert mines from the VACAPES Underwater Detonation box.	Dam Neck Annex North Beach	76	None	Personnel movement, vehicle movement, weapons firing – blank-fire, weapons firing – non-lethal training ammunition

Key: Ops = Operations; VACAPES = Virginia Capes.
Note: Additional training event details are in Appendix C.

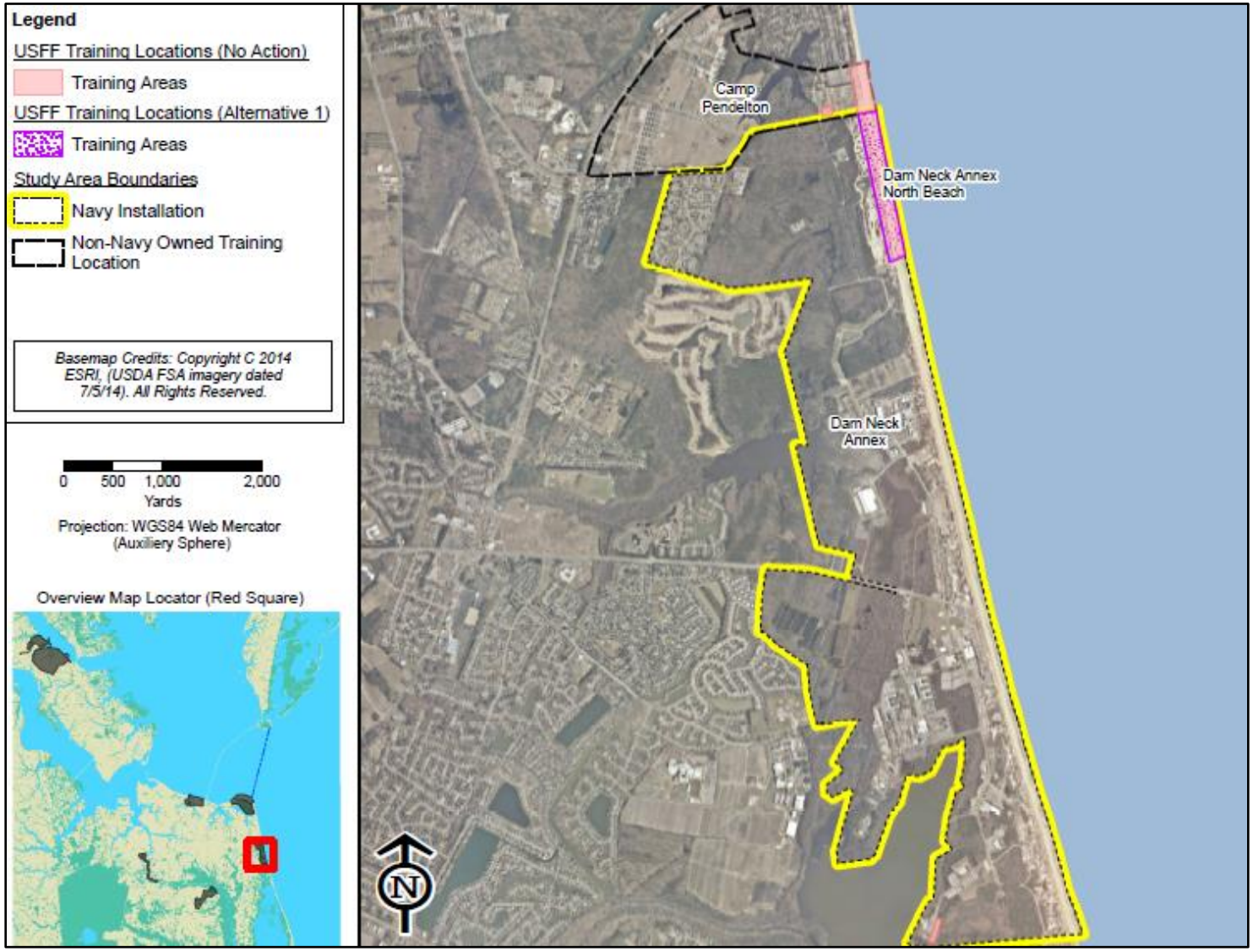


Figure 2-18. Alternative 1 – Dam Neck Annex Training Area

2.4 Alternative 2 (Preferred Alternative)

Alternative 2 analyzes the same training that occurs in Alternative 1, plus the addition of three newly proposed training locations to provide increased flexibility to train throughout the Hampton Roads fleet concentration area. Training at additional locations would not only allow for flexibility, but would also improve readiness, as warfighters need to be proficient in different environments, and would meet Navy readiness requirements into the foreseeable future. Therefore, Alternative 2 would expand the area of potential impacts compared to the other alternatives. The three newly proposed training events would occur at JEB Fort Story, NALF Fentress, and St. Juliens Creek Annex, as described below. This section includes tables describing these training events and includes separate Alternative 2 figures showing their locations. The number of events at each training area reflects the anticipated number required to provide increased flexibility to train to USFF requirements.

2.4.1 Joint Expeditionary Base Fort Story: Alternative 2 Training

Alternative 2 training events are described in Table 2-17 and the corresponding locations at JEB Fort Story are depicted on Figure 2-19. Under Alternative 2, EOD training would expand into a new training area that overlaps with the existing explosive training areas in Alternative 1 and the No Action Alternative. The new training area would add to the existing explosive training areas that include explosives on land, personnel movement, vehicle movement, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition.

Table 2-17. Joint Expeditionary Base Fort Story: USFF Alternative 2 Training Events

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
EOD Drills Field Training Exercises	Personnel conduct field training, normally by four platoons, to exercise tactics, techniques, and procedures as a small unit of action. Scenarios such as simulating improvised explosive devices, surface ordnance, chemical, nuclear, and biological weapons may be included.	TA Wilderness (majority of training would occur at the western boundary of the training area)	56	Explosives on land, personnel movement, vehicle movement, weapons firing – blank-fire, weapons firing – non-lethal training ammunition

Key: EOD = Explosive Ordnance Disposal.
Note: Additional training event details are in Appendix C. Explosives on land would occur within EOD Range 1.

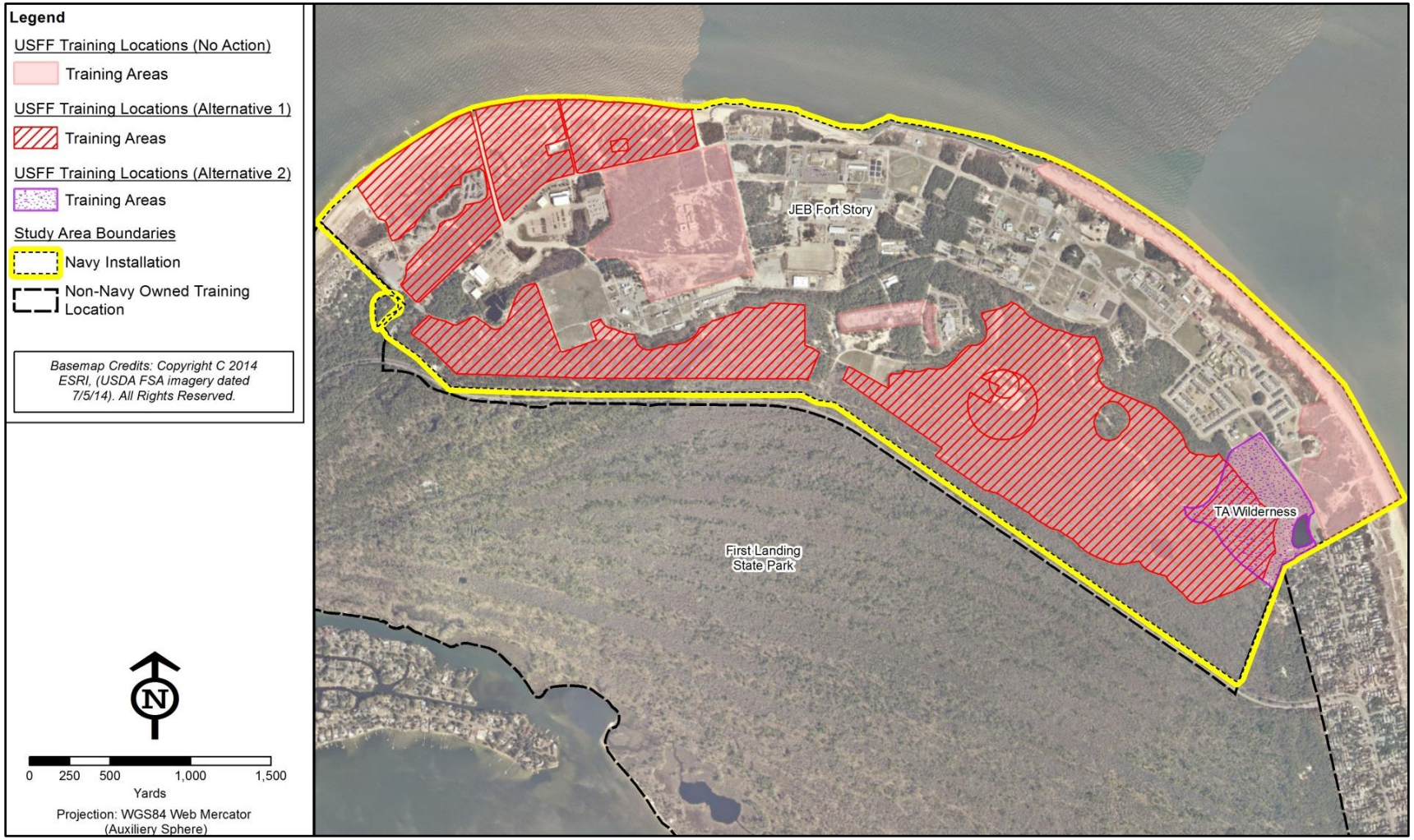


Figure 2-19. Alternative 2 – Joint Expeditionary Base Fort Story Training Areas

2.4.2 Naval Auxiliary Landing Field Fentress: Alternative 2 Training

Alternative 2 training events are described in Table 2-18 and the corresponding locations at NALF Fentress are depicted on Figure 2-20.

Table 2-18. Naval Auxiliary Landing Field Fentress: USFF Alternative 2 Training Events

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
ULT Readiness Assessment (Field Training Exercise for 450 personnel)	Multi-day training where up to 450 personnel achieve security team certifications (e.g., embarked, aircraft, harbor and landside) while in a temporary encampment.	Bunkers; all LZs can be scheduled for encampments; abandoned runways for convoys	3	Equipment use, personnel movement, vehicle movement, weapons firing – blank-fire
ULT Readiness Assessment (Field Training Exercise for 143 personnel)	Multi-day training where up to 143 personnel achieve security team certifications (e.g., embarked, aircraft, harbor and landside) while in a temporary encampment.	Bunkers; all LZs can be scheduled for encampments; abandoned runways for convoys	1	Equipment use, personnel movement, vehicle movement, weapons firing – blank-fire

Key: LZ = Landing Zone; ULT = Unit Level Training.
Note: Additional training event details are in Appendix C.

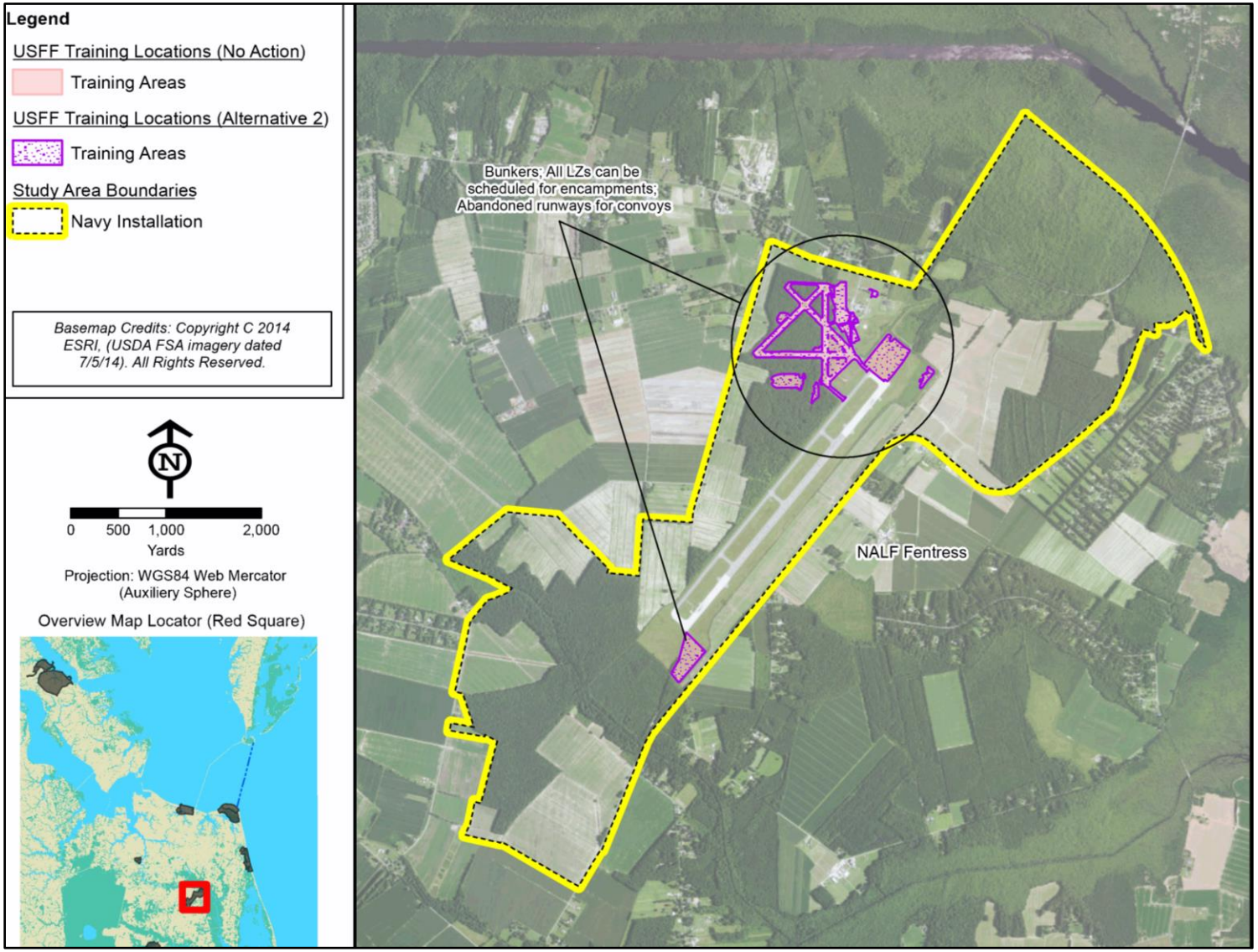


Figure 2-20. Alternative 2 – Naval Auxiliary Landing Field Fentress Training Area

2.4.3 St. Juliens Creek Annex USFF Training Events: Alternative 2 Training

Alternative 2 training events are described in Table 2-19 and the corresponding locations at St. Juliens Creek Annex are depicted on Figure 2-21. Under Alternative 2, a new training area within St. Juliens Creek Annex would be used to support EOD training using vehicle and personnel movement.

Table 2-19. St. Juliens Creek Annex: USFF Alternative 2 Training Events

Training Event	*Event Description*	*Location*	*No. of Events Per Year*	*Primary Training Event Activities*
EOD Drills Field Training Exercise	Personnel conduct field training, normally by four platoons, to exercise tactics, techniques and procedures as a small unit of action. Scenarios such as simulating improvised explosive devices, surface ordnance, chemical, nuclear, and biological weapons may be included.	Northeast corner of St. Juliens Creek Annex surrounding the communications tower	28	Vehicle movement, personnel movement

Key: EOD = Explosive Ordnance Disposal.
Note: Additional training event details are in Appendix C.

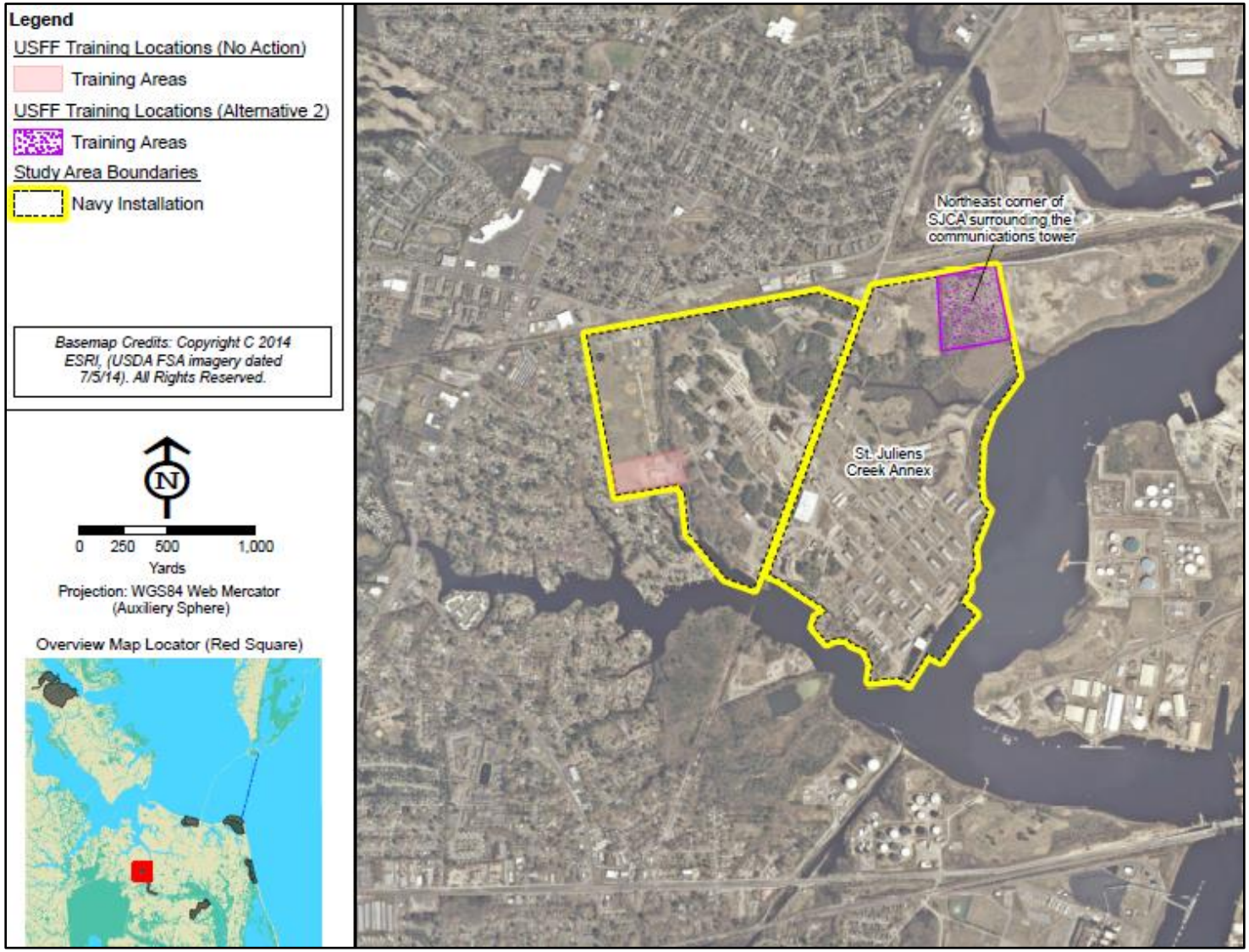


Figure 2-21. Alternative 2 – St. Juliens Creek Annex Training Area

2.5 Summary of Proposed Action and Alternatives for Analysis

As introduced in Section 2.1 (Organization of Training Events for Analysis), the Navy grouped the training events by location and common element (i.e., PTEA) to aid in the analysis of potential environmental impacts. This process allows the analysis to capture the impacts from a combination of events and does not underrepresent impacts from only analyzing individual events. Each training event carried forward for analysis is associated with at least one PTEA. For each PTEA, Table 2-20 shows the list of corresponding training events that involve that PTEA.

Table 2-20. Summary of Primary Training Event Activities and Training Events

Primary Training Event Activity	***Training Events***
Beach landings	• Integrated Beach Training • LCAC Overland Training Maneuvers • Deep Draft Ship Anchored Off-Shore • EOD ULT Small Boat Ordnance Loading and Mine Countermeasures Training • Mobile Diving and Salvage Unit Salvage De-Beaching Ops • ULTRA-Certification (Full Mission Profile)
Equipment use	• ULTRA (FTX for 143, 200, and 450 personnel) • ULT (Surface/Air Cargo Handling) • ULTRA (Navy Cargo Handling Battalion's Readiness) • Air Cargo • Navy Expeditionary Ops
Explosives on land	• Expeditionary Training in Urban Setting • EOD and MDS ULT Demolition Training • EOD Drills FTX • EOD MCM ULT (Team Training Phase) • EOD ULT (Team Training Phase) • EOD ULT Demolition/Detonation Training (Utilizing Explosive Hydro-Jet technology)
Personnel movement	• Advanced ULT Riverine Security Team Land Navigation/Tactical Site Exploitation • Beach Master Ops • Beach Survey • Coastal Riverine Squadron ULT • Deep Draft Ship Anchored Off-Shore • EOD and MDS ULT Demolition Training • EOD Drills • EOD Drills FTX • EOD ULT MCM Beaching Ops • EOD MCM ULT (Team Training Phase) • EOD ULT (Team Training Phase) • EOD ULT Demolition/Detonation Training (Utilizing Explosive Hydro-Jet technology) • Expeditionary Training in Urban Setting • Hiking, Kayaking, Communications Training, Land Navigation, Confidence Training, First Aid Training • Land Navigation • Land Navigation and Tent Encampments • LCAC Overland Training Maneuvers

Table 2-20. Summary of Primary Training Event Activities and Training Events [Continued]

Primary Training Event Activity	*Training Events*
Personnel movement (continued)	• MDS Unit Salvage De-Beaching Ops • MAST/Radar Sonar Surveillance Center/Super High Frequency ULTRA • MCM Beach and Exploitation Ops • Navy Expeditionary Ops • Surface Observations • Physical Training • ULT (Surface/Air Cargo Handling) • ULTRA (FTX for 143 and 450 personnel) • ULTRA (Navy Cargo Handling Battalion's Readiness) • ULTRA-Certification (Full Mission Profile)
Underwater movement	• Underwater Search Procedures
Vehicle movement	• Air Cargo • Air Cargo (Basic/Advanced Class) • Beach Survey • Beach Master Ops • Convoy Counter-Improvised Explosive Device Training • Convoy Ops • EOD and MDS ULT Demolition Training • EOD Drills • EOD Drills FTX • EOD MCM ULT (Team Training Phase) • EOD ULT Small Boat Ordnance Loading and Mine Countermeasures Training • EOD ULT MCM Beaching Ops • Explosives Handling Training • Expeditionary Training in Urban Setting • LCAC Overland Training Maneuvers • Deep Draft Ship Anchored Off-Shore • MAST/Radar Sonar Surveillance Center/Super High Frequency ULTRA • MCM Beach and Exploitation Ops • Navy Expeditionary Ops • Shipboard Cargo • Shipboard Cargo (Basic/Advanced Class) • Surface Observations • ULT (Surface/Air Cargo Handling) • ULTRA (FTX for 143 and 450 personnel) • ULTRA (Navy Cargo Handling Battalion's Readiness)
Vessel movement	• ULTRA-Certification (Full Mission Profile)
Weapons firing-blank-fire	• Aircraft Security Team Unit Level and Certification • EOD and MDS ULT Demolition Training • EOD Drills • EOD Drills FTX • Expeditionary Training in Urban Setting

Table 2-20. Summary of Primary Training Event Activities and Training Events [Continued]

Primary Training Event Activity	*Training Events*
	• EOD ULT Demolition/Detonation Training (Utilizing Explosive Hydro-Jet technology)
Weapons firing-blank-fire (continued)	• Coastal Riverine Squadron ULT • MCM Beach and Exploitation Ops • Navy Expeditionary Ops • ULTRA (Navy Cargo Handling Battalion's Readiness) • ULTRA (FTX for 143, 200, and 450 personnel) • ULTRA-Certification (Full Mission Profile)
Weapons firing-non-lethal training ammunition	• EOD Drills FTX • EOD Drills • Expeditionary Training in Urban Setting on Beach • MCM Beach and Exploitation Operations

Key: CAT = Category; EOD = Explosive Ordnance Disposal; FTX = Field Training Exercise; LCAC = Landing Craft, Air Cushion; MAST = Military Fly Away System Terminal; MCM = Mine Countermeasures; MDS = Mobile Diving and Salvage; Ops = Operations; ULT = Unit Level Training; ULTRA = Unit Level Training Readiness Assessment.

As noted in Section 2.1 (Organization of Training Events for Analysis), the proposed training events and corresponding PTEAs may create one or more stimuli that cause stress on one or multiple resources. Each proposed PTEA was examined to determine its potential stressors; not all stressors affect every resource area and not all PTEAs produce every stressor. Table 2-21 identifies the relationship between stressors and PTEAs within the study area.

Table 2-21. Stressors Associated with Primary Training Event Activities

Primary Training Event Activity	*Stressors*					
	Physical Disturbance	Physical Strike	Public Interaction	Noise	Ingestion	Pollutants [includes Air, Water]
Beach landings	X	X		X		
Equipment use				X		X
Explosives on land	X	X		X		X
Personnel movement	X					
Underwater movement		X		X		
Vehicle movement	X	X		X		X
Vessel movement		X	X	X		X
Weapons firing – blanks			X	X	X	X
Weapons firing – non-lethal training ammunition		X		X		X

*Brass casings are expended during weapons firing with blanks. Uncaptured brass casings are potential pollutants.

To summarize some of the primary training event activities within each training area, additional training event information is derived from the event descriptions in Appendix C (USFF Training Included in the Proposed Action and Alternatives). For instance, to summarize primary training event activities with platform use such as vehicle movement, the total hours are determined by multiplying the number of events, event duration, number of platforms, and platform operating time for each training event and then totaling the hours for each training area (total operational hours is used versus the number of vehicles since operational time provides the best determination of impacts and the number of vehicles for each training event varies). Beach landings are summarized by multiplying the number of events, number of vessels, and beach landings per vessel for each training event and then totaling the landings for each training area. Equipment use for generators is summarized by multiplying the number of events, event duration, number of generators, and generator operating time for each training event and then totaling the hours for each training area. Personnel movement is summarized by multiplying the number of events and number of personnel per event for each training event and then totaling the number for each training area. Weapons firing – blanks and weapons firing – non-lethal training ammunition are summarized by multiplying the number of events by the typical number of rounds fired. Explosives on land are summarized by totaling the number of events in each training area and identifying the number of detonations at the identified NEW.

2.5.1 No Action Alternative Summary for Analysis

Table 2-22 lists a quantitative summary of PTEAs at each training location for the No Action Alternative.

Table 2-22. No Action Alternative Primary Training Event Activities at Each Training Location

Location	*Primary Training Event Activity*	*Annual Quantity*
JEB Little Creek		
Land – Beaches/Dunes		
TA Alpha, Bravo, and Charlie Dunes	Personnel movement	1,020 people
	Vehicle movement	255 hours
TA Anzio Beach 2 and 4	Beach landings	120 landings
	Personnel movement	2,374 people
	Vehicle movement	2,100 hours
TA Anzio Beach 1, 2, and 3; TA Signal Point Field	Beach landings	180 landings
	Personnel movement	2,160 people
TA Mud Flats	Beach landings	48 landings
	Personnel movement	2,504 people
	Vehicle movement	1,205 hours
Land – Non-Beaches/Dunes		
Desert Cove – Piers 54 & 55	Vehicle movement	640 hours
TA Signal Point Field, TA Iwo Jima Field, and TA Rodriguez Field	Personnel movement	720 people
	Weapons firing – blanks	595,400 rounds
JEB Fort Story		
Land – Beaches/Dunes		
TA Inchon Beach	Beach landings	120 landings
	Personnel movement	2,300 people
TA Omaha Beach and Building 900	Beach landings	12 landings
	Personnel movement	884 people
	Vehicle movement	1,430 hours
	Weapons firing – blanks	1,400 rounds

Table 2-22. No Action Alternative Primary Training Event Activities at Each Training Location [Continued]

Location	*Primary Training Event Activity*	*Annual Quantity*
	Weapons firing – non-lethal training ammunition	2,800 rounds
TA Utah Beaches I and II	Beach landings	247 landings
	Personnel movement	3,078 people
	Vehicle movement	3,305 hours
Land – Non-Beaches/Dunes		
All explosive TAs	Explosives on land	80 events (average 8 detonations/event with maximum NEW of 1.25 pounds)
	Personnel movement	3,110 people
	Vehicle movement	3,870 hours
	Weapons firing – blanks	640 rounds
Building 807 (casemate)	Vehicle movement	1,726 hours
	Weapons firing – blanks	1,400 rounds
	Weapons firing – non-lethal training ammunition	2,800 rounds
Range 1 – Navy EOD Demo	Explosives on land	28 events (1 detonation/event with maximum NEW of 1.25 pounds)
	Personnel movement	560 people
	Vehicle movement	23 hours
	Weapons firing – blanks	28 rounds
TA Nike Site	Personnel movement	560 people
	Vehicle movement	1,727 hours
	Weapons firing – blanks	1,400 rounds
	Weapons firing – non-lethal training ammunition	2,800 rounds
TA Small Arms Testing and Evaluation Compound	Personnel movement	560 people
	Vehicle movement	2,240 hours
	Weapons firing – blanks	1,400 rounds
	Weapons firing – non-lethal training ammunition	2,800 rounds
TA Urban Warfare Village	Personnel movement	60 people
TA Wilderness	Personnel movement	300 people
Dam Neck Annex/Camp Pendleton		
Land – Beaches/Dunes		
Dam Neck Annex North Beach; Camp Pendleton Beach	Beach landings	380 landings
	Personnel movement	1,454 people
	Vehicle movement	3,715 hours
Land – Non-Beaches/Dunes		
Camp Pendleton Shipboard Trainer; Baum Village	Personnel movement	560 people
	Vehicle movement	187 hours
	Weapons firing – blanks	1,400 rounds
NALF Fentress		
Land – Non-Beaches/Dunes		
	Personnel movement	1,800 people
	Vehicle movement	4,500 hours

Table 2-22. No Action Alternative Primary Training Event Activities at Each Training Location [Continued]

Location	*Primary Training Event Activity*	*Annual Quantity*
Bunkers; All LZs can be scheduled for Camping; Abandoned runways for convoys	Weapons firing – blanks	4,500 rounds
	Weapons firing – non-lethal training ammunition	9,000 rounds
Northwest Annex		
Land – Non-Beaches/Dunes		
Marine Corps Fleet Anti-Terrorism Security Team Urban Training Facility – Munro Village	Personnel movement	1,190 people
	Vehicle movement	510 hours
St. Juliens Creek Annex		
Land – Non-Beaches/Dunes		
St. Juliens Creek Annex Building 277 fenced compound	Equipment use	21,948 hours
	Personnel movement	4,843 people
	Vehicle movement	4,527 hours
	Weapons firing – blanks	35,200 rounds
NWS Yorktown		
Land – Non-Beaches/Dunes		
Home Station Training Lanes	Equipment use	2,016 hours
	Vehicle movement	8,100 hours
	Weapons firing – blanks	28,100 rounds
	Weapons firing – non-lethal training ammunition	5,000 rounds
Yorktown EOD Demolition Range	Explosives on land	104 events (average 13 detonations/event with maximum NEW of 25 pounds)
	Personnel movement	1,560 people
	Vehicle movement	1,092 hours
	Weapons firing – blanks	1,352 rounds
TA A (Driving Course)	Vehicle movement	18,000 hours
Cheatham Annex		
Land – Non-Beaches/Dunes		
C-130 Cargo Load Trainer (Zone J)	Equipment use	400 hours
	Vehicle movement	1,304 hours
	Weapons firing – blanks	64,000 rounds
Cheatham Annex Field TAs (Cheatham Annex Zones C, D, F, H, I, and L)	Equipment use	6,300 hours
	Personnel movement	2,093 people
	Vehicle movement	2,273 hours
	Weapons firing – blanks	12,800 rounds
Cheatham Annex Field TAs (Cheatham Annex Zones C, D, F, H, I, and L), Crane Training Site (Zone K), T-ACS (pierside) Cheatham Annex Pier (CAD A), C-130 Cargo Load Trainer (Zone J)	Equipment use	61,920 hours
	Personnel movement	8,772 people
	Vehicle movement	5,904 hours
	Equipment use	5,760 hours
	Personnel movement	720 people

Table 2-22. No Action Alternative Primary Training Event Activities at Each Training Location [Continued]

Location	*Primary Training Event Activity*	*Annual Quantity*
Cheatham Annex Field TAs (Cheatham Annex Zones C, D, F, H, I, and L); T-ACS (pierside)	Vehicle movement	504 hours
	Weapons firing – blanks	5,600 rounds
T-ACS (pierside)	Vehicle movement	5,058 hours
Water and Adjacent Shoreline		
Jones Pond (Cheatham Annex Training Zone F)	Personnel movement	24 people
	Underwater movement	1 events
First Landing State Park		
Land – Non-Beaches/Dunes		
Main Gate to access park trails	Personnel movement	592 people
Southern Branch of the Elizabeth River		
Water and Adjacent Shoreline		
Southern Branch	Personnel movement	2,160 people
	Vessel movement	1,980 hours
	Weapons firing – blanks	144,000 rounds (21,600 uncaptured brass rounds)

Key: CAD A = Cheatham Annex Pier (formerly Cheatham Annex Depot) training location; EOD = explosive ordnance disposal; JEB = Joint Expeditionary Base; LZ = landing zone; NALF = Naval Auxiliary Landing Field; NEW = net explosive weight; NWS = Naval Weapons Station; TA = training area; T-ACS = auxiliary crane ship.

2.5.2 Alternative 1 Summary for Analysis

Table 2-23 provides a quantitative summary of PTEAs for the newly proposed or changed training events that would occur at JEB Little Creek, JEB Fort Story, and Dam Neck Annex under Alternative 1. The quantities represent the additional numbers over and above those accounted for under the No Action Alternative events. The No Action Alternative event totals are not included in the Annual Quantity column of Table 2-23.

Table 2-23. Alternative 1 Primary Training Event Activities at Each Training Location

Location	*Primary Training Event Activity*	*Annual Quantity*
JEB Little Creek		
Land – Beaches/Dunes		
TA Normandy; TA Delta Dunes	Explosives on land	2 events (2 detonations with a maximum NEW of 1.25 pounds)
	Personnel movement	48 people
	Vehicle movement	1 hour
JEB Fort Story		
Land – Beaches/Dunes		
TA Omaha Beach and Building 900	Explosives on land	76 events (1 detonation/event with maximum NEW of 1.25 pounds)
	Personnel movement	1,368 people
	Vehicle movement	291 hours
	Weapons firing – blanks	22,952 rounds
	Weapons firing – non-lethal training ammunition	15,200 rounds

Table 2-23. Alternative 1 Primary Training Event Activities at Each Training Location [Continued]

Location	*Primary Training Event Activity*	*Annual Quantity*
TA Utah Beaches I and II	Beach landings	165 landings
	Personnel movement	900 people
	Vehicle movement	2,880 hours
Land – Non-Beaches/Dunes		
All explosive TAs	Explosives on land	240 events (average 9 detonations/event with maximum NEW of 0.2 pounds)
	Personnel movement	5,280 people
	Weapons firing – blanks	2,160 rounds
Range 1 – Navy EOD Demo	Explosives on land	240 events (average 13 detonations/event with maximum NEW of 1.25 pounds)
	Personnel movement	5,280 people
	Vehicle movement	60 hours
	Weapons firing – blanks	3,120 rounds
Dam Neck Annex/Camp Pendleton		
Land – Beaches/Dunes		
Dam Neck Annex North Beach	Personnel movement	1,368 people
	Vehicle movement	291 hours
	Weapons firing – blanks	7,600 rounds
	Weapons firing – non-lethal training ammunition	30,400 rounds

Key: EOD = Explosive Ordnance Disposal; JEB = Joint Expeditionary Base; NEW = net explosive weight; TA = training area.

2.5.3 Alternative 2 Summary for Analysis

Table 2-24 provides a quantitative summary of PTEAs for the newly proposed training events at JEB Fort Story, NALF Fentress, and St. Juliens Creek Annex under Alternative 2. The quantities represent the additional numbers over and above those accounted for under the No Action Alternative and Alternative 1 events. For example, the No Action Alternative and Alternative 1 event totals are not included in the Annual Quantity column of Table 2-24.

Table 2-24. Alternative 2 Primary Training Event Activities at Each Training Location

Location	*Primary Training Event Activity*	*Annual Quantity*
JEB Fort Story		
Land – Non-Beaches/Dunes		
TA Wilderness	Explosives on land	56 events (1 detonation/event maximum NEW 1.25 pounds)
	Personnel movement	784 people
	Vehicle movement	3,640 hours
	Weapons firing – blanks	2,912 rounds
	Weapons firing – non-lethal training ammunition	5,600 rounds
NALF Fentress		
Land – Non-Beaches/Dunes		
	Equipment use	6,300 hours

Table 2-24. Alternative 2 Primary Training Event Activities at Each Training Location [Continued]

Location	*Primary Training Event Activity*	*Annual Quantity*
Bunkers; all LZs can be scheduled for camping; abandoned runways for convoys	Personnel movement	1,493 people
	Vehicle movement	1,072 hours
	Weapons firing – blanks	12,800 rounds
St. Juliens Creek Annex		
Land – Non-Beaches/Dunes		
Northeast corner of St. Juliens Creek Annex surrounding the communications tower	Personnel movement	392 people
	Vehicle movement	1,890 hours

Key: JEB = Joint Expeditionary Base; LZ = landing zone; NALF = Naval Auxiliary Landing Field; NEW = net explosive weight; TA = training area.
Note: Explosives on land would occur within EOD Range 1.

2.6 Alternatives Considered but Eliminated from Detailed Analysis

These alternatives were considered but eliminated because they did not meet the purpose and need:

- no training alternative
- use of practice ordnance only versus live/high explosive ordnance
- using alternative range locations
- conducting simulated/synthetic training only

2.6.1 No Training Alternative

If the Navy did not conduct training exercises along the east coast, it would not be able to meet its obligations, as identified in Title 10 United States Code section 5062, which requires the Navy to be "organized, trained, and equipped primarily for the prompt and sustained combat incident to operate at sea." Without proper training, U.S. combat forces would not be capable of deploying at a level of readiness necessary to respond to "real world" contingency situations. For these reasons, an alternative that would decrease military training from current levels or eliminate training altogether would not meet the purpose of and need for the Proposed Action. Therefore, this alternative was not carried forward for further analysis.

2.6.2 Use of Practice Ordnance Only

An alternative that would rely entirely on non-explosive practice ammunition use within the study area would not achieve the necessary levels of proficiency in explosives in a high stress and realistic environment. Non-explosive practice ammunition is utilized within the study area and provides the opportunity to implement a successful, integrated training program while reducing the risk and expense typically associated with live explosives. As such, practice explosives are already utilized extensively to enhance combat performance in the Navy's training program. However, while it is an essential component of training, practice explosives cannot be used exclusively to train safely in an inherently unsafe combat environment since it would not provide the necessary proficiency under realistic

conditions. Consequently, this alternative fails to meet the purpose of and need for the Proposed Action. Therefore, this alternative was not carried forward for further analysis.

2.6.3 Using Alternative Range Locations Outside of the Hampton Roads Fleet Concentration Area

Range locations outside the Hampton Roads fleet concentration area would not provide:

- proximity to the homeport region of Norfolk, Virginia, as well as the Navy command headquarters, training schools, ships, submarines, aircraft squadrons, and Marine Corps forces located there
- proximity to Hampton Roads fleet concentration area shore-based facilities and infrastructure and the logistical support provided for training events
- proximity to Hampton Roads fleet concentration area military families, in light of the readiness benefits derived from minimizing the time Sailors and Marines spend deployed away from home
- presence of unique training and testing ranges, which include the established mine warfare capabilities in the VACAPES Range Complex, and naval training beaches located at JEB Little Creek – Fort Story and Dam Neck Annex capable of supporting amphibious training events
- environmental conditions (topography and weather) that maximize the training realism and testing effectiveness

The uniquely interrelated nature of the components of the installations and other training sites located within the study area provides the optimal training environment required to maintain readiness.

2.6.4 Conducting Simulated/Synthetic Training Only

The Navy uses simulation extensively for training and continues to research new ways to provide realistic training through simulation, but there are limits to the realism that technology can presently provide. Unlike live training, computer-based training does not provide the requisite level of realism necessary to attain combat readiness. Simulation cannot replicate the inherent high-stress environment and complexity of the coordination needed to combine multiple military assets and personnel into a single fighting unit.

Today's simulation technology does not permit all warfare training with the degree of fidelity required to maintain proficiency. While simulators are used for the basic training, they are of limited utility beyond basic training. A simulator cannot match the dynamic nature of the environment, such as bathymetry or the training activities involving several units with multiple crews interacting in a variety of environments. Just as a pilot would not be ready to fly solo after simulator training, a Navy commander cannot allow military personnel to engage in real combat activities based merely on simulator training. Moreover, it is imperative that crews achieve competence and gain confidence in their ability in the mode they will use in combat operations.

Computer simulation can provide familiarity and complement live training; however, it cannot provide the fidelity and level of training necessary to prepare naval forces for deployment. Therefore, the alternative of substituting simulation for live training fails to meet the purpose of and need for the Proposed Action and was eliminated from detailed study.

2.7 Best Management Practices Included in Proposed Action

This section presents an overview of the best management practices (BMPs) that are incorporated into the Proposed Action in this document. BMPs are existing policies, practices, and measures that the Navy

implements to reduce the environmental impacts of designated activities, functions, or processes. Although BMPs mitigate potential impacts by avoiding, minimizing or reducing/eliminating impacts, BMPs are distinguished from potential mitigation measures because BMPs are (1) existing requirements for the Proposed Action, (2) ongoing, regularly occurring practices, or (3) not unique to this Proposed Action. In other words, the BMPs identified in this document are inherently part of the Proposed Action and are not potential mitigation measures proposed as a function of the NEPA environmental review process for the Proposed Action. Table 2-25 includes a list of BMPs.

Table 2-25. Best Management Practices

Best Management Practice	***Description***	***Impacts Reduced/Avoided***
The Navy provides public notification of training events, as needed.	Throughout the study area, the Navy provides notification to the public via various media such as radio and television when training events may result in increased noise and/or activity.	Navy notification prior to training events reduces the potential for the public to be alarmed or annoyed by increases in noise or activity.
Discovery of unrecorded or unevaluated cultural resources is managed in accordance with existing procedures.	In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy would manage these resources in accordance with the National Historic Preservation Act and other federal and state laws, Navy, and DoD regulations and instructions, and DoD American Indian and Alaska Native Policy, by implementing Standard Operating Procedure #12, *Project Specific Standard Treatment of Archaeological Resources*, of the Integrated Cultural Resources Management Plan, which contains procedures for inadvertent discovery of archaeological materials and for human remains.	Navy management practices for discovery of unrecorded or unevaluated cultural resources include the requirement for training activities to cease and appropriate notification of cultural resource staff. These existing procedures ensure potential cultural resources are protected.
The Navy practices safe navigation during operation of small vessels.	Navy surface vessel operators are alert at all times, travel at a safe speed for the prevailing conditions, use state-of the-art satellite navigational systems, and are trained to take proper action to avoid collisions.	Safe navigation practices minimize interaction between vessels and objects, species, and habitats in the water.
The Navy delays, moves, or cancels training activities if conditions present a risk to the safety of the public.	Training activities would be delayed, moved, or cancelled if there is any question about the safety of the public.	Relocation or delay of Navy training activities minimizes risk to public safety.
Range maintenance procedures remove and dispose of debris within explosive training areas.	Routine range maintenance of explosive training areas is conducted. During range maintenance, debris is safely removed from the area and disposed of in compliance with applicable requirements.	Range maintenance reduces the likelihood of pollutant transmission into nearby surface waters.
<u>Southern Branch of the Elizabeth River</u> Blank-fire activities from small vessels are not conducted if non-participants are within 200 feet of participating small vessels.	Navy operators of small vessels visually scan the training area to ensure that non-participants are not present. If non-participants are present within 200 feet of small vessels, the Navy does not conduct blank-fire activities within the Southern Branch of the Elizabeth River.	The separation from non-participants minimizes the impacts of noise from blank-fire events on the general public and eliminates the risk to the general public from expended brass casings.

2.8 Comparison of Alternatives

Table 2-26 presents a comparison of the alternatives with respect to the number and type of primary training events associated with each stressor for each location. The quantities for Alternative 1 represent the additional numbers over and above those accounted for under the No Action Alternative events, and the quantities for Alternative 2 represent the additional numbers over and above those accounted for under the No Action Alternative and Alternative 1 events. For example, the No Action Alternative event totals are not included in the Annual Quantity Alternative 1 column of Table 2-26.

Table 2-26. Comparison of Alternatives

Location	*Primary Training Event Activity*	*Annual Quantity*		
		No Action Alternative	*Alternative 1 (difference from the No Action Alternative)*	*Alternative 2 (difference from Alternative 1)*
JEB Little Creek				
Land –Beaches/Dunes				
TA Alpha, Bravo, and Charlie Dunes	Personnel movement	1,020 people		
	Vehicle movement	255 hours		
TA Anzio Beach 2 and 4	Beach landings	120 landings		
	Personnel movement	2,374 people		
	Vehicle movement	2,100 hours		
TA Anzio Beach 1, 2, and 3; TA Signal Point Field	Beach landings	180 landings		
	Personnel movement	2,160 people		
TA Mud Flats	Beach landings	48 landings		
	Personnel movement	2,504 people		
	Vehicle movement	1,205 hours		
TA Normandy; TA Delta Dunes	Explosives on land	0 events	2 event (2 detonations with a maximum NEW of 1.25 pounds)	
	Personnel movement	0 people	48 people	
	Vehicle movement	0 hours	1 hour	
Land – Non-Beaches/Dunes				
Desert Cove – Piers 54 & 55	Vehicle movement	640 hours		
TA Signal Point Field, TA Iwo Jima Field, and TA Rodriguez Field	Personnel movement	720 people		
	Weapons firing – blanks	595,400 rounds		
JEB Fort Story				
Land –Beaches/Dunes				
TA Inchon Beach	Beach landings	120 landings		
	Personnel movement	2,300 people		
TA Omaha Beach and Building 900	Beach landings	12 landing		
	Explosives on land	0 events	76 events (1 detonation/event with maximum NEW of 1.25 pounds)	
	Personnel movement	884 people	1,368 people	

Table 2-26. Comparison of Alternatives [Continued]

Location	*Primary Training Event Activity*	*Annual Quantity*		
		No Action Alternative	*Alternative 1 (difference from the No Action Alternative)*	*Alternative 2 (difference from Alternative 1)*
TA Omaha Beach and Building 900 (Continued)	Vehicle movement	1,430 hours	291 hours	
	Weapons firing – blanks	1,400 rounds	22,952 rounds	
	Weapons firing – non-lethal training ammunition	2,800 rounds	15,200 rounds	
TA Utah Beaches I and II	Beach landings	247 landings	165 landings	
	Personnel movement	3,078 people	900 people	
	Vehicle movement	3,305 hours	2,880 hours	
Land – Non-Beaches/Dunes				
All explosive TAs	Explosives on land	80 events (average 8 detonations/event with maximum NEW of 1.25 pounds)	240 events (average 9 detonations/event with maximum NEW of 0.2 pounds)	
	Personnel movement	3,110 people	5,280 people	
	Vehicle movement	3,870 hours		
	Weapons firing – blanks	640 rounds	2,160 rounds	
TA Nike Site	Personnel movement	560 people		
	Vehicle movement	1,727 hours		
	Weapons firing – blanks	1,400 rounds		
	Weapons firing – non-lethal training ammunition	2,800 rounds		
Building 807 (casemate)	Vehicle movement	1,726 hours		
	Weapons firing – blanks	1,400 rounds		
	Weapons firing – non-lethal training ammunition	2,800 rounds		
TA Small Arms Testing and Evaluation Compound	Personnel movement	560 people		
	Vehicle movement	2,240 hours		
	Weapons firing – blanks	1,400 rounds		
	Weapons firing – non-lethal training ammunition	2,800 rounds		
TA Urban Warfare Village	Personnel movement	60 people		
Range 1 – Navy EOD Demo	Explosives on land	28 events (1 detonation/event with maximum NEW of 1.25 pounds)	240 events (average 13 detonations/event with maximum NEW of 1.25 pounds)	
	Personnel movement	560 people	5,280 people	
	Vehicle movement	23 hours	60 hours	
	Weapons firing – blanks	28 rounds	3,120 rounds	

Table 2-26. Comparison of Alternatives [Continued]

Location	*Primary Training Event Activity*	*Annual Quantity*		
		No Action Alternative	*Alternative 1 (difference from the No Action Alternative)*	*Alternative 2 (difference from Alternative 1)*
TA Wilderness	Explosives on land	0 events		56 events (1 detonation/event maximum NEW 1.25 pounds). Detonations occur at Range 1.
	Personnel movement	300 people		784 people
	Vehicle movement	0 hours		3,640 hours
	Weapons firing – blanks	0 events		2,912 rounds
	Weapons firing – non-lethal training ammunition	0 events		5,600 rounds
Dam Neck Annex/Camp Pendleton				
Land –Beaches/Dunes				
Dam Neck Annex North Beach; Camp Pendleton Beach	Beach landings	380 landings		
	Personnel movement	1,454 people	1,368 people	
	Vehicle movement	3,715 hours	291 hours	
	Weapons firing – blanks	0 events	7,600 rounds	
	Weapons firing – non-lethal training ammunition	0 events	30,400 rounds	
Land – Non-Beaches/Dunes				
Camp Pendleton Shipboard Trainer; Baum Village	Personnel movement	560 people		
	Vehicle movement	187 hours		
	Weapons firing – blanks	1,400 rounds		
NALF Fentress				
Land – Non-Beaches/Dunes				
Bunkers; All LZs can be scheduled for Camping; Abandoned runways for convoys	Equipment use	0 hours		6,300 hours
	Personnel movement	1,800 people		1,493 people
	Vehicle movement	4,500 hours		1,072 hours
	Weapons firing – blanks	4,500 rounds		12,800 rounds
	Weapons firing – non-lethal training ammunition	9,000 rounds		
Northwest Annex				
Land – Non-Beaches/Dunes				
Marine Corps Fleet Anti-Terrorism Security Team Urban Training Facility – Munro Village	Personnel movement	1,190 people		
	Vehicle movement	510 hours		

Table 2-26. Comparison of Alternatives [Continued]

Location	*Primary Training Event Activity*	*Annual Quantity*		
		No Action Alternative	*Alternative 1 (difference from the No Action Alternative)*	*Alternative 2 (difference from Alternative 1)*
St. Juliens Creek Annex				
Land – Non-Beaches/Dunes				
St. Juliens Creek Annex Building 277 fenced compound	Equipment use	21,948 hours		
	Personnel movement	4,843 people		
	Vehicle movement	4,527 hours		
	Weapons firing – blanks	35,200 rounds		
Northeast corner of St. Juliens Creek Annex surrounding the communications tower	Personnel movement	0 people		392 people
	Vehicle movement	0 hours		1,890 hours
NWS Yorktown				
Land – Non-Beaches/Dunes				
Home Station Training Lanes	Equipment use	2,016 hours		
	Vehicle movement	8,100 hours		
	Weapons firing – blanks	28,100 rounds		
	Weapons firing – non-lethal training ammunition	5,000 rounds		
Yorktown EOD Demolition Range	Explosives on land	104 events (average 13 detonations/event with maximum NEW of 25 pounds)		
	Personnel movement	1,560 people		
	Vehicle movement	1,092 hours		
	Weapons firing – blanks	1,352 rounds		
TA A (Driving Course)	Vehicle movement	18,000 hours		
Cheatham Annex				
Land – Non-Beaches/Dunes				
C-130 Cargo Load Trainer (Zone J)	Equipment use	400 hours		
	Vehicle movement	1,304 hours		
	Weapons firing – blanks	64,000 rounds		
Cheatham Annex Field TAs (Cheatham Annex Zones C, D, F, H, I, and L)	Equipment use	6,300 hours		
	Personnel movement	2,093 people		
	Vehicle movement	2,273 hours		
	Weapons firing – blanks	12,800 rounds		

Table 2-26. Comparison of Alternatives [Continued]

Location	*Primary Training Event Activity*	*Annual Quantity*		
		No Action Alternative	*Alternative 1 (difference from the No Action Alternative)*	*Alternative 2 (difference from Alternative 1)*
Cheatham Annex Field TAs (Cheatham Annex Zones C, D, F, H, I, and L), Crane Training Site (Zone K), T-ACS (pierside) Cheatham Annex Pier (CAD A), C-130 Cargo Load Trainer (Zone J)	Equipment use	61,920 hours		
	Personnel movement	8,772 people		
	Vehicle movement	5,904 hours		
Cheatham Annex Field TAs (Cheatham Annex Zones C, D, F, H, I, and L); T-ACS (pierside)	Equipment use	5,760 hours		
	Personnel movement	720 people		
	Vehicle movement	504 hours		
	Weapons firing – blanks	5,600 rounds		
T-ACS (pierside)	Vehicle movement	5,058 hours		
Water and Adjacent Shoreline				
Jones Pond (Cheatham Annex Training Zone F)	Personnel movement	24 people		
	Underwater movement	1 events		
First Landing State Park				
Land – Non-Beaches/Dunes				
Main Gate to access park trails	Personnel movement	592 people		
Southern Branch of the Elizabeth River				
Water and Adjacent Shoreline				
Eastern Branch	Personnel movement	2,160 people		
	Vessel movement	1,980 hours		
	Weapons firing – blanks	144,000 rounds (21,600 uncaptured rounds)		

Key: CAD A = Cheatham Annex Pier (formerly Cheatham Annex Depot) training location; EOD = Explosive Ordnance Disposal; JEB = Joint Expeditionary Base; LZ = landing zone; NALF = Naval Auxiliary Landing Field; NEW = net explosive weight; TA = training area; T-ACS = auxiliary crane ship.

3 AFFECTED ENVIRONMENT

This chapter presents a description of the environmental resources and baseline conditions that could be affected from implementing the Proposed Action. All potentially relevant environmental resource areas were initially considered for analysis in this Environmental Assessment (EA). In compliance with the National Environmental Policy Act (NEPA), Council on Environmental Quality, and Department of Navy guidelines, the discussion of the affected environment (i.e., existing conditions) focuses only on those resource areas potentially subject to impacts. Additionally, the level of detail used in describing a resource is commensurate with the anticipated level of potential environmental impact. This section includes air quality, water resources, biological resources, cultural resources, noise, public health and safety, hazardous materials and wastes, and socioeconomics. All resource areas are not present at each location and, therefore, only applicable resource areas are discussed for each location.

Resources Not Analyzed in Detail in this EA

The potential impacts to the following resource areas are considered to be negligible or non-existent, so they were not analyzed in detail in this EA:

- **Geological Resources:** Geological resources include topography, geology, and soils. Topography is typically described with respect to the elevation, slope, and surface features found within a given area. The geology of an area may include bedrock materials, mineral deposits, and fossil remains. The principal geological factors influencing the stability of structures are soil stability and seismic properties. Soil refers to unconsolidated earthen materials overlying bedrock or other parent material. Soil structure, elasticity, strength, shrink-swell potential, and erodibility determine the ability for the ground to support structures and facilities. Soils are typically described in terms of their type, slope, physical characteristics, and relative compatibility or limitations with regard to particular construction activities and types of land use. While ground disturbance would occur in some locations as a result of the Proposed Action, no change in topography or geology would occur. In addition, soil erodibility is addressed in Section 3.2 (Water Resources), and, therefore, geological resources are not analyzed separately.
- **Land Use:** The term *land use* refers to real property classifications that indicate either natural conditions or the types of human activity occurring on a parcel. Two main objectives of land use planning are to ensure orderly growth and compatible uses among adjacent property parcels or areas. Natural conditions of property can be described or categorized as unimproved, undeveloped, conservation or preservation area, and natural or scenic area. There is a wide variety of land use categories resulting from human activity. Descriptive terms often used include residential, commercial, industrial, agricultural, institutional, and recreational. The Proposed Action does not include changes to land use and, therefore, land use was not carried forward for analysis.
- **Utilities:** Utilities typically include water distribution, wastewater collection, stormwater collection, solid waste management, energy, communications, and facilities. Impacts to utilities are primarily associated with changes in the number of personnel utilizing the utility infrastructure and/or construction, renovation, and demolition actions that result in a change on the demands on the existing utility infrastructure. Since the Proposed Action does not involve changes to personnel or construction, no changes to utilities would occur and, therefore, this resource area was not carried forward for analysis.

- **Population, Housing and Employment**: Socioeconomics is typically defined as the basic attributes and resources associated with the human environment, particularly characteristics of population and economic activity. Demographics, employment characteristics, and housing occupancy status data provide key insights into socioeconomic conditions that might be affected by a proposed action. Since the Proposed Action does not involve changes to populations, housing or employment, these socioeconomic resource areas are not carried forward for analysis. As described in Section 3.8 (Socioeconomics), socioeconomic resources analyzed in this EA are limited to: recreational activities and commercial and recreational transportation and fishing.
- **Environmental Justice:** Environmental justice is the concept that fair treatment and meaningful involvement of all people will be given regardless of race, color, national origin, or income with respect to creation, implementation, and enforcement of environmental laws, regulations, and policies. Consideration of environmental justice involves the poverty status, race, and ethnicity of populations that could be affected by proposed action(s). The Proposed Action does not involve any activities (noise, air emissions, health, or other hazards) that would disproportionately affect minority or low-income populations. Noise, safety, and health conditions affecting low-income and minority populations would not change perceptibly from those currently found at the Navy installations and the non-Navy training areas. Furthermore, the Proposed Action would not expose these populations to increased health and safety risks (see Section 4.6, Public Health and Safety). Therefore, environmental justice (per Executive Order [EO] 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) is not carried forward for detailed examination.

3.1 Air Quality

3.1.1 Definition of the Resource

This discussion of air quality includes criteria pollutants, standards, sources, permitting, and climate change associated with greenhouse gas (GHG) emissions. Air quality in a given location is defined by the concentration of various pollutants in the atmosphere. A region's air quality is influenced by many factors, including the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. Therefore, this section is organized differently from other resource area sections in this chapter; air emissions are grouped for the entire study area instead of grouping by specific training location, because emissions are not limited by the boundary of a training location. Air quality within a region is tracked by county or city air emissions.

3.1.2 Regulatory Framework

3.1.2.1 Criteria Pollutants and National Ambient Air Quality Standards

The principal pollutants defining the air quality, called "criteria pollutants," include carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, suspended particulate matter less than or equal to 10 microns in diameter, fine particulate matter less than or equal to 2.5 microns in diameter, and lead are emitted by both stationary and mobile emissions sources. Carbon monoxide, sulfur dioxide, lead, and some particulates are emitted directly into the atmosphere from emissions sources. Ozone, nitrogen dioxide, and some particulates are formed through atmospheric chemical reactions that are influenced by weather, ultraviolet light, and other atmospheric processes.

Clean Air Act. Under the Clean Air Act (CAA), the U.S. Environmental Protection Agency (USEPA) has established National Ambient Air Quality Standards (NAAQS) (40 Code of Federal Regulations [CFR] part 50) for these pollutants. NAAQS are classified as primary or secondary. Primary standards protect against adverse health effects; secondary standards protect against welfare effects, such as damage to farm crops and vegetation and damage to buildings. Some pollutants have long-term and short-term standards designed to protect against acute and chronic, health effects, respectively.

Areas that are and have historically been in compliance with the NAAQS are designated as attainment areas. Areas that violate a federal air quality standard are designated as non-attainment areas. Areas that have transitioned from non-attainment to attainment are designated as maintenance areas and are required to adhere to maintenance plans to ensure continued attainment.

The CAA requires states to develop a general plan to attain and maintain the NAAQS and a specific plan to attain the standards for each area designated non-attainment for a NAAQS. These plans, known as State Implementation Plans, are developed by state and local air quality management agencies and submitted to USEPA for approval.

3.1.2.2 Hazardous Air Pollutants

In addition to the NAAQS for criteria pollutants, there are two sets of national emissions standards that regulate hazardous air pollutants from stationary sources. The National Emission Standards for Hazardous Air Pollutants (40 CFR part 61) regulate emissions of specific hazardous air pollutant compounds from specific sources, while National Emission Standards for Hazardous Air Pollutants (40 CFR part 63) regulate hazardous air pollutant emissions from listed categories of stationary sources. Hazardous air pollutants emitted from mobile sources are commonly called Mobile Source Air Toxics. Mobile Source Air Toxics are compounds emitted from highway vehicles and non-road equipment, which are known or suspected to cause cancer or other serious health and environmental effects. USEPA issued Mobile Source Air Toxic Rules, identifying 21 compounds as being hazardous air pollutants that required regulation. A subset of six of these Mobile Source Air Toxic compounds were identified as having the greatest influence on health: benzene, 1,3-butadiene, formaldehyde, acrolein, acetaldehyde, and diesel particulate matter. Unlike the criteria pollutants, there are no NAAQS for hazardous air pollutants.

3.1.2.3 General Conformity

The USEPA General Conformity Rule applies to federal actions occurring in non-attainment or maintenance areas when the total direct and indirect emissions of non-attainment pollutants (or their precursors) exceed specified thresholds. The emissions thresholds that trigger requirements for a conformity analysis are called *de minimis* levels. *De minimis* levels (in tons per year) vary by pollutant and also depend on the severity of the non-attainment status for the air quality management area in question. All counties and cities within the study area have been determined by USEPA to be in attainment for all criteria pollutants and, therefore, General Conformity analysis is not required (USEPA, 2016a).

3.1.2.4 Permitting

The CAA requires new major stationary sources and major modifications at existing major stationary sources to have an air pollution permit before commencing construction. Because all emission sources

involved in the Proposed Action and alternatives are related to mobile sources, there is no further discussion of Title V or New Source Review permitting.

3.1.3 Regional Conditions

3.1.3.1 Climate (Regional)

The Hampton Roads area enjoys a temperate climate with cooling winds off the water in the heat of summer and warming winds in winter. The climate is relatively humid in the warmer summer months. On average, the warmest month is July, with the high temperature averaging around 87 degrees Fahrenheit. The average low temperature in January is 32 degrees Fahrenheit.

Hampton Roads in general receives approximately 20 percent more annual rainfall than the United States average. Snowfall is 70 percent lower than the United States annual average.

3.1.3.2 Air Quality (Regional)

All components of the Proposed Action and alternatives would take place within the Hampton Roads Intrastate Air Quality Control Region. The Virginia Department of Environmental Quality (DEQ) is responsible for implementing and enforcing state standards and federal air quality regulations in Virginia.

Hampton Roads was designated non-attainment for the 1997 ozone NAAQS on April 30, 2004 (69 *Federal Register* [FR] 23941), and redesignated on June 1, 2007 (72 FR 30490), to attainment/maintenance. In 2008, USEPA issued a revision to the ozone NAAQS, setting it to 0.075 parts per million or 75 parts per billion (ppb). On May 21, 2012 (77 FR 30088), Hampton Roads was designated as in attainment of this more stringent standard. On March 6, 2015 (80 FR 12264), USEPA published the final 2008 ozone NAAQS implementation rule, which revoked the 1997 ozone NAAQS for areas like Hampton Roads that had attained the 84-ppb standard, been redesignated for the 84-ppb standard, and been designated attainment/classifiable in the 2012 publication for the 2008 ozone NAAQS.

All counties and cities within the Hampton Roads Intrastate Air Quality Control Region have been determined by USEPA to be in attainment for all criteria pollutants (USEPA, 2015). This classification is found in 40 CFR section 81.347. At this time, neither transportation conformity nor General Conformity requirements apply to the Hampton Roads area; therefore, a General Conformity evaluation is not required for federal actions.

3.1.3.3 Baseline Emissions

The counties and cities that include the 10 primary training locations are identified in Table 3.1-1; where applicable, Table 3.1-1 also contains the current air emissions permit for each primary training location. The most recent 2014 National Emissions Inventory data (last updated November 1, 2016) of annual pollutant emissions for study area-relevant Hampton Roads counties or unincorporated cities are shown in Table 3.1-2 (USEPA, 2016b). The city and county data include emissions amounts from point sources, area sources, and mobile sources. *Point sources* are stationary sources that can be identified by name and location. *Area sources* are point sources from which emissions are too low to track individually, such as a home or small office building, or a diffuse stationary source, such as wildfires or agricultural tilling. *Mobile sources* are any kind of vehicle or equipment with gasoline or diesel engine, an aircraft, or a ship. Two types of mobile sources are considered: on-road and non-road. On-road sources consist of vehicles such as cars, light trucks, heavy trucks, buses, engines, and motorcycles. Non-road sources are aircraft, locomotives, diesel and gasoline boats and ships, personal watercraft, lawn and garden equipment,

agricultural and construction equipment, and recreational vehicles (USEPA, 2015). Volatile organic compound and nitrogen oxide emissions are used to represent ozone generation because they are precursors of ozone.

Table 3.1-1. Primary Training Location Counties and Cities

Counties/Cities	*Primary Training Location*	*Air Permit Information*
City of Virginia Beach	Joint Expeditionary Base (JEB) Little Creek	JEB Little Creek's emissions are covered under a Title V Operating Permit (No. TRO-60033) issued by the State of Virginia. JEB Little Creek is a Title V major source of SO_2, NO_x, CO, VOCs, and HAPs.
	Fort Story	JEB Fort Story's emissions are covered under a state stationary source permit to operate (Registration No. 60330, Facility Identification No. 51-810-00005)
	Dam Neck Annex and Camp Pendleton	Dam Neck Annex operates under a Synthetic Minor-Source Permit (Registration No. 60280, Facility Identification No. 51-810-00006). Permit is not required for Camp Pendleton.
	First Landing State Park	NA
City of Chesapeake	Naval Auxiliary Landing Field (NALF) Fentress	NALF Fentress operates under a synthetic minor source exemption (AIRS ID No. 550-00215)
	Northwest Annex	Northwest Annex operates under stationary source permit No. TRO-60957.
	Southern Branch of the Elizabeth River	NA
	St. Juliens Creek Annex	NA
York County	Naval Weapons Station (NWS) Yorktown	NWS Yorktown's emissions are covered under a State Operating Permit (No. TRO-60301) issued by the State of Virginia. The installation is classified as a synthetic minor source.
	Cheatham Annex	Cheatham Annex operates under a Synthetic Minor Source Permit (Registration No. 60275, Facility Identification No. 51-199-00003).
James City County	NWS Yorktown	NWS Yorktown's emissions are covered under a State Operating Permit (No. TRO-60301) issued by the State of Virginia. The installation is classified as a synthetic minor source.

Key: AIRS ID = Aerometric Information Retrieval System Identification; CO = carbon monoxide; JEB = Joint Expeditionary Base; HAP = hazardous air pollutant; NA = Not Applicable; NALF = Naval Auxiliary Landing Field; NO_x = nitrogen oxides; NWS = Naval Weapons Station; SO_2 = sulfur dioxide; VOC = volatile organic compound.

3.1.3.4 Region of Influence Summary Emissions

As noted in Table 3.1-1, the 10 primary training locations are located within two counties and two independent cities within the Hampton Roads Intrastate Air Quality Control Region. That region comprises four counties and 10 cities. Table 3.1-2 presents the annual emissions inventory for the four counties and/or cities within the overall air quality region of influence for the Proposed Action. The remaining two counties and eight cities within the Hampton Roads Intrastate Air Quality Control Region are not listed in Table 3.1-2. If they had been listed, the total annual criteria pollutant and GHG emissions within the region of influence would be much greater than that shown in Table 3.1-2. For conservative comparison purposes, only emission data for the City of Virginia Beach, City of Chesapeake, York County, and James City County are provided.

Table 3.1-2. Affected Environment Baseline National Emissions Inventory (2014)

Location	Annual Emissions (tons/year)						
	Criteria Pollutants						GHGs
	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOCs	CO_2e
City of Virginia Beach	50,786	6,900	3,649	1,313	606	14,445	1,885,588
City of Chesapeake	32,784	6,039	3,918	1,132	10,501	11,418	1,422,975
York County	13,428	3,600	2,425	534	9,798	5,235	555,093
James City County	11,158	2,092	1,322	469	451	5,712	436,469
ROI Total	***108,156***	***18,631***	***11,314***	***3,448***	***21,356***	***36,810***	***4,300,125***

Source: (USEPA, 2016b)
Key: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gases; NO_x = nitrogen oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; SO_2 = sulfur dioxide; ROI = region of influence; VOC = volatile organic compound.

3.1.3.5 Greenhouse Gases and Climate Change

Climate change refers to any significant change in the measures of climate lasting for an extended period of time (USEPA, 2016c). These gases act like a blanket around the earth, trapping energy in the atmosphere and causing it to warm (USEPA, 2016c). According to USEPA, the global average temperature has increased by more than 1.5 degrees Fahrenheit since the late 1800s. Natural causes alone cannot explain all of these changes. Human activities are contributing to climate change, primarily by releasing tons of GHGs, such as carbon dioxide, into the atmosphere every year. Most of the warming of the past half century has been caused by human activities that result in the emissions of GHGs, including burning fossil fuels for heat and energy, clearing forests, fertilizing crops, storing waste in landfills, raising livestock, and producing some kinds of industrial products. These GHG emissions include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (USEPA, 2016d).

Each GHG is assigned a global warming potential, which refers to the ability of a gas or aerosol to trap heat in the atmosphere (USEPA, 2016e). The global warming potential rating system is standardized to carbon dioxide, which has a value of one. The equivalent carbon dioxide rate is calculated by multiplying the emissions of each GHG by its global warming potential and adding the results together to produce a single, combined emissions rate representing all GHGs. An increase in GHGs, especially those with larger global warming potentials, causes more heat to be retained.

The buildup of GHGs in the atmosphere and the warming of the planet affect many aspects of the environment. Not all of the effects of GHG are related to climate. For example, elevated concentrations of carbon dioxide can lead to ocean acidification and stimulate terrestrial plant growth, and methane emissions can contribute to higher ozone levels.

The United States and the world are warming, global sea level is rising, and some types of extreme weather events are becoming more frequent and more severe (U.S. Global Change Research Program, 2016). These elements of climate change may impact the way the Navy executes its missions by increasing demand to provide humanitarian assistance and relief related to natural disasters, reducing the availability of infrastructure at coastal installations due to rising sea levels and increased flooding, and limiting training activities due to severe weather and available supporting infrastructure. The Navy's

role in the defense of our country requires planning for a wide range of contingencies. Included in these contingencies is the future trend of climate change.

The Navy is actively developing and participating in energy, environmental, and climate change initiatives that will increase use of alternative energy and reduce emissions of GHGs. The Navy is committed to improving energy security and environmental stewardship by reducing reliance on fossil fuels. The Navy has adopted energy, environmental, and climate change goals including increasing alternative energy use Navy-wide to 50 percent by 2020; reducing non-tactical petroleum use; ensuring environmentally sound acquisition practices; and ensuring environmentally compliant operations for ships, submarines, aircraft, and facilities operated by the Navy.

While the implications of climate change may influence factors such as water availability and agriculture and food security, the factors applicable to the Proposed Action in the study area include extreme weather and sea level rise. These climate change factors are described below and are further discussed, as appropriate, in the water resources and biological resources sections.

Extreme Weather - The number of Category 4 and 5 hurricanes in the Atlantic basin has increased substantially since the early 1980s compared to the historical record that dates back to the mid-1880s; this can be attributed to both natural variability and climate change (Carter et al., 2014). Because the study area is in a region of transition for precipitation between wetter conditions to the north and drier conditions to the southwest, many of the model projections show only small changes relative to natural variations (Carter et al., 2014).

Sea Level Rise – The Chesapeake Bay region, including the Hampton Roads area, has the highest rates of sea-level rise on the Atlantic Coast of the United States (Eggleston & Pope, 2013). Over the past century, Chesapeake Bay waters have risen about 1 foot and are predicted to rise another 1.3 to 5.2 feet over the next 100 years (Chesapeake Bay Program, 2016). In addition, land in the region is sinking, primarily from natural causes, resulting in sea levels rising faster than the global average (Center for Sea Level Rise, 2016). As a result, Virginia Beach has been identified as among the most vulnerable areas to sea level rise within the United States based on the population living on land less than 1 meter above local mean high water (Strauss et al., 2012). Sea level rise in the study area may have implications on the available beach/shoreline areas and ecosystems for sensitive species. Ecosystems such as tidal marshes are at risk from sea level rise; the pace of sea level rise will increasingly lead to inundation of coastal wetlands in the region (Carter et al., 2014). Sea level rise in coastal habitats can increase the salinity of surface water areas, leading to a decline in the extent and composition of coastal marshes. This increase in salinity impacts the plant and animal species that are present in these areas. Climate change could result in shifts in local species composition, invasive or new locally viable species, changes in species growth rates, shifts in migratory patterns or dates, and alterations to spawning seasons (Osgood, 2008).

3.2 Water Resources

3.2.1 Definition of the Resource

This discussion of water resources includes surface water, wetlands, floodplains, shorelines, sediments, and soils. This section also discusses the physical characteristics of waters, wetlands, etc.; wildlife and vegetation are addressed in Section 3.3 (Biological Resources).

Surface water resources generally consist of wetlands, lakes, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale.

Wetlands are jointly defined by USEPA and the U.S. Army Corps of Engineers (USACE) as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands generally include "swamps, marshes, bogs and similar areas."

Floodplains are areas of low-level ground present along rivers, stream channels, large wetlands, or coastal waters. Floodplain ecosystem functions include natural moderation of floods, flood storage and conveyance, groundwater recharge, and nutrient cycling. Floodplains also help to maintain water quality and are often home to a diverse array of plants and animals. In their natural vegetated state, floodplains slow the rate at which the incoming overland flow reaches the main water body. Floodplain boundaries are most often defined in terms of frequency of inundation, that is, the 100-year and 500-year flood. Floodplain delineation maps are produced by the Federal Emergency Management Agency (FEMA) and provide a basis for comparing the locale of the Proposed Action to the floodplains.

Shorelines can be located along marine (oceans), brackish (estuaries), or fresh (lakes) bodies of water. Physical dynamics of shorelines include tidal influences, channel movement and hydrological systems, flooding or storm surge areas, erosion and sedimentation, water quality and temperature, presence of nutrients and pathogens, and sites with potential for protection or restoration. Shoreline ecosystems are vital habitat for multiple life states of many fish, birds, reptiles, amphibians, and invertebrates. Different shore zones provide different kinds and levels of habitat, and when aggregated, can significantly influence life. Organic matter that is washed onto the shore, or "wrack," is an important component of shoreline ecosystems, providing habitat for invertebrates, soil and organic matter, and nutrients to both the upland terrestrial communities and aquatic ecosystems.

Sediments are the solid fragments of organic and inorganic matter created from weathering rock transported by water, wind, and ice (glaciers) and deposited at the bottom of bodies of water. Components of sediment range in size from boulders, cobble, and gravel to sand (particles 0.05 to 2.0 millimeters [mm] in diameter), silt (0.002 to 0.05 mm), and clay (less than or equal to 0.002 mm). Sediment may also be produced locally as non-living particulate organic material ("detritus") that travels to the bottom (Milliman, 1972). Through the downward movement of organic and inorganic particles in the water column, substances that are otherwise scarce in the water column (e.g., metals) are concentrated in bottom sediment. The Southern Branch of the Elizabeth River is the only training location in the study area that includes activities that may impact sediments and therefore sediment discussion is limited to this training location.

Soil refers to unconsolidated earthen materials overlying bedrock or other parent material. Soil structure, elasticity, strength, shrink-swell potential, and erodibility determine the ability for the ground to support structures and facilities. Soils are typically described in terms of their type, slope, physical characteristics, and relative compatibility or limitations with regard to particular construction activities and types of land use. Since the Proposed Action does not include construction activities, the discussion of soils focuses on the potential for erosion. Erosion potential considers the susceptibility to erosion by water and also considers the surface runoff potential of soils or the loss of water from an area by flow

over the land surface. Surface runoff potential in this analysis assumes that the surface of the soil is bare and retention of surface water due to irregularities in the ground surface is minimal.

Climate change-related sea level rise and increases in intensity of storms may increase pollutant runoffs, impact wetlands functioning, impair water quality, overwhelm water infrastructures, and impact groundwater/drinking water from salt water intrusion. Sea level rise and storm surge can have impacts far beyond the area directly affected. Sea level rise combines with other climate-related impacts and existing pressures such as land subsidence, causing significant economic and ecological implications. Freshwater supplies from rivers, streams, and groundwater sources near the coast are at risk from accelerated saltwater intrusion due to higher sea levels.

3.2.2 Regulatory Framework

A number of federal laws regulate land uses and actions that have the potential to impact the condition of surface waters (including wetlands) due to the importance of these resources to the health of ecosystems and the human environment. Regulations related to water quality and floodplains are described in this section. Regulations related to wildlife habitat, navigation, and recreational uses of water resources are described in other relevant sections.

3.2.2.1 Surface Water

Clean Water Act of 1977 (33 United States Code [U.S.C.] section 1251 et seq., which amends the Federal Water Pollution Control Act of 1972) and subsequent amendments were designed to assist in restoring and maintaining the chemical, physical, and biological integrity of waters of the United States. The Clean Water Act (CWA) sets water quality standards for all contaminants in surface waters and specifies permitting requirements, delegated to individual states, for discharges of wastewater and storm water to waters of the United States under the National Pollutant Discharge Elimination System (NPDES). Section 402 of the CWA regulates the discharge of pollutants from point sources into waters of the United States and prohibits spills, leaks, or other discharges of oil or hazardous substances into waters of the United States without a permit. The CWA limits any discharge of pollutants to a level sufficient to ensure compliance with state water quality standards. Direct discharges of effluents are regulated under numerical limitations contained in the NPDES permit issued by USEPA or under the state NPDES program approved by USEPA.

The Virginia DEQ administers the NPDES program in Virginia (Virginia Pollutant Discharge Elimination System [VPDES]). Virginia DEQ issues VPDES permits for all point source discharges to surface waters, including: wastewater treatment plants, Municipal Separate Storm Sewer Systems (MS4), industrial activities stormwater discharges, and construction activities stormwater discharges.

The relevance of these federal and state regulations for activities covered in this EA is that individual installations must comply with Section 402 of the CWA through NPDES permits and Storm Water Pollution Prevention Plans (SWPPP). Activities that would introduce new contributions to existing stormwater management systems affecting point source discharge limits need to be addressed by and/or incorporated into the existing facility plans, programs, and/or permits. Table 3.2-1 lists the existing permits for Proposed Action training locations.

Table 3.2-1. Virginia Pollutant Discharge Elimination System Permits for Proposed Action Training Locations

Location	*Permit*	*Permit Description*	*Effective Dates*
JEB Little Creek, JEB Fort Story, and Dam Neck Annex	General Permit for Discharges of Stormwater from Small MS4	Authorizes operators of small MS4 to discharge to surface waters within the boundaries of the Commonwealth of Virginia.	July 1, 2013-June 30, 2018
JEB Little Creek	VPDES	Authorizes stormwater discharge and identifies monitoring requirements.	January 1, 2015-December 31, 2019
JEB Fort Story	VPDES	Authorizes stormwater discharge and identifies monitoring requirements.	July 1, 2014-June 30, 2019
Dam Neck Annex	VPDES	Authorizes stormwater discharge and identifies monitoring requirements.	July 1, 2014-June 30, 2019
NALF Fentress	Virginia Pollution Abatement Permit	Requires monitoring of spray irrigation wastewater associated with land application.	June 28, 2011-June 27, 2021
Northwest Annex	VPDES	Authorizes wastewater treatment plant discharge and identifies monitoring requirements.	August 1, 2014-July 31, 2019
St. Juliens Creek Annex	VPDES	Authorizes stormwater discharge and identifies monitoring requirements.	July 1, 2014-June 30, 2019
NWS Yorktown	VPDES	Authorizes stormwater discharge and identifies monitoring requirements.	July 1, 2014-June 30, 2019
Cheatham Annex	VPDES	Authorizes stormwater discharge and identifies monitoring requirements.	July 1, 2014-June 30, 2019

Key: JEB = Joint Expeditionary Base; MS4 = Municipal Separate Storm Sewer Systems; NALF = Naval Auxiliary Landing Field; NWS = Naval Weapons Station; VPDES = Virginia Pollutant Discharge Elimination System.

Sections 305(b) and 303(d) of the CWA require states to conduct water quality assessments and report water bodies that do not meet federal water quality standards or that have impaired uses. The Commonwealth of Virginia designates six uses for surface waters: aquatic life, fish consumption, public water supply, shellfish consumption, recreation, and/or wildlife. “Impaired waters” contain levels of contamination higher than those allowed by water quality standards and, therefore, cannot support one or more of their designated uses. Under Section 303(d) of the CWA, states are required to develop total maximum daily loads (TMDLs) for impaired waters under their jurisdictions. USEPA defines a TMDL as a measure of the maximum amount of a pollutant that a water body can receive and still safely meet water quality standards (USEPA, 2017). A TMDL study identifies sources of pollution and the reductions needed from those identified pollutant sources to meet water quality standards.

The Virginia DEQ maintains the list of 303(d) impaired waters in Virginia, last published for 2014 (Virginia DEQ, 2016). There are two extensive lists, one for impaired waters needing cleanup plans, and one for impaired waters not needing cleanup plans. Chesapeake Bay and tidal tributaries are impaired for fish consumption due to polychlorinated biphenyls in fish tissue; select segments of the Bay and its tidal tributaries are impaired for aquatic life uses including shallow-water submerged aquatic vegetation, deep-water aquatic life, deep seasonal refuge, and open water aquatic life due to dissolved oxygen concentrations. As of 2010, the Southern Branch of the Elizabeth River and its tidal tributaries are impaired for fish consumption due to dioxin (including 2,3,7,8-tetrachlorodibenzo-p-dioxin).

EO 12088, *Federal Compliance with Pollution Control Standards* requires federal facilities to comply with all substantive and procedural requirements applicable to point and non-point sources of pollution.

EO 13508, *Chesapeake Bay Protection and Restoration* (74 FR 23099) The purpose of the EO is "to protect and restore the health, heritage, natural resources, and social and economic value of the nation's largest estuarine ecosystem and natural sustainability of its watershed." The EO directed federal agencies to "define environmental goals for the Chesapeake Bay and describe milestones for making progress toward attainment of these goals." As one of the largest landholders in the Chesapeake Bay watershed, the Department of Defense (DoD) has been engaged in protection and restoration initiatives and programs under such planning efforts as the Chesapeake Bay Program, Chesapeake Ecosystem Unified Plan, the Chesapeake 2000: A Watershed Partnership agreement, and the Chesapeake Bay Restoration Act of 2000 (Lane et al., 2007).

The Chesapeake Bay Program is a unique regional, state, federal, and local partnership that has been directing and conducting the restoration of the Chesapeake Bay since the signing of the 1983 Chesapeake Bay Agreement (USEPA, 2016f). The Navy leads the DoD Chesapeake Bay Program and represents the DoD throughout the partnership with the Chesapeake Bay Watershed Agreement and EO 13508 and Strategy guiding the overall management of the DoD Chesapeake Bay Program (DoD, 2016a).

In 2010, the USEPA established the Chesapeake Bay TMDL that addresses poor water quality in the Chesapeake Bay and its tribal tributaries (USEPA, 2016g). The TMDL addresses direction identified in EO 13508 and set Chesapeake Bay watershed limits of 185.9 million pounds of nitrogen, 12.5 million pounds of phosphorus, and 6.45 billion pounds of sediments per year. The TMDL is designed to ensure that all pollution control measures needed to fully restore the Chesapeake Bay and its tidal rivers are in place by 2025 (USEPA, 2016g). Each jurisdiction (Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia, and the District of Columbia) developed Watershed Implementation Plans that detail how they would meet the pollution allocations. In 2018, the Virginia Department of Environmental Quality will submit to USEPA the Virginia Phase III Watershed Implementation Plan (Virginia DEQ, 2017).

DoD supports ongoing efforts of the Chesapeake Bay TMDL by tracking and reporting implementation of best management practices (BMPs) for installations within the Chesapeake Bay watershed (130 installations) (DoD, 2016a). The Chesapeake Bay TMDL is a combination of 92 smaller TMDLs for individual Chesapeake Bay tidal segments. For the study area, relevant TMDLs are identified within each training location discussion.

3.2.2.2 Wetlands

EO 11990, *Protection of Wetlands*, requires federal agencies to adopt a policy to avoid, to the extent practicable, long- and short-term adverse impacts associated with the destruction and modification of wetlands and to avoid the direct and indirect support of new construction in wetlands whenever there is a practicable alternative.

3.2.2.3 Floodplains

EO 11988, *Floodplain Management,* sets forth the responsibilities of federal agencies for reducing the risk of flood loss or damage to personal property, minimizing the impacts of flood loss, and restoring the natural and beneficial functions of floodplains. Compliance with the EO pertains to the 100-year floodplain, which is the area susceptible to being inundated by the base flood, that is, the flood having a 1 percent chance of being equaled or exceeded in any given year. In coastal areas, FEMA also maps

coastal flood zones, labeled as V zones (identified V if estimated, or VE if based on engineering calculations) based on velocity hazard caused by wave action. EO 11988 requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. Since the Proposed Action does not include the occupancy or modification of floodplains, this resource area is not discussed further in this EA.

3.2.3 Joint Expeditionary Base Little Creek

The following describe the existing conditions for the water resources at Joint Expeditionary Base (JEB) Little Creek.

3.2.3.1 Surface Waters

JEB Little Creek is located within the Chesapeake Bay/Small Coastal Basin watershed, which encompasses the small bays, tidal estuaries, river inlets, islands, and the shoreline immediately surrounding the Bay as well as the Bay itself. Surface water bodies cover approximately 590 acres of JEB Little Creek. Little Creek Harbor, which includes Desert Cove, Little Creek Cove, Fisherman's Cove, and Little Creek Channel, is a 470-acre tidal estuary. Freshwater inputs to the harbor are primarily from Little Creek, which drains into the harbor from the west through Fisherman's Cove. Non-tidal surface water resources at Little Creek include three fresh water lakes and five ponds in the central and eastern portions of the installation, along with several streams (Navy, 2017c). The lakes and ponds provide habitat for a variety of wildlife species as well as recreational opportunities. All five ponds are located within the area of the golf course.

The Virginia DEQ has assessed water quality for the Chesapeake Bay and its tributaries, which is documented in the Virginia DEQ 2014 305(b)/303(d) Virginia Water Quality Assessment Integrated Report (Virginia DEQ, 2016). Per this report, the designated use for JEB Little Creek is aquatic life (Virginia DEQ, 2016). The Chesapeake Bay and its tidal tributaries, which include Little Creek Harbor, are considered impaired for fish consumption. Portions of the Bay and its tidal tributaries have been identified as impaired for aquatic life uses and have exceeded the water quality standards for dissolved oxygen, water clarity, and chlorophyll a because of excess nutrients and sediment. According to the Virginia DEQ's Final 2014 305(b)/303(d) Integrated Report (Virginia DEQ, 2016), none of the freshwater lakes and ponds on JEB Little Creek are listed as impaired.

The stormwater drainage system at JEB Little Creek collects runoff from impermeable surfaces throughout developed areas and directs discharges through a total of 28 regulated stormwater outfalls (Table 3.2-1). The outfalls discharge to Little Creek Cove, Desert Cove, and Fisherman's Cove, which all drain to Little Creek Channel, as well as directly to Little Creek Channel. JEB Little Creek has a SWPPP (dated 2015). The SWPPP identifies potential pollutants and describes stormwater management standards, stormwater management controls, and BMPs to maintain and protect water quality. These measures help protect surface water quality in freshwater resources on the installation by preventing uncontrolled runoff. JEB Little Creek outfalls are monitored under the conditions set forth in the VPDES permit issued for the installation. The 2015–2019 permit for JEB Little Creek requires periodic monitoring of flow, pH, total suspended solids, total dissolved solids, total petroleum hydrocarbons, and dissolved copper and zinc at 10 outfalls.

In addition to the VPDES permit, JEB Little Creek is included under a consolidated General Permit for Discharges of Stormwater from Small MS4. The General Permit requires implementation of measures at

each covered installation to achieve compliance with the Navy's MS4 program. Measures include educational programs to reduce contribution of pollutants to the sewer system, identification of illicit discharges, compliance with TMDL goals, and other BMPs related to facilities operations (referred to as "good housekeeping") and stormwater control. The MS4 permit requires development of a Chesapeake Bay Total Maximum Daily Load Action Plan in accordance with the permit and subsequent guidance provided by the Virginia DEQ. Navy installations regulated under the permit are required to reduce nutrient and sediment loads to the Bay watershed.

3.2.3.2 Wetlands

A 2009 wetland delineation completed by the Navy and reverified by the USACE in 2015 identified approximately 76 acres of wetlands at JEB Little Creek (Navy, 2017c). There is an intermittent stream that flows into Little Creek Cove through wetlands and mudflats along the southeastern side of the cove.

3.2.3.3 Shorelines

The shoreline of the harbor is almost entirely developed with bulkhead, riprap, and quay walls, except for an isolated area of salt marsh on Little Creek Cove and an undeveloped beach on the eastern shore of Little Creek Channel (Navy, 2017c).

Ocean currents push sand northward along the coast and into the Chesapeake Bay inlet channel, but the sand accretion this causes further west at Cape Henry is interrupted prior to reaching the Little Creek shoreline by the Lynnhaven inlet. Within-Bay wave energy is relevant for erosion conditions at Little Creek for winds directed from the north and northeast, which is capable of generating low to medium wave energy across this portion of the southern bay (Hardaway Jr. & Byrne, 1999). Long-term erosion rates for the Chesapeake Bay shoreline within the boundaries of Virginia Beach, which includes the JEB Little Creek shoreline, are estimated at 1.7 feet/year (Hardaway Jr. & Byrne, 1999). Tidal circulation results in a net transport of sand westward along this reach of bay shoreline from the Lynnhaven inlet to the Willoughby spit (Hardaway Jr. & Byrne, 1999). A jetty was installed at the east entrance of Little Creek Channel in the 1920s to prevent this sand from filling the channel (Hardaway Jr. & Byrne, 1999). This results in erosional conditions on the eastern beach segment of JEB Little Creek, while the western beaches tend to be more stable.

FEMA Flood Insurance Rate Map 5155310016F shows that the entire bay shoreline is characterized as VE, coastal flood zone with velocity hazard (wave action). The general shoreline in the vicinity of the installation is erosional (Beaches and Waterways Advisory Committee, 2002), with evidence of active erosion along the relatively narrow beach fronting Training Area (TA) Charlie dunes at the eastern side of the JEB Little Creek shoreline. The Anzio beaches to the west do not show signs of active erosion.

Little Creek Harbor has natural shoreline conditions consisting of a small wetland located in the vicinity of the existing Morale, Welfare, and Recreation Marina, approximately 150 feet southwest of Pier 8 (Navy, 2017c). This wetland is connected to Little Creek Harbor under a bridge on Iwo Jima Road. The entire shoreline along the Morale, Welfare, and Recreation Marina and Piers 5 and 6 consists of seawalls or hard structures, and no fringe wetlands are present.

3.2.3.4 Soils - Erosion Potential

The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), Web Soil Survey identifies 18 soil types at JEB Little Creek (NRCS, 2013a). These soil types range in rating from moderate to very low susceptibility to erosion by water; the beaches along the northern boundary are not rated

for erosion potential (NRCS, 2013b). While the beaches are not rated for erosion potential, the soils adjacent to the beaches have a low susceptibility to erosion by water. The primary areas of very high runoff potential are in the developed areas of JEB Little Creek; the remainder of the installation is identified as low to negligible potential for runoff (NRCS, 2013c).

The Web Soil Survey also provides ratings for various military operations. Since the Proposed Action primarily includes training with personnel and vehicle movement, the bivouac area category in the Web Soil Survey was reviewed to determine the compatibility with field operations such as site preparation used for tents and parking areas as well as heavy foot traffic and some vehicle traffic. A "very limited" rating indicates that the soil has one or more features that are unfavorable for the specified use; in general, the surface of the area should absorb rainfall readily, remain firm under heavy foot traffic, and should not be dusty when dry. While approximately half of JEB Little Creek is not rated for military operation suitability, including the beaches, the area adjacent to the beaches is rated very limited for field operations (NRCS, 2013d).

3.2.4 Joint Expeditionary Base Fort Story

The following describe the existing conditions for the water resources at JEB Fort Story.

3.2.4.1 Surface Waters

JEB Fort Story is located within the Chesapeake Bay/Small Coastal Basin watershed, which encompasses the small bays, tidal estuaries, river inlets, islands, and the shoreline immediately surrounding the Bay as well as the Bay itself. Non-tidal surface water resources at Fort Story include four man-made lakes and one unnamed pond that have an approximate combined surface area of 10 acres (Navy, 2017c).

The Virginia DEQ 2014 305(b)/303(d) Water Quality Assessment Integrated Report (Virginia DEQ, 2016) indicates the Chesapeake Bay waters adjacent to JEB Fort Story designated use as aquatic life. The surrounding waters of the Chesapeake Bay and its tidal tributaries are considered impaired for fish consumption. Portions of the Bay and its tidal tributaries have been identified as impaired for aquatic life uses and have exceeded the water quality standards for dissolved oxygen, water clarity, and chlorophyll a because of excess nutrients and sediment. According to the Virginia DEQ's Final 2014 305(b)/303(d) Integrated Report (Virginia DEQ, 2016), none of the surface waters on JEB Fort Story are listed as impaired.

JEB Fort Story has a VPDES General Permit for stormwater discharges associated with industrial activity (Table 3.2-1). The 2014–2019 permit for JEB Fort Story requires periodic monitoring of flow, pH, total suspended solids, nitrogen, and phosphorus at two outfalls. The installation also has eight non-regulated outfalls, with four discharging to the Atlantic Ocean and four discharging to an interior basin. Non-regulated outfalls are managed in accordance with the SWPPP to protect water quality in the receiving waters. JEB Fort Story has a SWPPP dated 2014. The SWPPP identifies potential pollutants and describes stormwater management standards, stormwater management controls, and BMPs to maintain and protect water quality.

In addition to the VPDES permit, JEB Fort Story is included under a consolidated General Permit for Discharges of Stormwater from Small MS4. The General Permit requires implementation of measures at each covered installation to achieve compliance with the Navy's MS4 program. Measures include educational programs to reduce contribution of pollutants to the sewer system, identification of illicit discharges, compliance with TMDL goals, and other BMPs related to facilities operations (referred to as

"good housekeeping") and stormwater control. The MS4 permit requires development of a Chesapeake Bay Total Maximum Daily Load Action Plan in accordance with the permit and subsequent guidance provided by the Virginia DEQ. Navy installations regulated under the permit are required to reduce nutrient and sediment loads to the Bay watershed.

3.2.4.2 Wetlands

A 2005 planning-level wetland delineation of JEB Fort Story identified 133 different wetland areas covering approximately 403 acres (Navy, 2017c). These delineated wetlands have been reverified by the USACE. JEB Fort Story has a broad tract of forested wetlands that is immediately adjacent to the north side of Shore Drive/Highway 60 for most of the east-west extent of the property. These wetlands were likely contiguous with the extensive forested wetlands in the adjacent First Landing State Park prior to road construction. The boundary of this wetland system borders a few of the developed areas of the installation.

3.2.4.3 Shorelines

The JEB Fort Story shoreline within the Bay is primarily increasing due to the net northward transport of sand along the Atlantic Coast immediately south of the Chesapeake Bay inlet coupled with inlet dynamics. There are localized areas of erosion (e.g., near piers) but most of the Bay shoreline west to Lynnhaven Creek is increasing or stable (Beaches and Waterways Advisory Committee, 2002).

FEMA Flood Insurance Rate Maps 5155310041G (western portion of Fort Story), 5155310042G (central portion), and 5155310061G (eastern portion) shows that the entirety of the shoreline at JEB Fort Story is characterized as VE, coastal flood zone with velocity hazard (wave action). The boundary parallels the general configuration of the shoreline with only minor deviations as there are no irregular low-lying areas or drainages along the shoreline. Storms can exert substantial erosive forces along the beach and dune system, although the long-term condition along this portion of the Atlantic coast is accretional due to a net northward migration of sand in this area (Beaches and Waterways Advisory Committee, 2002).

3.2.4.4 Soils - Erosion Potential

The U.S. Department of Agriculture NRCS Web Soil Survey identifies 12 soil types at JEB Fort Story (NRCS, 2013e). These soil types are either rated as having a very low susceptibility to erosion by water or are not rated; the beaches along the northern boundary are not rated for erosion potential (NRCS, 2013f). While the beaches are not rated for erosion potential, the soils adjacent to the beaches have a low susceptibility to erosion by water. The primary areas of very high runoff potential are in the developed areas of JEB Fort Story; the remainder of the installation is identified as low to negligible potential for runoff (NRCS, 2013g).

According to the Web Soil Survey, the soil survey does not include ratings for military operations at the beaches of JEB Fort Story, but it does indicate that the majority of the installation is rated very limited or somewhat limited for field operations (NRCS, 2013h).

3.2.5 Dam Neck Annex and Camp Pendleton

The following describe the existing conditions for the water resources at Dam Neck Annex and Camp Pendleton.

3.2.5.1 Surface Waters

Dam Neck Annex and Camp Pendleton training areas are located along the open Atlantic Ocean shoreline approximately 9 miles south of the entrance to the Chesapeake Bay. Surface water quality in the Atlantic Ocean in this region is not designated as impaired (Virginia DEQ, 2016).

There are several lakes and ponds in Camp Pendleton and Dam Neck Annex, including Lake Christine to the north, Redwing Lake, Lilly Pond, Lotus Pond, and Sadler Pond (a man-made pond) in terrestrial portions of Dam Neck Annex, and Lake Tecumseh just off the installation boundary to the southwest (Navy, 2017d). These surface waters are located west of Regulus Avenue and are not in any areas impacted by Camp Pendleton Beach and Dam Neck North Annex Beach training events. Drainage from Redwing Lake, Lake Tecumseh, and other surface water bodies at/near the installation is through open drainage channels to the north (Rudee Inlet/Owl's Creek) and/or west (Back Bay system). None of the Dam Neck Annex waterbodies have been identified as impaired (Navy, 2017d). Stormwater from developed portions is routed west and/or northwest. There are no discharges to the ocean.

Dam Neck Annex has a VPDES general permit for stormwater discharges associated with industrial activities (Table 3.2-1). The general permit includes monitoring requirements and conditions to control stormwater discharges, and requires development and implementation of a SWPPP. The 2014–2019 Dam Neck Annex permit includes special conditions applicable to ship and boat building or repair yards, which include industry-specific management practices and a monitoring requirement and discharge limits for total suspended solids, total recoverable copper, and total recoverable zinc at outfall 001 in the central portion of the installation. In addition to the VPDES permit, Dam Neck Annex is included under a consolidated General Permit for Discharges of Stormwater from Small MS4. The General Permit requires implementation of measures at each covered installation to achieve compliance with the Navy's MS4 program. Measures include educational programs to reduce contribution of pollutants to the sewer system, identification of illicit discharges, compliance with TMDL goals, and other BMPs related to facilities operations (referred to as "good housekeeping") and stormwater control. Because Dam Neck Annex does not discharge to the Chesapeake Bay, the installation is not required to reduce nutrient and sediment loads to the Bay watershed as part of the MS4 permit requirements.

3.2.5.2 Wetlands

Based on 2011 and 2012 wetland delineation field surveys throughout the Dam Neck Annex property, there are extensive wetlands on the installation, including Lovetts Marsh and a wetlands mitigation area in the northern back-dune portion of the property; these are forested and scrub-shrub wetlands (USACE, 2012). These wetland boundaries have been confirmed by the USACE. There are numerous (approximately eight) small, interdune swales in the dunes along North Beach; the largest of these is the wetland loop used as the Landing Craft, Air Cushion (LCAC) inland training track. The interdunal wetlands are typically vegetated with freshwater emergent species with a scrub-shrub border.

There is a small interdune swale that is part of a maritime forest assembly, with a number of state-listed plant species, and a small wetland community associated with the helicopter pad at the southern end of Dam Neck Annex (Navy, 2017d). These areas are not in the vicinity of United States Fleet Forces training activities. Lovetts Marsh is located behind the training beach and dunes; two state-listed plants occur in this system (Navy, 2017d). Protective management measures for the system include limiting encroachment by site development and training activities, and maintaining the natural vegetative community by controlling hardwood encroachment and invasive species.

3.2.5.3 Shorelines

The predominant wind waves are generated by winds directed from the south-southeast; however, larger waves are generated by northeasters, directed from east-northeast (Navy, 2012a). The configuration of the coastline, channels and inlets, and variations in bathymetry along the coast affect localized shoreline stability.

The area immediately inshore of Sandbridge Shoal, located south of Dam Neck Annex, is erosional and has experienced substantial retreat, likely due to focusing of wave energy landward of the shoal (Navy, 2012a). The Sandbridge Beach is the subject of continual beach nourishment and shore stabilization analyses and projects. Regional beach nourishment is typically conducted by dredging sand from a Department of Interior, Bureau of Ocean Energy Management – approved borrow area within the Sandbridge Shoal (located approximately 3 miles offshore) and then distributing that sand on the affected beach areas. The Bureau of Ocean Energy Management issues the negotiated agreement with either the Navy or USACE for use of the sand in beach replenishment projects.

From Sandbridge Beach north to the Chesapeake Bay inlet, there is a net northward migration of sand and variable beach conditions, which have been addressed with shore and dune protection measures over time. This includes the beach nourishment at Sandbridge Beach, located south of Dam Neck Annex, as well as nourishment projects at Virginia Beach, located north of Dam Neck Annex and south of JEB Fort Story.

The installation has an active dune protection program to ensure the dunes persist to provide important shore protection functions. Dune restoration projects include planting vegetation, posting signs to limit access, and installing fences to help trap and hold dune sand. Additionally, two shoreline stabilization projects have been implemented, one in the middle portion of the installation (Bachelors Officers Quarters and Shifting Sands Club beach restoration; artificial dune construction and beach nourishment) and one in the LCAC training area at the north end of the installation.

The Shifting Sands Club dune may require periodic beach nourishment for the site. Long-term monitoring at the LCAC beach stabilization site indicates that erosion is still a problem along this area (Navy, 2017d). A dune sustainability survey was conducted in 2010, and a dune restoration survey was conducted in 2012.

Based on FEMA Flood Insurance Rate Map 5155310137G (dated January 16, 2015), the entirety of the shoreline is a velocity zone, VE, meaning it is subjected to additional hazard from storm waves.

3.2.5.4 Soils - Erosion Potential

The U.S. Department of Agriculture NRCS Web Soil Survey identifies 23 soil types at Dam Neck Annex and Camp Pendleton (NRCS, 2013i). These soil types range in rating from high to very low susceptibility to erosion by water or are not rated; the beaches along the northern boundary are not rated for erosion potential (NRCS, 2013j). While the beaches are not rated for erosion potential, the soils adjacent to the beaches have a low susceptibility to erosion by water. Soils with the highest susceptibility to erosion by water are located along the western boundary of the installations. The primary areas of very high runoff potential are in the developed areas of Dam Neck Annex and Camp Pendleton and along the western area of the installations; the remainder of the installation is identified as low to negligible potential for runoff (NRCS, 2013k).

According to the Web Soil Survey, the soil survey does not include ratings for military operations at the beaches of Dam Neck Annex and Camp Pendleton, but it does indicate that the installation is rated very limited or somewhat limited for field operations (NRCS, 2013l).

3.2.6 Naval Auxiliary Landing Field Fentress

The following describe the existing conditions for the water resources at Naval Auxiliary Landing Field (NALF) Fentress.

3.2.6.1 Surface Waters

Surface waters at NALF Fentress consist of artificial drainage ditches, channelized streams, including a major portion of Pocaty Creek, which flows through the southwest portion of the installation. There are no ponds or other water bodies on NALF Fentress (Navy, 2017e).

Stormwater discharges join the Pocaty River at the south end of the installation or creeks along the North Landing River (a segment of the Atlantic Intracoastal Waterway) to the north of the installation. Surface water quality in the North Landing River and Albemarle and Chesapeake Canal is affected by relatively low flows and agricultural runoff. The Virginia DEQ 2014 305(b)/303(d) Water Quality Assessment Integrated Report (Virginia DEQ, 2016) indicates the Pocaty River and North Landing River have designated uses of aquatic life and recreation. Virginia DEQ has identified the Pocaty River, the Albemarle Canal, and North Landing River as impaired surface waters due to dissolved oxygen and Escherichia coli.

NALF Fentress has a Virginia Pollution Abatement Permit (Table 3.2-1) that requires monitoring of spray irrigation wastewater for pH, biological oxygen demand, total organic carbon, total residual chlorine, nutrients, and several other parameters associated with land application. The permit also requires groundwater monitoring for many of the same analytes as well as metals (cadmium, chromium, copper, lead, nickel) with no specified limits.

3.2.6.2 Wetlands

NALF Fentress has an extensive network of drainage ditches and wetlands bordering existing developed lands (roads, buildings, and airfields). An installation-wide preliminary jurisdictional wetlands determination was obtained from the USACE in 2012; results indicated a prevalence of wetlands and jurisdictional drainage channels located immediately adjacent to most of the developed portions of the installation (Navy, 2017e). These include extensive wetlands adjacent to the North Landing River in the undeveloped northern portion of the installation, extensive wetlands and/or drainage systems around the southern portion of the installation, and wetlands between roads and airfield areas in the interior of the property. These wetland boundaries have been confirmed by the USACE. Most of the wetlands within the installation boundary are forested, with a small percentage of palustrine emergent wetlands (Navy, 2017e).

3.2.6.3 Shorelines

Shorelines are not part of the potential training areas at NALF Fentress and, therefore, are not discussed further.

3.2.6.4 Soils - Erosion Potential

The U.S. Department of Agriculture NRCS Web Soil Survey identifies 16 soil types at NALF Fentress (NRCS, 2013m). These soil types range in rating from high to low susceptibility to erosion by water or are not rated (NRCS, 2013n). Soils at NALF Fentress are identified as medium to negligible potential for runoff (NRCS, 2013o).

According to the Web Soil Survey, the majority of NALF Fentress is rated very limited or somewhat limited for field operations (NRCS, 2013p).

3.2.7 Northwest Annex

The following describe the existing conditions for the water resources at Northwest Annex.

3.2.7.1 Surface Waters

Surface water resources at Northwest Annex include Mill Stream, an unnamed tributary of the Northwest River, an extensive network of drainage ditches and canals, and several small excavated ponds (Navy, 2017f). Ponds on the installation consist of the remains of three fishing ponds dug for recreational fishing in the 1960s and an emergency sewage holding pond. One of the three fishing ponds has been dewatered and currently supports a scrub shrub wetland community with a small area of open water. The other two fishing ponds have joined and are called Lunker Lake. Mill Stream flows south through the center of the installation, bordered by agricultural fields to the east and expansive wetlands to the west. The unnamed tributary flows west through the expansive wetland system. Both are channelized streams that have been straightened and deepened to enhance drainage (Navy, 2017f).

The installation is located in the Southern Rivers Watershed, for which agricultural runoff is a primary source of water quality impacts, contributing nutrients, pesticides, and sediment to surface waters. Mill Stream receives wastewater effluent from the installation sewage treatment plant but a fisheries study (1995) and stream monitoring study (2002) indicated water quality was not substantially degraded in the stream (Navy, 2017f). The unnamed tributary to the Northwest River receives runoff from agricultural ditches in the center of the installation, causing a condition of excess nutrients and sediment (Navy, 2017f). While there are impaired waters in the watershed, none of the waterbodies on the installation have been identified as impaired.

Northwest Annex is relatively undeveloped and has few sources of industrial pollutants. The wastewater treatment facility is regulated under a VPDES permit (Table 3.2-1). There are no regulated stormwater outfalls.

3.2.7.2 Wetlands

An installation-wide wetlands delineation was conducted in 2012 and a preliminary jurisdictional determination was obtained from the USACE (Navy, 2017f). Roughly the western half of the installation consists of freshwater wetlands, and there are additional wetlands bordering drainages and adjacent to agricultural fields along the eastern boundary of the installation (Navy, 2017f). Most of the wetlands are forested wetlands, or a mix of forested and emergent, or forested and scrub shrub wetlands.

3.2.7.3 Shorelines

Shorelines are not part of the potential training areas at Northwest Annex and, therefore, are not discussed further.

3.2.7.4 Soils - Erosion Potential

The U.S. Department of Agriculture NRCS Web Soil Survey identifies 22 soil types at the Northwest Annex (NRCS, 2013q). These soil types range in rating from high to low susceptibility to erosion by water or are not rated (NRCS, 2013r). Soils with the highest susceptibility to erosion by water are dispersed throughout the installation. The primary areas of very high runoff potential are in the southern portion of the installation that falls in North Carolina; the remainder of the installation is identified as medium to negligible potential for runoff (NRCS, 2013s).

According to the Web Soil Survey, the majority of the installation is rated very limited for field operations (NRCS, 2013t).

3.2.8 St. Juliens Creek Annex

The following describe the existing conditions for the water resources at St. Juliens Creek Annex.

3.2.8.1 Surface Waters

Blow Creek and its tributaries cross the northeastern portion of St. Juliens Creek Annex. While surface waters are not part of the potential training areas at St. Juliens Creek Annex, the Elizabeth River receives stormwater from this location. The Elizabeth River is considered impaired in various segments for the use designations of aquatic life, fish consumption, and recreation because of contaminants and other water quality issues (such as polychlorinated biphenyls, low dissolved oxygen content, bacteria, tributyltin, and polycyclic aromatic hydrocarbons). The Southern Branch of the Elizabeth River is impaired for fish consumption due to dioxin in fish tissue. The Elizabeth River watershed has an approved TMDL for enterococci.

St. Juliens Creek Annex has a VPDES General Permit for discharge of stormwater from industrial activities (Table 3.2-1). The 2014–2019 permit for St. Juliens Creek Annex requires periodic monitoring of total suspended solids, zinc, lead, cadmium, copper, chromium, petroleum hydrocarbons, iron, and aluminum at nine outfalls. These outfalls all discharge to the Elizabeth River, generally in low, wetland areas.

Pursuant to requirements in the VPDES permit, St. Juliens Creek Annex developed a SWPPP that addresses potential pollutant sources on the installation. The SWPPP identifies sources of pollution that affect the quality of stormwater discharges from operations including storage areas/tanks, liquid transfer operations, and waste handling. The plan also provides guidelines for the station's stormwater pollution prevention program and technical procedures such as BMPs to prevent illicit discharges to the stormwater drainage system. BMPs include structural and non-structural modifications such as secondary containment, roof and canopy structures, vegetative filters, and flammable storage lockers. The installation has a total of 42 stormwater outfalls with discharges directly to the Southern Branch of the Elizabeth River, St. Juliens Creek and its tributaries, and Blow Creek and its tributaries (See Section 3.2.12.1 for the Southern Branch of the Elizabeth River TMDL information.)

3.2.8.2 Wetlands

The Navy has not conducted a wetland delineation of St. Juliens Creek Annex; however, the National Wetlands Inventory database maintained by the U.S. Fish and Wildlife Service (USFWS) depicts multiple wetland areas on the installation. Along the shoreline of Blows Creek is an estuarine and marine

wetland. One freshwater forested/shrub wetland is present adjacent to the Blows Creek estuarine and marine wetland and seven freshwater emergent wetlands are present throughout the installation.

3.2.8.3 Shorelines

Shorelines are not part of the potential training areas at St. Juliens Creek Annex and, therefore, are not discussed further.

3.2.8.4 Soils - Erosion Potential

The U.S. Department of Agriculture NRCS Web Soil Survey identifies 11 soil types at St. Juliens Creek Annex (NRCS, 2013u). These soil types are rated as medium susceptibility to erosion by water or are not rated (NRCS, 2013v). Northwest Annex soils are identified as low to negligible potential for runoff (NRCS, 2013w).

According to the Web Soil Survey, a large portion of St. Juliens Creek Annex is not rated for military operation suitability; the remainder of the installation is rated very limited or somewhat limited for field operations with the very limited area present along the creeks (NRCS, 2013x).

3.2.9 Naval Weapons Station Yorktown

The following describe the existing conditions for the water resources at Naval Weapons Station (NWS) Yorktown.

3.2.9.1 Surface Waters

NWS Yorktown has multiple creeks that flow south and west into the James River and north and east into the York River. Blow's Mill Run and Skiffes Creek are two small non-tidal creeks that drain into Skiffes Creek Reservoir, off-base to the south, and ultimately into the James River. Roosevelt Pond is located a short distance landward of the explosives handling pier that is located in the York River, and Lee Pond is a small pond located southwest of Roosevelt Pond. There are three small freshwater ponds located in the northwest portion of the installation, referred to as Ponds 10, 11, and 12, separated from the tidal King Creek by Burma Road and water control structures.

The York River watershed has numerous designated impairments on tributaries to the York River, and the main stem has a TMDL for fecal coliform in shellfish waters; King Creek and Felgates Creek are included in a TMDL for fecal coliform (Virginia DEQ, 2016).

NWS Yorktown has VPDES authorization under a stormwater general permit (Table 3.2-1). The 2014–2019 permit for NWS Yorktown requires periodic monitoring of zinc, copper, iron, and aluminum at two outfalls. NWS Yorktown developed a SWPPP that identifies potential pollutants and describes stormwater management standards, stormwater management controls, and BMPs to maintain and protect water quality.

3.2.9.2 Wetlands

An installation-wide wetland delineation was completed by the Navy and confirmed by the USACE in 2013. Based on this wetland inventory, a total of 856 acres of wetlands was mapped at NWS Yorktown. A predominance of tidal wetlands is associated with tidal creeks bordering the installation (King Creek to the north) and Felgates Creek, which crosses into the middle of the installation and branches into three separate tidal drainages. However, there are numerous, small freshwater wetlands, including drainages leading to the tidal creeks. These tidal creeks border developed lands in the main part of the base, which

includes narrow forested wetlands along Blow's Mill Run and scattered pockets elsewhere on the installation.

3.2.9.3 Shorelines

Shorelines are not part of the potential training areas at NWS Yorktown and, therefore, are not discussed further.

3.2.9.4 Soils - Erosion Potential

The U.S. Department of Agriculture NRCS Web Soil Survey identifies 26 soil types at NWS Yorktown; however, over 90 percent of the installation does not have soil data available (i.e., information is limited to soils along the boundary of the installation) (NRCS, 2013y). The identified soil types range in rating from high to medium susceptibility to erosion by water (NRCS, 2013z). These same soil types are likely present throughout the installation. The identified soil types range from very high to negligible runoff potential (NRCS, 2013aa).

According to the Web Soil Survey, the available soil information indicates the installation is rated very limited or somewhat limited for field operations (NRCS, 2013bb).

3.2.10 Cheatham Annex

The following describe the existing conditions for the water resources at Cheatham Annex.

3.2.10.1 Surface Waters

Fresh water lakes and ponds on the installation include Penniman Lake, in the northeast corner of the installation, a golf course pond called Hipps Pond, Cheatham Pond in the northwest corner of the installation, and Jones Pond in the southwest portion of the installation, which is separated from the tidal stream, Queen Creek, by the Colonial Parkway. Tidal creeks at Cheatham Annex include Queen Creek, which forms the northwestern boundary of the installation, and King Creek, which forms the southeastern boundary (Navy, 2010a).

The York River watershed has numerous designated impairments on tributaries to the York River, and the main stem has a TMDL for fecal coliform in shellfish waters. Queen Creek and King Creek, both of which border Cheatham Annex, are included in a TMDL for fecal coliform (Virginia DEQ, 2016). Jones Pond does not have any identified impairments.

Cheatham Annex has VPDES authorization under a stormwater general permit (Table 3.2-1). The 2014–2019 permit for NWS Yorktown requires periodic monitoring of total suspended solids, zinc, and copper at 20 outfalls.

3.2.10.2 Wetlands

An installation-wide wetland delineation was completed by the Navy and confirmed by the USACE in 2013. Based on this wetland inventory, a total of 298 acres of wetlands were mapped at Cheatham Annex. While there are extensive portions of the installation with tidal wetlands due to the extent of tidal creek systems, there is a relatively limited extent of non-tidal wetlands within the installation boundary. Non-tidal wetlands are generally limited to narrow areas of freshwater forested/scrub-shrub and emergent wetlands extending upgradient from the upper limits of the tidal creek systems.

3.2.10.3 Shorelines

FEMA National Flood Insurance Rate maps for the installation (51199C0061D, dated January 16, 2015) indicate relatively narrow velocity zone, VE, along the York River shoreline. As with much of the Chesapeake Bay region, the York River shoreline is experiencing net erosion, with York County erosion rates on the order of 0.9 feet per year (Hardaway Jr. & Byrne, 1999). A shoreline stabilization project was implemented at Cheatham Annex in 2013, to stabilize a substantial portion of the installation shoreline that was experiencing erosion by installing sloped, armor-stone revetments. A total of approximately 3,450 feet of the shoreline was stabilized in three separate locations (Navy, 2013a).

3.2.10.4 Soils - Erosion Potential

The U.S. Department of Agriculture NRCS Web Soil Survey identifies 11 soil types at Cheatham Annex; however, over 90 percent of the installation does not have soil data available (i.e., information is limited to soils along the boundary of the installation) (NRCS, 2013cc). The identified soil types range in rating from high to medium susceptibility to erosion by water (NRCS, 2013dd). These same soil types are likely present throughout the installation. The identified soil types range from high to very low runoff potential (NRCS, 2013ee).

According to the Web Soil Survey, the available soil information indicates the installation is rated very limited or somewhat limited for field operations (NRCS, 2013ff).

3.2.11 First Landing State Park

The following describe the existing conditions for the water resources at First Landing State Park.

3.2.11.1 Surface Waters

There are no freshwater ponds, lakes or streams at the First Landing State Park with the exception of a few small open water areas within the forested wetlands. The Virginia DEQ 2014 305(b)/303(d) Water Quality Assessment Integrated Report (Virginia DEQ, 2016) indicates the adjacent waters (Chesapeake and Broad Bay) designated use is aquatic life. There is an approved TMDL for fecal coliform for the Lynnhaven River, Broad Bay, and Linkhorn Bay, which border the shoreline of First Landing State Park to the south and west. The surrounding waters of the Chesapeake Bay and its tidal tributaries, including Broad Bay, are considered impaired for fish consumption. Portions of the Chesapeake Bay and its tidal tributaries have been identified as impaired for aquatic life uses and have exceeded the water quality standards for dissolved oxygen, water clarity, and chlorophyll a because of excess nutrients and sediment.

3.2.11.2 Wetlands

The National Wetlands Inventory database maintained by the USFWS depicts almost the entirety of the land area within the park as a freshwater, forested wetland.

3.2.11.3 Shorelines

Shorelines are not part of the potential training areas at First Landing State Park and, therefore, are not discussed further.

3.2.11.4 Soils - Erosion Potential

The U.S. Department of Agriculture NRCS Web Soil Survey identifies 14 soil types at First Landing State Park (NRCS, 2013gg). These soil types are either rated as having a very low susceptibility to erosion by water or are not rated (NRCS, 2013hh). Only 12 acres are identified as areas of very high runoff potential; the remainder of First Landing State Park is identified as low to negligible potential for runoff (NRCS, 2013ii).

According to the Web Soil Survey, nearly all of First Landing State Park soils are rated very limited for field operations (NRCS, 2013jj). Nevertheless, the soils are obviously supportive of intensive walking/jogging trail use as the Park trails and facilities host over 1 million visitors each year.

3.2.12 Southern Branch of the Elizabeth River

The following describe the existing conditions for the water resources at the Southern Branch of the Elizabeth River.

3.2.12.1 Surface Waters

The Atlantic Intracoastal Waterway from the Great Bridge Locks northward on the Southern Branch of the Elizabeth River is considered an estuarine system. The Southern Branch of the Elizabeth River is impaired for fish consumption due to dioxin in fish tissue. The Elizabeth River watershed has an approved TMDL for enterococci.

3.2.12.2 Wetlands

The Southern Branch of the Elizabeth River is bordered by wetlands for portions of its length within the study area.

3.2.12.3 Shorelines

The shorelines along the Southern Branch of the Elizabeth River within the study area vary from undeveloped wetlands to developed areas with riprap and quay walls. Most of the shoreline supports industrial uses serviced from the river by barge and from the land by truck and rail transportation. Some of the shoreline includes narrow sandy areas.

3.2.12.4 Sediments

Sediments in the Southern Branch of the Elizabeth River consist predominantly of fine sands in channel locations, with accumulations of finer-grained material (silt, clay and organic matter) in more protected shoreline locations such as beneath/behind shoreline structures (Navy, 2009). While the Elizabeth River leading into the Atlantic Intracoastal Waterway has been identified as one of the country's most polluted waterways by the USACE, and designated a Region of Concern by USEPA's Chesapeake Bay Program in 1993, based on effects of past industrial activities and waste disposal practices, the sediments are not unacceptably contaminated (Agency for Toxic Substances and Disease Registry, 2009). In addition, regional efforts such as the Elizabeth River Project are community efforts actively working to restore the Elizabeth River to the highest practical level of environmental quality. Past efforts included the Money Point Cleanup (located near St. Juliens Creek Annex) where 7 acres, including wetlands and forested shore, were restored and 12 acres of contaminated sediments were dredged (up to 6 feet depth). Additional actions under the Elizabeth River Project include the Living River Restoration Trust that provides incentives for participation in local conservation efforts, including cleanup of

contaminated river bottoms, and the 2016 Watershed Action Plan that identifies goals for 2020 and 2025 such as increasing vegetated wetlands, creation or restoration of tidal and non-tidal wetlands, establishing contiguous wildlife habitat along a connected corridor, vegetated shoreline, or water trails, and increased native plant gardens on properties adjacent to the Elizabeth River (Elizabeth River Project, 2016).

3.3 Biological Resources

3.3.1 Definition of the Resource

Biological resources are generally described as living organisms that occupy terrestrial and/or aquatic habitats. These resources include living, native, or naturalized plant and animal species. Plant associations are referred to generally as vegetation, and animal species are referred to generally as wildlife. Habitat can be defined as the resources and conditions (biotic and abiotic) present in an area that support a plant or animal. Within this EA, biological resources are broken down into seven minor resource categories: (1) Habitats and Vegetation, (2) Mammals, (3) Invertebrates, (4) Fish, (5) Reptiles and Amphibians, (6) Birds, and (7) Federally Protected Species and Critical Habitats. Where a species is federally protected, it is discussed within the Federally Protected Species and Critical Habitats subsection, and the discussion is not repeated within the other subsections (e.g., Mammals, Reptiles, Fish, or Birds).

3.3.1.1 Habitats and Vegetation

Terrestrial vegetation and habitats generally refers to all plants and trees collectively within a particular area. Specific habitat attributes of each training area will be discussed in the installation subsections.

None of the Navy installations in the study area have commercial forestry programs. All forest locations are small, isolated patches that are surrounded by development (Navy, 2010a). Urban forestry practices are used to manage individual trees and small stands. Forestry will not be carried forward for analysis in Chapter 4 (Environmental Consequences).

Aquatic habitats in the study area include those present in Jones Pond at Cheatham Annex as well as those found in the Southern Branch of the Elizabeth River (essential fish habitat [EFH] is only found in the Southern Branch of the Elizabeth River). Specific habitat attributes of the training areas will be discussed in the installation subsections. These attributes include water column parameters, which can vary by depth, salinity, temperature, dissolved oxygen, and flow; bottom type, which can be hard (i.e., rock), soft (mud, silt, sand, etc.) or intermediate (gravel, cobble); vegetation, including submerged and emergent which provide food and shelter for many species of fish and invertebrates; and natural and man-made structures such as oyster reefs, shipwrecks, piers, pilings, and bulkheads, which can provide important three-dimensional structure to which fish and sessile organisms can be attracted to or attach upon.

Likely changes to aquatic habitats and vegetation from climate change include an increase in coastal flooding and submergence of estuarine wetlands, increased shore erosion, an increase in salinity variability, an increase in harmful algae, an increase in hypoxia (lack of dissolved oxygen in the water), an increase in water temperature, and a reduction of eelgrass (Najjar et al., 2010). Increased water temperature could lead to the invasion of tropical species (Virginia Institute of Marine Science, 2009). Projected future distribution of tidal wetland habitat in Virginia indicates the potential for relative declines in wetland habitat up to 52 percent, with tidal marsh habitat in the meso-polyhaline reaches of

the Chesapeake Bay at the highest risk due to land development. Sea level rise resulting from climate change will add to the decline by spurring increases in shoreline hardening (e.g., bulkheads, rip rap) for protection (Virginia Institute of Marine Science, 2009). Sea level rise threatens to outpace a marsh's ability to vertically build up sediment and hardened shorelines would prevent a wetland from migrating inland in concert with sea level rise (Virginia Institute of Marine Science, 2009).

3.3.1.2 Mammals

Terrestrial mammals live predominantly or entirely on land. A few examples of common species found in the study area include: whitetail deer (*Odocoileus virginianus*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), nutria (*Myocastor coypus*), muskrat (*Ondatra zibethica*), Virginia opossum (*Didelphis virginianus*), eastern gray squirrel (*Sciurus carolinensis*), and eastern cottontail (*Sylvilagus floridanus*), least shrew (*Cryptotis parva*), southern short-tailed shrew (*Blarina carolinensis*), southeastern shrew (*Sorex longirostris longirostris*), eastern harvest mouse (*Reithrodontomys humulus*), white-footed mouse (*Peromyscus leucopus*), meadow vole (*Microtus pennsylvanicus*), woodland vole (*M. pinetorum*), pine vole (*M. pinetorum*), eastern mole (*Scalopus aquaticus*), and marsh rice rat (*Oryzomys palustris*).

3.3.1.3 Invertebrates

Invertebrates, or animals without backbones, are an incredibly diverse group. Terrestrial invertebrate species include: nematodes, leeches, earthworms, slugs, land snails, arachnids, and insects. Invertebrates are often keystone components of habitats and ecosystems.

Aquatic invertebrates are relatively small and slow compared to aquatic vertebrates (e.g., fish, reptiles, mammals). Benthic invertebrates occur on the bottom or within the substrate and may be sedentary (e.g., oysters), slow moving (e.g., hermit crabs), or highly mobile (e.g., shrimp). Pelagic invertebrates occur in the water column. Most pelagic species consist of small zooplankton, although larger species such as jellyfish and squid may occur as well.

Major categories of invertebrates found in moderately saline environments include arthropods (e.g., crabs, shrimp), molluscs (e.g., oysters), worms, sponges, and cnidarians (e.g., jellyfish). Polychaete worms may be found on the sediment surface or may burrow into the substrate. Various species may be predators, scavengers, deposit-feeders, filter-feeders, or suspension feeders. Molluscs include mobile species such as snails, and sessile species such as clams and mussels. Crustaceans include relatively large species such as crabs and shrimp, and smaller organisms such as copepods. Many crustacean species occur on the bottom, although some, such as copepods, may occur in the water column. During previous sampling of benthic invertebrates in the Elizabeth River, north of the Great Bridge lock (and therefore above the freshwater zone), polychaete worms were the dominant taxa collected (Neilson, 1975). Other abundant taxa included molluscs and crustaceans. Stone et al. (1994) provide a list of invertebrates found in estuarine areas of the mid-Atlantic region. Benthic species commonly found in the Virginia region included eastern oyster (*Crassostrea virginica*), softshell clam (*Mya arenaria*), daggerblade grass shrimp (*Paleomonetes pugio*), sevenspine bay shrimp (*Crangon septemspinosa*), and blue crab (*Callinectes sapidus*).

In freshwater habitats such as Jones Pond at Cheatham Annex, typical macroinvertebrates (generally defined as invertebrates that can be seen with the naked eye) include species such as crayfish, grass shrimp (*Palaemonetes* species), aquatic insects (e.g., water boatmen, dragonfly larvae), snails, worms, and freshwater clams or mussels. Microinvertebrates typically include many types of zooplankton (e.g.,

daphnia, rotifers) and species living on the bottom (e.g., sponges, hydroids). Clams and mussels are relatively large, slow-moving benthic filter feeders with hard shells. Smaller filter feeders occur in the water column (e.g., zooplankton) and on the bottom (e.g., caddisfly larvae). Snails typically graze on algae. Benthic omnivores/scavengers may be relatively large (e.g., crayfish) or small (e.g., grass shrimp). Some insect larvae (e.g., dragonfly larvae) are carnivorous. Many freshwater worms are deposit feeders. Most of these freshwater taxa are abundant, short-lived, fast-growing, and populations are not threatened.

3.3.1.4 Fish

Fish occurring within the study area may be categorized as estuarine or freshwater species. Estuarine species tolerate a range of water salinities during various seasons or life stages. Estuarine fish such as American shad (*Alosa sapidissima*), speckled trout (*Cynoscion nebulosus*), and Atlantic croaker (*Micropogonias undulatus*) occur in the Southern Branch of the Elizabeth River. Freshwater fish species are generally intolerant of high salinity waters and are found in installation ponds and lakes. Common freshwater fish include bass, species of sunfish, and catfish. Because the Proposed Action takes place primarily on upland terrestrial environments, the description of fish in the existing environment is limited to only those locations where vessel movements are conducted (i.e., Jones Pond on Cheatham Annex [Section 3.3.10.4] and the Southern Branch of the Elizabeth River [Section 3.3.12.4]).

3.3.1.5 Reptiles and Amphibians

Terrestrial reptiles and amphibians are two classes of animals that are grouped together due to the fact that they are ectotherms, meaning that they derive heat from outside sources, most commonly the sun, as opposed to endothermic animals (i.e., mammals) that derive their heat from internal means. Reptiles include: snakes, lizards, alligators, and turtles. Amphibians include: frogs, toads, and salamanders. Reptiles and especially amphibians are frequently wild indicators of the health of an ecosystem because of their permeable skin and will bio accumulate toxins from smaller creatures which they eat.

3.3.1.6 Birds

The bird community within the study area is diverse and reflects the wide variety of habitats available. The study area is located in the Atlantic migratory flyway and provides important stopover areas for neotropical migrants during spring and fall migration.

Within the study area, forested areas serve as foraging and resting habitat for a number of species including black-throated blue warbler (*Dendroica caerulescens*) and blackpoll warbler (*Dendroica striata*). Forest-dwelling birds that stay through the summer and are known to nest on the installations include eastern wood-pewee (*Contopus virens*), pine warbler (*Dendroica pinus*), brown thrasher (*Toxostoma rufum*), ovenbird (*Seiurus aurocapillus*), red-eyed vireo (*Vireo olivaceous*), white-eyed vireo (*V.griseus*), blue-gray gnatcatcher (*Polioptila caerulea*), and various woodpeckers (Family Picidae).

Familiar birds of open areas and urban settings include northern mockingbird (*Mimus polyglottos*), American robin (*Turdus migratorius*), northern cardinal (*Cardinalis cardinalis*), brown-headed cowbird (*Molothrus ater*), house sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), rock dove (pigeon) (*Columba livia*), mourning dove (*Zenaida macroura*), purple martin (*Progne subis*), and European starling (*Sturnus vulgaris*).

Several birds of prey utilize various habitats in the area, including red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*B. lineatus*), merlin (*Falco aesalon*), sharp-shinned hawk (*Accipiter velox*),

northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), osprey (*Pandion haliaetus*), and bald eagle (*Haliaeetus leucocephalus*).

The shoreline and aquatic habitats within the area provide important bird habitats, and are used extensively by waterfowl, shorebirds, seabirds, and other waterbirds. Waterfowl known to occur include several species of geese and a large number of ducks such as the Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), wood duck (*Aix sponsa*), and American black duck (*Anas rubripes*). Shorebirds known to occur include sandpiper (*Actitis* spp. *and Calidris* spp.), sanderling (*Calidris alba*), plover (C*haradrius* spp. and *Pluvialis* spp.), and other shorebird species. As with waterfowl, most shorebird species use shoreline and aquatic habitats for feeding during migration to and from nesting areas in the far north. Waterbirds that have been observed in the area include grebes (Family Podicipedidae), pelican (*Pelecanus occidentalis*), cormorant (*Phalacrocorax* spp.), herons and egrets (Family Ardeidae), loons (*Gavia* spp.), rails (Family Rallidae), and gulls and terns (Family Laridae). Common summer or permanent resident waterbirds that are known or likely to nest in the region include great blue heron (*Ardea herodias*), green heron (*Butorides virescens*), little blue heron (*Florida caerulea*), and a large number of gulls and terns.

3.3.1.7 Federally Protected Species and Critical Habitats

The federally protected species discussed in this section consist of threatened, endangered, and other special status species protected under the Endangered Species Act (ESA), as well as species federally protected under the Marine Mammal Protection Act (MMPA). Critical habitat is defined under the ESA as a specific geographic area that contains features essential to the conservation of an endangered or threatened species and that may require special management and protection (ESA section 3 [5][A]). To date, there are no critical habitats on any terrestrial or aquatic habitats evaluated under this document. Table 3.3-1 lists all federally protected species (under ESA and MMPA) that are potentially present within the study area.

The USFWS Information for Planning and Conservation (IPaC) Consultation (Consultation Code: 05E2VA00-2015-SLI-3232) for this project was completed using an overall area that encompasses each of the Installations and Non-Installation training locations. As a result, three species (Red-Cockaded woodpecker (*Picoides borealis*), Seabeach amaranth (*Amaranthus pumilus*), and northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) are included in the ESA Species List provided by the USFWS that are not located within any of the training locations covered by this document.

Two fish species protected under the ESA may occur within the study area. The Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) occurs in portions of the Chesapeake Bay and the nearshore Atlantic Ocean at many times of the year and may occur in the Southern Branch of the Elizabeth River. Critical habitat is currently not designated for the Atlantic sturgeon, although the National Marine Fisheries Service (NMFS) proposed critical habitat in 2016. The shortnose sturgeon (*Acipenser brevirostrum*) occurs in the northern to middle portion of the Chesapeake Bay approximately to the Potomac River. Shortnose sturgeons are considered extralimital in the lower Chesapeake Bay region, with only one documented occurrence in the James River (NMFS, 1998). The species is, therefore, highly unlikely to occur in the Southern Branch of the Elizabeth River and is not discussed further in this document.

Marine mammals are a diverse group of approximately 130 mammal species adapted to live in marine environments, although some do spend time in fresh water or on land. Dolphins, whales, porpoises, seals and sea lions fall under the jurisdiction of NMFS, while the otter, manatee, and dugong are

managed by the USFWS. All marine mammals are protected under the MMPA, and some are also listed as federally endangered or threatened under the ESA.

Table 3.3-1. Federally Protected Species (Under ESA and MMPA) per Location

Species	*Federal Status*	*Location*									
		JEB Little Creek	*JEB Fort Story*	*Dam Neck Annex and Camp Pendleton*	*NALF Fentress*	*Northwest Annex*	*St. Juliens Creek Annex*	*NWS Yorktown*	*Cheatham Annex*	*First Landing State Park*	*Southern Branch of the Elizabeth River*
Northern Long-eared Bat	ESA (T)	X	X	X	X	X	X	X	X	X	X
Piping Plover	ESA (T)	X	X	X							
Red Knot	ESA (T)	X	X	X							
Roseate Tern	ESA (E)	X	X	X							
Small Whorled Pogonia	ESA (T)							X	X		
Atlantic Sturgeon	ESA (E)										X
Atlantic Bottlenose Dolphin	MMPA										X
West Indian Manatee	MMPA, ESA (T)										X
Harbor Seal	MMPA	X	X	X						X	X
Nesting Loggerhead Sea Turtle	ESA (T)	X	X	X							
Nesting Green Sea Turtle	ESA (T)	X	X	X							
Nesting Kemp's Ridley Sea Turtle	ESA (E)	X	X	X							

Source: (USFWS, 2017)
Key: MMPA = Marine Mammal Protection Act; ESA = Endangered Species Act; E = Endangered; T = Threatened
JEB = Joint Expeditionary Base; NALF = Naval Auxiliary Landing Field; NWS = Naval Weapons Station.

In-water training under the Proposed Action is limited to Jones Pond at Cheatham Annex and the Southern Branch of the Elizabeth River. No marine mammals are present in Jones Pond at Cheatham Annex and, therefore, they are not discussed further for that location. On the other hand, marine mammals may be present within the Southern Branch of the Elizabeth River. These include the Atlantic bottlenose dolphin (*Tursiops truncatus*), protected under the MMPA, the harbor seal (*Phoca vitulina*), protected under the MMPA, and the West Indian manatee *(Trichechus manatus latirostris),* protected under the MMPA and listed as a federally threatened species under the ESA. In addition, harbor seals may be present on some beach areas within the study area. Preferred haul-out locations in the region consist of rock armor formations that protect the two tunnels of the Chesapeake Bay Bridge Tunnel (Rees et al., 2016).

Sea turtles are air-breathing marine reptiles found throughout the world's tropical and subtropical oceans and coastal beaches. Sea turtles spend most of their lives in the water with adult females returning to land to lay their eggs. They often migrate long distances between feeding grounds and nesting beaches. Seven species of sea turtles have been identified worldwide with three of the species, all of which are listed as either threatened or endangered under the ESA, occurring within the study area. Jurisdiction for sea turtles is shared by NMFS for marine environments and the USFWS for terrestrial environments (nesting beaches). The USFWS IPaC Consultation (Consultation Code: 05E2VA00-2015-SLI-3232) for this project was completed using an overall area that encompasses each

of the installations and non-installation training locations. Although five species of sea turtles have been found to occur within Virginia coastal waters, only three species have been found to nest in Virginia and within the study area. Hawksbill sea turtle (*Eretmochelys imbricate*) and leatherback sea turtle (*Dermochelys coriacea*) were included in the ESA Species List provided by the USFWS; however, these two species have not been documented to nest in the vicinity of the study area and, therefore, are not included in this document. Only species with documented nesting activities within the study area are discussed in this EA.

The following sea turtle species occur within the study area:

- Loggerhead sea turtle (*Caretta caretta*) – listed as threatened within the Northwest Atlantic
- Green sea turtle (*Chelonia mydas*) – listed as threatened within the North Atlantic
- Kemp's ridley sea turtle (*Lepidochelys kempii*) – listed as endangered throughout entire range

3.3.1.7.1 Northern Long-eared Bat (*Myotis septentrionalis*)

The northern long-eared bat is one of the species of bats most impacted by the disease white-nose syndrome. Due to declines caused by white-nose syndrome and continued spread of the disease, the northern long-eared bat was listed as threatened under the ESA on April 2, 2015. The USFWS developed a final 4(d) rule, which published in the *Federal Register* on January 14, 2016. The 4(d) rule specifically defines the "take" prohibitions.

The northern long-eared bat is a medium-sized bat with a body length of 3 to 3.7 inches and a wingspan of 9 to 10 inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*. Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, surveyors find them hibernating most often in small crevices or cracks, often with only the nose and ears visible. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. This bat has also been found rarely roosting in structures, such as barns and sheds. The northern long-eared bat's range includes much of the eastern and north central United States and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia (USFWS, 2015a).

3.3.1.7.2 Piping Plover (*Charadrius melodus*)

The primary reasons that piping plovers are threatened can be attributed to habitat loss or degradation and nest disturbance and predation. The Northern Great Plain and Atlantic Coast populations were listed as federally threatened in 1986.

Piping plovers are small, stocky shorebirds with a sand-colored upper body, a white underside, and orange legs. During the breeding season, adults have a black forehead, a black breast band, and an orange bill. Piping plovers use wide, flat, open, sandy beaches with very little grass or other vegetation. Nesting territories often include small creeks or wetlands. Piping plovers are migratory birds. In the spring and summer they breed in northern United States and Canada. There are three locations where

piping plovers nest in North America: the shorelines of the Great Lakes, the shores of rivers and lakes in the Northern Great Plains, and along the Atlantic Coast. Their nesting range has become smaller over the years, especially in the Great Lakes area. In the fall, plovers migrate south and winter along the coast of the Gulf of Mexico or other southern locations (USFWS, 2015b).

3.3.1.7.3 Red Knot (*Calidris canutus*)

The main impact to the red knot can be attributed to declining food supply and habitat loss. The red knot was listed as federally threatened in 2015.

The red knot is a robin sized bird. Winter plumage is fairly non-descript; however, in the spring, plumage is unmistakable with a bright red chest. The subspecies that migrates from southern Argentina to the Canadian Arctic in spring relies on stopover habitat along Delaware Bay, where the birds feed on horseshoe crabs eggs before they continue north to the Arctic. Overharvesting of horseshoe crabs along the central Atlantic Coast has led to a sharp reduction in this food source for migratory shorebirds, and Red knots seem to have been impacted particularly hard by this. In the study area, the birds utilize tidal flats and shorelines during the summer and coastal mudflats, tidal zones, and sometimes open sandy beaches during the winter (Audubon, 2017).

3.3.1.7.4 Roseate Tern (*Sterna dougallii dougallii*)

The roseate tern was listed as federally endangered in 1987. The primary threats to the species are a result of habitat loss and predation.

The roseate tern is a medium-sized, gull-like tern about 15 inches long. When not in breeding season, it has a black bill, black legs, white forehead and most of the crown, and a long, deeply forked tail. During this time, the roseate tern is often difficult to distinguish from common terns, among which it nests in the Northeast. During breeding season, it is paler than other terns, with most of its plumage turning silver-gray above and creamy white below a rosy-pink chest and a black cap. It also develops long white tail-streamers that it loses after the breeding season. In the northeastern birds, the black bill becomes orange-red at the base and the black legs also turn orange-red. The roseate tern is a specialist feeder eating almost exclusively small fish, primarily the American sand lance in northeastern populations. It captures food mainly by plunge diving, completely submerging its body underwater to catch prey, but it also feeds in shallow waters and even steals food from common terns. Roseate terns nest on small barrier islands, often at ends or breaks. They nest in hollows or under dense vegetation, debris or rocks, hidden from predators. Roseate terns in northeastern North America almost always nest in colonies with common terns. Roseate terns begin arriving to breeding areas at the end of April and begin laying eggs as early as the third or fourth week of May. They lay about one to two eggs, rarely three, and rely on the more aggressive Arctic and common terns in the surrounding colony to defend them. In the winter, roseate terns migrate south in late August to early September. They migrate from the northeastern United States to the waters off Trinidad and northern South America from the Pacific coast of Columbia to eastern Brazil (USFWS, 2011a).

3.3.1.7.5 Small Whorled Pogonia (*Isotria medeoloides*)

Small whorled pogonia is federally listed as threatened. Populations are generally regionally isolated. Habitat loss and general population isolation threaten populations of this species across the Southeast.

Small whorled pogonia is a small plant in the Orchid family. It has five or six fleshy leaves and slightly glaucous and green or yellow-green leaves and stem. The hollow stem can reach up to 10 inches but is commonly shorter. The plants typically grow individually and scattered. Small whorled pogonia flowers mid-May to mid-June, though plants may not flower every year. Its fruit is an upright elliptical capsule (Weakley et al., 2012). Small whorled pogonia can be distinguished from an associate plant and look-alike, Indian cucumber (*Medeola virginiana*), by its hollow stem. Indian cucumber also has a thinner, firmer stem, cobweb-like pubescence, and a node near the base of the stem. The preferred habitat of small whorled pogonia is mature or second-growth beech, birch, and oak hardwood forests with an open understory and thick leaf litter. It typically prefers acidic soils and is commonly found on slight slopes above streams (USFWS, 2016a).

3.3.1.7.6 Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)

The Atlantic sturgeon, listed as endangered under the ESA, is an anadromous fish that presently occurs in 37 river systems from Canada to Florida (National Oceanic and Atmospheric Administration [NOAA] (2010a)). Spawning is thought to take place in flowing water between the salt front of estuaries and the fall line in about 20 of these rivers (NOAA, 2010b). Spawning was originally thought to occur only in the spring along the Atlantic coast; however, recent research indicates that spawning primarily occurs in the fall in the South Atlantic rather than spring (Balazik & Musick, 2015; Smith et al., 2015; Kahn et al., 2014; Balazik et al., 2012). Following spawning, adults may move into estuarine or coastal waters, while juveniles remain in freshwater habitats for at least the first year. In the study area, there are spring and fall spawning periods. Fall spawning takes place upstream (out of the study area) in the James and York River systems (Kahn et al., 2014; Balazik et al., 2012). Spring spawning has recently been discovered in the lower James River near Fort Eustis (Balazik & Musick, 2015). Sturgeons are omnivorous bottom feeders. Adults forage on benthic invertebrates (molluscs, crustaceans, worms, mussels, and fish). Juveniles feed on aquatic insects and other invertebrates.

NMFS has identified five distinct population segments of Atlantic sturgeon. A distinct population segment is defined as a population or group of populations that is discrete from other populations of the species, and that is considered significant in relation to the entire species. The five distinct population segments include the New York Bight, Chesapeake Bay, South Atlantic, and Carolina segments (all listed as endangered), as well as the Gulf of Maine segment (listed as threatened). The Chesapeake Bay distinct population segment most closely coincides with the study area. This population includes all Atlantic sturgeon in watersheds that drain into the Chesapeake Bay and into coastal waters from the Delaware-Maryland border to Cape Henry, Virginia, as well as wherever these fish occur in in coastal bays, estuaries, and marine environments from the Bay of Fundy, Canada, to the St. Lawrence River, Florida. However, individuals from all other distinct population segments could occur in the study area, as fish from multiple regions may be found in the Chesapeake Bay and the nearshore Atlantic Ocean (Hager, 2015).

Commercial overharvest resulted in historical widespread decline in Atlantic sturgeon abundance (NMFS, 2016a). Current threats include bycatch during fishing operations targeting other species, habitat degradation and loss, habitat impediment (e.g., dams), and ship strikes.

The Navy recently funded a multi-year tracking study to examine Atlantic sturgeon occurrence patterns in the lower Chesapeake Bay, with an emphasis on areas of military usage (Hager, 2015). Acoustic receivers were placed in the York River watershed, Hampton Roads, Elizabeth River, mouth of the

Chesapeake Bay, and nearshore Atlantic waters. In general, study results confirmed the Chesapeake Bay region's importance to the species' sustainability. The fish detected varied in age structure, and periods of extended occupation were noted within the Bay and its tributaries. The majority of individuals originated in other regions.

3.3.1.7.7 Atlantic Bottlenose Dolphin (*Tursiops truncatus*)

The bottlenose dolphin occurs in tropical to temperate waters of the Atlantic Ocean as well as inshore, nearshore, and offshore waters of the Gulf of Mexico and United States East Coast (Waring et al., 2016). They occur in most enclosed or semi-enclosed seas in habitats ranging from shallow, murky, estuarine waters to deep, clear offshore waters in oceanic regions (Jefferson et al., 2008b; Jefferson et al., 2015; Wells et al., 2009). Open ocean populations occur far from land; however, population density appears to be highest in nearshore areas (Scott & Chivers, 1990).

There are two morphologically and genetically distinct bottlenose dolphin morphotypes (distinguished by physical differences) (Duffield et al., 1983) described as coastal and offshore forms. The coastal morphotype of bottlenose dolphin is continuously distributed along the Atlantic coast south of Long Island, New York, around the Florida peninsula, and along the Gulf of Mexico coast. As the range of the offshore bottlenose dolphin includes waters beyond the continental slope (Kenney, 1990), bottlenose dolphins within the study area are assumed to be the coastal morphotype.

Acoustic monitoring data indicate that dolphins are present in coastal waters of Norfolk and Virginia Beach nearly every day with diminished acoustic activity in February (Lammers et al., 2015). The greatest abundance of bottlenose dolphins was observed during the fall in an area from the shore out to 3.7 kilometers, extending from Naval Station Norfolk down to the Virginia/North Carolina border (Engelhaupt et al., 2016). Diel (i.e., within 24-hour period) patterns with increased detections during nighttime hours were documented at two sites near Naval Station Norfolk and one site near JEB Little Creek (Engelhaupt et al., 2016).

Bottlenose dolphins are opportunistic feeders, taking a variety of fishes, cephalopods, and crustaceans (Wells & Scott, 1999) and using a variety of feeding strategies (Shane et al., 1986). In addition to using echolocation, a process for locating prey by emitting sound waves that reflect back, bottlenose dolphins likely detect and orient to fish prey by listening for the sounds they produce, so-called passive listening (Barros & Myrberg, 1987; Barros & Wells, 1998). Nearshore bottlenose dolphins prey predominantly on coastal fishes and cephalopods (Mead & Potter, 1995). There are no significant species-specific threats to bottlenose dolphins in the northwest Atlantic Ocean.

3.3.1.7.8 West Indian Manatee (*Trichechus manatus*)

West Indian manatees are currently listed as threatened under the ESA and as depleted under the MMPA. The USFWS announced in March 2017 the reclassification of the West Indian manatee from endangered to threatened due to substantial improvements in the species' overall status since the original listing in 1967 (50 CFR part 17, March 16, 2017). A five-year review, as required under section 4(c)(2)(A) of the ESA, was conducted simultaneously with the status review associated with the 90-day finding (FR 79 [127]: 37706-37710, July 2, 2014).

The West Indian manatee is divided into the Florida (*Trichechus manatus latirostris*) and Antillean (*Trichechus manatus manatus*) subspecies of which only the Florida manatee is found within the study area (Lefebvre et al., 2001).

The Florida manatee population is divided into four management units: the Upper St. Johns River (4 percent of the population), Atlantic Coast (46 percent), Southwest Florida (38 percent), and Northwest Florida (12 percent). Data indicate that the Upper St. Johns River and Northwest Florida management units are flourishing, and the Atlantic Coast management unit is likely stable. Preliminary analyses from the USFWS indicate that all four management units are doing well. There is no critical habitat for manatee within the study area.

Manatees are found in coastal marine, brackish, and freshwater habitats. They are typically found in seagrass beds, canals, creeks, embayments, and lagoons near the mouths of rivers and sloughs (Lefebvre et al., 2000). Habitat selection is influenced by food, water temperatures, and freshwater resources. Females with calves are influenced by additional factors when selecting habitats, including ambient noise, currents, and increased amounts of forage (Gannon et al., 2007).

Florida manatees are found throughout the southeastern United States. Because manatees are a subtropical species with little tolerance for cold, they are generally restricted to the inland and coastal waters of peninsular Florida during the winter, when they shelter in or near warm-water springs, industrial effluents, and other warm-water sites (Hartman, 1979; Lefebvre et al., 2001). In warmer months, manatees leave these sites and can disperse great distances. Warm-weather sightings are most common in Florida, coastal Georgia, and Alabama, but increased sightings have been reported in mid-Atlantic states such as North Carolina and Virginia between June and October (Cummings et al., 2014).

Demographic analyses indicate that the Florida stock of manatees is increasing or stable (Runge et al., 2007). Population modeling of the Florida manatee predicts that, assuming all current threats remain constant, there is less than a 2.5 percent chance that the southeastern United States population of Florida manatees will fall below 4,000 individuals over the next 100 years (Runge et al., 2015).

West Indian manatees are herbivorous and are known to consume more than 60 species of plants. They typically feed on bottom vegetation, plants in the water column, and shoreline vegetation, such as hyacinths and marine seagrasses (Reynolds et al., 2009). In some areas, they are known to feed on algae and parts of mangrove trees (Jefferson et al., 2015; Mignucci-Giannoni & Beck, 1998).

The Florida manatee is negatively impacted by cold stress, hurricanes, toxic red tide poisoning, habitat destruction (such as loss of seagrass), and other natural and human-made factors. However, vessel strikes are the single greatest cause of death for Florida manatees, accounting for 24 percent of manatee deaths in Florida during the last 30 years (Jett & Thapa, 2010). A review of research on the effectiveness of laws reducing boat speeds in areas of known manatee habitat indicated that reducing boat speeds in specific areas is an appropriate, reasonable, and defensible management action, although more studies on the effectiveness of boat speed reduction have been recommended (Calleson & Frohlich, 2007).

3.3.1.7.9 Harbor Seal (*Phoca vitulina*)

The harbor seal is not listed under the ESA but is protected under the MMPA. Harbor seals occur in nearshore waters and are rarely found more than 20 kilometers from shore; they frequently occupy bays, estuaries, and inlets (Baird, 2001). Individual seals have been observed several kilometers upstream in coastal rivers (Baird, 2001). Haul-out sites vary but include intertidal and subtidal rock outcrops, sandbars, sandy beaches, and even peat banks in salt marshes (Burns, 2008; Gilbert and Guldager, 1998; Prescott, 1982; Schneider and Payne, 1983; Wilson, 1978). Harbor seals occur in the cold and temperate nearshore waters of the northwest Atlantic, typically north of 35 degrees North (°

N) (Waring et al., 2016). Harbor seal distribution along the U.S. Atlantic coast has shifted in recent years, with an increased number of seals reported in southern New England to the mid-Atlantic region (Waring et al., 2016).

Harbor seals have been seen hauling out on the beaches at Camp Pendleton/Dam Neck, First Landing, and possibly Fort Story from late fall through early spring. There is a potential for harbor seals to haul out at other locations, including JEB Little Creek. Winter haul-out sites for harbor seals have also been reported for Chesapeake Bay Bridge Tunnel islands in the lower Chesapeake Bay (Waring et al., 2016) (Rees et al., 2016). During land-based counts of these rock islands from November 2014 to May 2015, 112 occurrences were recorded at four different haul-out sites during 12 survey days; peak numbers were recorded during March (Rees et al., 2016). Follow-up surveys in the lower Chesapeake Bay were conducted October 2015 to May 2016 and resulted in 184 harbor seal sightings between December 2015 and April 2016; similar to the 2014–2015 season, the highest counts were recorded in the months of February and March (Rees et al., 2016). Seal presence in the lower Chesapeake Bay was noted to fluctuate seasonally, with arrival beginning sometime in October or November and the last sightings occurring in April (Rees et al., 2016). Numbers of seals observed as hauled out increased with a decrease in water temperature (Rees et al., 2016).

The main prey species of the harbor seal are cod, hake, mackerel, herring, salmon, sardines, smelt, shad, capelin, sand eels, sculpins, and flatfish (Burns, 2008). Sand eels are the main prey for individuals foraging in the southern portion of their range, while cod is the main prey in other geographic areas. Harbor seals are also known to feed on cephalopods and crustaceans (Burns, 2008).

There are no significant species-specific threats for harbor seals in the western North Atlantic, although some animals are bycaught in commercial fisheries (Waring et al., 2015; Waring et al., 2009).

3.3.1.7.10 Loggerhead Sea Turtle (*Caretta caretta*)

In 2009, a status review conducted for the loggerhead (the first turtle species subjected to a complete stock analysis) identified nine distinct population segments within the global population (Conant et al., 2009). In a September 2011 rulemaking, NMFS and the USFWS listed five of these distinct population segments as endangered and kept four as threatened under the ESA, effective as of October 24, 2011 (FR 76 (184): 58868-58952, September 22, 2011). The Southeast Indo-Pacific Ocean, Southwest Indian Ocean, Northwest Atlantic Ocean, and South Atlantic Ocean distinct population segments are classified as threatened. Only the Northwest Atlantic population segment occurs within the study area. Loggerheads from other distinct population segments may occur in the study area as well, although they will be less common. The USFWS designated approximately 685 miles of loggerhead sea turtle nesting beaches as critical habitat in North Carolina, South Carolina, Georgia, Florida, Alabama, and Mississippi (FR 79 (132): 39756-39854, July 10, 2014), however no terrestrial critical habitat for loggerhead sea turtles occurs within the study area. Critical habitat has also been designated by NMFS within the marine environment, including nearshore reproductive habitat directly off the highest-density nesting beaches mentioned above and their adjacent beaches out to 1.6 kilometers offshore, wintering habitat that extends from Cape Hatteras south to Cape Fear encompassing waters from the 20-meter depth contours out to the 100-meter depth contours, two breeding habitats offshore of Florida, two constricted migratory habitat areas off the coast of North Carolina and southern Florida, and *Sargassum* habitat in U.S. Atlantic waters south of 40° N latitude from the 10-meter depth contour to the outer

boundary of the Economic Exclusion Zone (FR 79 (132): 39855-39912, July 10, 2014). None of these areas occur within the study area.

Loggerhead sea turtles occur in U.S. waters in habitats ranging from coastal estuaries to waters far beyond the continental shelf (Dodd Jr., 1988). Loggerheads typically nest on beaches close to reef formations and next to warm currents (Dodd Jr., 1988), preferring beaches facing the ocean or along narrow bays (NMFS and USFWS, 2009). After emergence from the nest, hatchlings swim to offshore currents and remain in the open ocean, often associating with floating mats of Sargassum (Witherington & Hirama, 2006; Carr, 1987; 1986).

Migration between oceanic and nearshore habitats occurs during the juvenile stage as turtles move seasonally from open-ocean current systems to nearshore foraging areas (Mansfield, 2006; Bolten, 2003). Juvenile loggerhead sea turtles inhabit offshore waters in the North Atlantic Ocean, where they are often associated with natural and artificial reefs (Fritts et al., 1983). These offshore habitats provide juveniles with an abundance of prey and sheltered locations where they can rest (Rosman et al., 1987). After reaching a length of 40 centimeters (Carr, 1987), early juvenile loggerheads make a transoceanic crossing, swimming back to nearshore feeding grounds near their beach of origin in the western Atlantic Ocean (Bowen et al., 2004; Musick & Limpus, 1997). Some individuals will stay in the oceanic habitat while others may move back and forth between the two areas (Laurent et al., 1998; Musick & Limpus, 1997). Juveniles are frequently observed in developmental habitats, including coastal inlets, sounds, bays, estuaries, and lagoons with depths less than 100 meters (Hopkins-Murphy et al., 2003). Once adults, loggerheads continue to migrate seasonally from feeding areas to mating areas and, for females, nesting areas (Bolten, 2003). After reaching sexual maturity, adult turtles settle in nearshore foraging habitats (Godley et al., 2003; Musick & Limpus, 1997), primarily feeding on the bottom but can be captured in the water column (Bjorndal, 2003; Bolten, 2003).

The loggerhead is the most commonly sighted sea turtle in Virginia (Swingle et al., 2016). The coastal waters of Virginia serve as developmental habitat for juveniles that take up residency during the spring and summer months (Barco & Lockhart, 2016; Lutcavage & Musick, 1985). The presence of juvenile sea turtles in the Chesapeake Bay area and in Virginia North Atlantic coastal waters peak from May through October (Navy, 2009; Mansfield, 2006). Individual juvenile loggerheads have been known to return to the same seasonal foraging areas, such as the Chesapeake Bay, for many years (Mansfield, 2006; Lutcavage & Musick, 1985). The majority of stranded sea turtles in Virginia are juvenile loggerheads (Barco & Lockhart, 2016).

Loggerhead nesting in the study area occurs from April through September, with a peak in June and July (Weishampel et al., 2006; Dodd Jr., 1988; Williams-Walls et al., 1983). Large nesting colonies exist in Florida, with more limited nesting along the Gulf coast and north through Virginia (Conant et al., 2009; NMFS and USFWS, 2009). Observed loggerhead nest counts on Florida's 26 core index beaches varied from a peak of 59,918 in 1998 to a low of 28,074 in 2007. Since 2007, there has been a general increase in nest counts, which include the 2016 nesting season. The 2015 season yielded a nest count of 89,295 nests, which was lower than the 2014 and 2012 seasons but higher than the 2013 season. However, the 2016 season resulted in 122,706 nests (Florida Fish and Wildlife Conservation Commission, 2017), which is higher than the last four years' (2012–2015) nesting seasons (Florida Fish and Wildlife Conservation Commission, 2016). Major nesting concentrations are found from North Carolina through southwest Florida, but limited numbers of nests are found northward to Virginia (NMFS, 2017). While

the loggerhead is the only sea turtle species that nests regularly on Virginia's beaches, only 5 to 15 nests are reported annually along Virginia's ocean-facing beaches (Barco & Swingle, 2014a).

Climate change is considered a threat to sea turtles because their life history, physiology, and behavior are extremely sensitive to environmental temperatures (Fossette et al., 2012; Hawkes et al., 2009; Hawkes et al., 2007). In an evaluation of marine turtle resiliency to climate change, loggerhead sea turtles from the northwest Atlantic region were found to be among the most resilient of 58 marine turtle regional management units examined and are considered only slightly more resilient than green sea turtles (Fuentes et al., 2013). Rookery vulnerability and non-climate-related threats (such as fisheries bycatch and coastal development) were factors considered to most likely influence the resilience of marine turtles to climate change (Fuentes et al., 2013).

Vehicle use on sea turtle nesting beaches is an issue for loggerhead sea turtles. Vehicles are allowed on some beaches in Florida, Georgia, North Carolina, Virginia, and Texas. Vehicles can run over and kill hatchlings or nesting adult turtles on the beach, disrupt the nesting process, create ruts in the sand that impede turtle movement, and crush nests (NMFS and USFWS, 2009).

3.3.1.7.11 Green Sea Turtle (*Chelonia mydas*)

The green turtle was first listed under the ESA in 1978. In 2016, NMFS and the USFWS reclassified the species into 11 "distinct population segments" within the global population (FR 81(66): 20057-20090, April 6, 2016). Nine of these populations are listed as threatened, and three of these populations are listed as endangered (FR 81(66): 20057-20090, April 6, 2016). The study area occurs within the North Atlantic distinct population segment, which is listed as threatened. The North Atlantic distinct population segment is listed as threatened and occurs within the study area. Critical habitat for this species has also been designated by NMFS within the marine environment (FR 63(170): 46693-46701, September 2, 1998); however, it is located outside of the study area.

The green sea turtle is distributed worldwide across tropical and subtropical coastal waters between 45° N and 40° S (The State of the World's Sea Turtles Team, 2011). In U.S. Atlantic waters, green sea turtles are found in inshore and nearshore waters ranging from Texas to the southwest and Puerto Rico to the southeast, up north to Massachusetts (NMFS and USFWS, 2007; NMFS and USFWS, 1991). Similar to other sea turtle species, green sea turtles are highly migratory. After emerging from the nest, green turtle hatchlings swim to offshore areas where they may alternate between floating passively in major current systems and actively swimming to reach their offshore distribution locations (Putman & Mansfield, 2015). Post-hatchling green turtles forage and develop in floating *Sargassum* habitats of the open ocean. At the juvenile stage (estimated at five to six years) they leave the open-ocean habitat and retreat to protected lagoons and open coastal areas that are rich in seagrass or marine algae (Bresette et al., 2006), where they will spend most of their lives (Bjorndal & Bolten, 1988). The optimal developmental habitats for late juveniles and foraging habitats for adults are warm, shallow waters (10 to 16 feet deep), with abundant submerged aquatic vegetation and close to nearshore reefs or rocky areas (Holloway-Adkins, 2006; Seminoff et al., 2002). Some green sea turtles are known to maintain distinct home ranges or site fidelity within foraging grounds (Musick & Limpus, 1997). Since late juvenile and adult green sea turtles feed on seagrasses, they can find very little food in the open ocean and presumably stay in the neritic (coastal water/shallow water close to land) environment.

As ocean temperatures increase in the spring, green sea turtles migrate from southeastern U.S. waters to the estuarine habitats of Long Island Sound, Peconic Bay, Chesapeake Bay, and possibly Nantucket

Sound, where an abundance of algae and eelgrass occurs. Peak occurrence in the northeast U.S. waters from Cape Hatteras to the Gulf of Maine is likely in September (Berry et al., 2000). During non-breeding periods, adult and juvenile distributions may overlap in coastal feeding areas (Weishampel et al., 2006; Hirth, 1997).

Juvenile green turtles use estuaries along the U.S. Atlantic coast, including the Chesapeake Bay, as summer developmental habitat (Epperly et al., 1995). Green sea turtles occur seasonally in Virginia; primarily from spring to fall, but are more likely to be sighted during the warmer months. Adults are predominantly tropical and are less common north of southern Florida. Although the green sea turtle is less common than loggerhead or Kemp's ridley sea turtles in the Chesapeake Bay area, they are observed annually (Swingle et al., 2016). In 2015, a fall mortality event of unknown origin resulted in 69 green turtle strandings documented throughout the state of Virginia, accounting for 23 percent of total strandings in the state that year; average green turtle strandings the previous five years was 11 (Barco & Lockhart, 2016; Swingle et al., 2016).

Female green sea turtles return to their natal beaches to nest every two to five years (Hirth, 1997). While nesting season varies from location to location in the southeastern United States, females generally nest in the summer between June and September (NMFS, 2016b). In the United States, most green sea turtle nesting occurs along the Atlantic coast of eastern central Florida, with smaller concentrations along the Gulf coast and Florida Keys. Records of green sea turtle nestings have also been reported from North Carolina, Virginia, and Delaware (NMFS and USFWS, 2007) (Boettcher, 2015). Green turtles have been documented nesting on beaches located north and south of Dam Neck Annex in Virginia Beach (Navy, 2017d). A green turtle nested at Cape Henlopen State Park in Delaware in August 2011, which was the first green turtle nesting ever observed north of Virginia (Murray, 2011). In addition, a green sea turtle nested Sandbridge Beach, Virginia in August 2015 (Virginia Department of Game and Inland Fisheries (VDGIF), 2016). Generally, nesting trends in the Northwestern Atlantic Ocean are stable to increasing and are increasing in Florida. For example, in 1989, biologists documented 464 green sea turtle nests on Florida index beaches. In 2011, the index count was 10,701. In 2013, the index count had increased to 25,553 and climbed to 27,975 in 2015 (Seminoff et al., 2015).

As previously indicated for loggerhead sea turtles, many aspects of marine turtles' life history, behavior, and physiology are closely tied to climatic variables, potentially making them vulnerable to impacts from climate change (Fossette et al., 2012; Hawkes et al., 2009; Hawkes et al., 2007). Fuentes et al. (2013) examined the resilience of 58 marine turtle regional management units to climate change and determined that green sea turtles in the northwest Atlantic regional management unit are among the most resilient marine turtles and are considered slightly less resilient than loggerhead sea turtles. Traits used to assess resilience included rookery vulnerability, non-climate-related threats, population size, and genetic diversity (Fuentes et al., 2013).

Vehicle use on sea turtle nesting beaches is an issue for green sea turtles. Vehicles are allowed on some beaches in Florida, Georgia, North Carolina, Virginia, and Texas. Vehicles can run over and kill hatchlings or nesting adult turtles on the beach, disrupt the nesting process, create ruts in the sand that impede turtle movement, and crush nests (NMFS and USFWS, 2009).

3.3.1.7.12 Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)

The Kemp's ridley sea turtle is listed as a single population and is classified as endangered under the ESA throughout its entire range (FR 35 (233): 18319-18322, December 2, 1970). The most recent status

review was released in 2015 by NMFS and the USFWS (NMFS and USFWS, 2015). There is no critical habitat currently designated for this species.

The Kemp's ridley's range includes the U.S. Atlantic seaboard from New England to Florida and the Gulf of Mexico. After the loggerhead, the Kemp's ridley is the second most abundant sea turtle in mid-Atlantic waters. Habitats frequently used by Kemp's ridley sea turtles in U.S. waters are warm-temperate to subtropical sounds, bays, estuaries, tidal passes, shipping channels, and beachfront waters, where their preferred food, the blue crab, is abundant (Seney & Musick, 2005; Lutcavage & Musick, 1985). Evidence suggests that post-hatchling and small juvenile Kemp's ridley sea turtles, similar to loggerhead and green sea turtles of the same region, forage and develop in floating *Sargassum* habitats of the north Atlantic Ocean and benthic nearshore habitats for foraging along the U.S. and Gulf coast (Morreale & Standora, 2005).

Juveniles migrate to habitats along the U.S. Atlantic continental shelf from Florida to New England (Morreale & Standora, 1998; Peña, 2006) at around two years of age. Tagging studies indicate that waters off of Naval Station Norfolk and the Chesapeake Bay may be foraging grounds while juveniles are in transit along the Atlantic coast (Barco & Lockhart, 2016). Migrating juvenile Kemp's ridleys travel along coastal corridors generally shallower than 50 meter in bottom depth (NMFS and USFWS, 2011). Models indicate that the most suitable habitats are less than 33 feet (10 meters) in bottom depth and with sea surface temperatures between 72 degrees Fahrenheit (°F) and 90°F (22° and 32° Celsius [°C]) (Coyne et al., 2000). Temperature is a known limiting factor in their distribution; in temperatures less than 55°F (13°C), they tend to float, make awkward movements (Marquez-M, 1994), and may even die of cold-stunning (Burke et al., 1991). Post-nesting Kemp's ridleys travel along coastal corridors generally shallower than 164 feet (50 meters) in bottom depth (Morreale et al., 2007). The Kemp's ridley is restricted to the North Atlantic Ocean (Marquez-M, 1994). This species occurs primarily in the Gulf of Mexico and along the U.S. Atlantic coast, but they are known to make transatlantic crossings (Fontaine & Caillouet, Jr., 1985; Wibbels, 1983). As adults, many turtles remain in the Gulf of Mexico, with only occasional occurrence in the Atlantic Ocean (NMFS and USFWS, 2011).

Nesting is primarily limited to the beaches in the western Gulf of Mexico (NMFS and USFWS, 2015). The nesting season occurs from April through July. Although the Kemp's ridley population has shown increases since 1985, the rate of recovery has declined in recent years. In 2010, Kemp's ridley nesting showed a steep decline (35 percent) followed by some recovery to 2009 levels, with other declines in 2013 and 2014 (Caillouet et al., 2016; NMFS and USFWS, 2015; Shaver, et al., 2016). In recent years, nesting females have been seen as far north as Georgia and North Carolina; in 2012, a single nest was laid in Dam Neck Annex, Virginia, and in 2014 (Section 3.3.5.6, Federally Protected Species and Critical Habitats), a single nest was laid in False Cape State Park, Virginia (Boettcher, 2015; Back Bay Restoration Foundation, 2012). At this time it cannot be determined if these nests represent a permanent range expansion/shift, or if they simply represent seasonal variation.

Unlike loggerhead and green sea turtles, Kemp's ridley sea turtles from the northwest Atlantic region were determined to be among the least resilient marine turtles to climate change, based on an evaluation of various population traits, such as population size and genetic diversity, as well as rookery vulnerability and population-level impacts from non-climate-related threats (Fuentes et al., 2013). Researchers have determined climate change to be a medium threat level to Kemp's ridley turtles in the region (Wallace et al., 2011).

Vehicle use on sea turtle nesting beaches is an issue for Kemp's ridley sea turtles. Vehicles are allowed on some beaches in Florida, Georgia, North Carolina, Virginia, and Texas. Vehicles can run over and kill hatchings or nesting adult turtles on the beach, disrupt the nesting process, create ruts in the sand that impede turtle movement, and crush nests (NMFS and USFWS, 2011).

3.3.2 Regulatory Framework

Special-status species for the purposes of this EA and section are those species listed as threatened or endangered under the ESA and species afforded federal protection under the MMPA, Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act, and Magnuson-Stevens Fishery Conservation and Management Act.

The Endangered Species Act of 1973 (16 U.S.C. sections 1531–1544) establishes protection over and conservation of threatened and endangered species and the ecosystems that they depend upon. An "endangered" species is a species in danger of extinction throughout all or a significant portion of its range. A "threatened" species is a species that is likely to become endangered within the near future throughout all or within a significant portion of its range. The USFWS and NMFS jointly administer the ESA and are also responsible for the listing of species (designating a species as either threatened or endangered). The ESA allows the designation of geographic areas as critical habitat for threatened or endangered species (see Section 3.3.1.7, Federally Protected Species and Critical Habitats, for definition of critical habitat). Section 7(a) (2) requires each federal agency to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When a federal agency's action "may affect" a listed species, that agency is required to consult with the Service (NMFS or the USFWS) that has jurisdiction over the species (50 CFR section 402.14(a)). In accordance with the Sikes Act (16 U.S.C. section 670 et seq.), critical habitat cannot be designated on any areas owned, controlled, or designated for use by the DoD where an Integrated Natural Resources Management Plan (INRMP) has been developed that, as determined by the Department of Interior or Department of Commerce Secretary, provides a conservation benefit to the species subject to critical habitat designation.

The Marine Mammal Protection Act of 1972 (16 U.S.C. section 1361 et seq.) established, with limited exceptions, a moratorium on the "taking" of marine mammals in waters or on lands under U.S. jurisdiction. The act further regulates "takes" of marine mammals in the global commons (that is, the high seas) by vessels or persons under U.S. jurisdiction. The term "take," as defined in Chapter 3 (16 U.S.C. section 1362(13)) of the MMPA, means "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." "Harassment" was further defined in the 1994 MMPA amendment to provide two levels of harassment: Level A (potential injury) and Level B (potential behavioral disturbance).

The National Defense Authorization Act of Fiscal Year 2004 (Public Law 108-136) amended the definition of harassment, removed the "specified geographic area" requirement, and removed the small numbers provision as applied to military readiness activities or scientific research activities conducted by or on behalf of the federal government consistent with Section 104(c)(3) (16 U.S.C. section 1374(c)(3)). The Fiscal Year 2004 National Defense Authorization Act adopted the definition of "military readiness activity" as set forth in the Fiscal Year 2003 National Defense Authorization Act (Public Law 107-314). A "military readiness activity" is defined as "all training and operations of the Armed Forces that relate to combat" and "the adequate and realistic testing of military equipment, vehicles, weapons, and sensors

for proper operation and suitability for combat use." For military readiness activities, the relevant definition of harassment is any act that does either of the following:

- injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild ("Level A harassment")
- disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering to a point where such behavioral patterns are abandoned or significantly altered ("Level B harassment") (16 U.S.C. section 1362(18)(B)(i) and (ii))

Within the framework of the MMPA, a marine mammal "stock" is defined as "a group of marine mammals of the same species or smaller taxon (subspecies) in a common spatial arrangement that interbreed when mature" (16 U.S.C. section 1362). For management under the MMPA, a stock is considered an isolated population or group of individuals within a whole species that is found in the same area. The MMPA directs the Secretary of Commerce (Secretary) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens or agencies who engage in a specified activity (other than commercial fishing) within a specified geographical region if NMFS finds that the taking will have a negligible impact on the species or stock(s) and will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant). The authorization must set forth the permissible methods of taking, other means of effecting the least practicable adverse impact on the species or stock and its habitat, and requirements pertaining to the mitigation, monitoring, and reporting of such taking.

The Migratory Bird Treaty Act protects migratory and most native-resident bird species. Additional protections are afforded under EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, which directs executive departments and agencies to take certain actions to further implement the MBTA. Under the MBTA, it is unlawful by any means or in any manner to pursue, hunt, take, capture, kill, attempt to take, capture, or kill or possess migratory birds or their nests or eggs at any time, unless permitted by regulation. The 2003 National Defense Authorization Act gave the Secretary of the Interior authority to prescribe regulations to exempt the U.S. Armed Forces from the incidental taking of migratory birds during authorized military readiness activities. The final rule authorizing DoD to take migratory birds in such cases includes a requirement that the U.S. Armed Forces must confer with the USFWS to develop and implement appropriate conservation measures to minimize or mitigate adverse effects of the Proposed Action if the action will have a significant negative effect on the sustainability of a population of a migratory bird species.

As part of the 1988 amendment to the Fish and Wildlife Conservation Act (Public Law 100-653), the USFWS is required to identify Birds of Conservation Concern, which are species, subspecies, and populations of migratory non-game birds that, without additional conservation actions, are likely to become candidates for listing under the ESA (USFWS, 2008). The USFWS published the most recent list of Birds of Conservation Concern in 2008, which identified specific species within 37 Bird Conservation Regions across North America. The goal envisioned by the USFWS in identifying these species is to stimulate the implementation of coordinated, proactive management and conservation actions among federal, state, tribal, and private partners to prevent these species from being listed under the ESA. Additionally, the Bird Conservation Region lists (USFWS, 2008) are intended to assist federal land-managing agencies and their partners in their efforts to abide by the bird conservation principles

embodied in the MBTA and EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. The study area is located within Bird Conservation Region 30, the New England/mid-Atlantic Coast.

Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c) protects bald and golden eagles (*Aquila chrysaetos*). The Act prohibits anyone without a federal permit to "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle...(or any golden eagle), alive or dead, or any part, nest, or egg thereof." "Take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." "Disturb" is further defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, injury to an eagle, a decrease in productivity by substantially interfering with the eagle's normal breeding, feeding or sheltering behavior, or nest abandonment by substantially interfering with the eagle's normal breeding, feeding or sheltering behavior." Additionally, the Act prohibits activities around an unoccupied nest site if, upon the eagle's return, the activities are shown to have resulted in an adverse impact on the eagle. Under the Bald and Golden Eagle Protection Act, a federal permit may be issued to authorize specific activities including the take, possession, and transportation of specimens for scientific or exhibition purposes, for the religious purposes of Indian tribes, or when a take is necessary to protect wildlife or agriculture in a particular area (USFWS, 2016b).

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. sections 1801–1882), enacted in 1976 and amended by the Sustainable Fisheries Act in 1996, mandates identification and conservation of EFH. EFH is defined as those waters and substrates necessary (required to support a sustainable fishery and the federally managed species) to fish for spawning, breeding, feeding, or growth to maturity (i.e., full life cycle). These waters include aquatic areas and their associated physical, chemical, and biological properties used by fish, and may include areas historically used by fish. Substrate types include sediment, hard bottom, structures underlying the waters, and associated biological communities. Federal agencies are required to consult with NMFS and to prepare an EFH assessment if potential adverse effects on EFH are anticipated from their activities. Any federal agency action that is authorized, funded, or undertaken or proposed to be undertaken that may affect fisheries is subject to the Magnuson-Stevens Fishery Conservation and Management Act. In addition, federal agencies shall consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any EFH identified under this act.

3.3.3 Joint Expeditionary Base Little Creek

The following discussions provide a description of the existing conditions for each of the biological resources at JEB Little Creek. A complete list of wildlife species for the base is listed in the INRMP (Navy, 2017c).

3.3.3.1 Habitats and Vegetation

The terrestrial environment at JEB Little Creek consists of a combination of developed and undeveloped habitats. Vegetated habitats in developed areas consist of manicured lawns, shrubs, and trees composed of both native and non-native species (Navy, 2017c). Vegetation in the undeveloped areas are composed of diverse communities that can be divided into ecological communities including mesic mixed hardwood, mesic mixed pine and hardwood, pine forests, maritime upland forests, maritime swamp forest, maritime dune woodland, maritime dune scrub, interdental ponds, maritime dune

grasslands, inter-dunal swales and ponds, upper beach and over wash flats, tidal oligohaline marsh, and coastal plain depressional wetland (Navy, 2017c). The Virginia Department of Conservation and Recreation (VADCR)-Digital Natural Heritage lists maritime upland forests, maritime mixed forests, maritime dune woodlands, and interdune ponds as critically imperiled and maritime dune grasslands and maritime swamp forests as imperiled in the state (Fleming & Patterson, 2012).

Various terrestrial surveys at JEB Little Creek have identified several state-listed plants considered rare in Virginia including Virginia beach pinweed (*Lechea maritima var. virginica*), bluejack oak (*Quercus incana*), Spanish moss (*Tillandsia usneoides*), wild olive (*Osmanthus americanus var. americanus*), tall yellow-eyed grass (*Xyris platylepis*), and seacoast marsh elder (*Iva imbricata*) (Navy, 2017c).

3.3.3.2 Mammals

Surveys for terrestrial mammals have not occurred at JEB Little Creek; however, mammal species at the installation are typical of an urban and suburban environment. Common species include: whitetail deer (*Odocoileus virginianus*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), eastern cottontail (*Sylvilagus floridanus*), eastern gray squirrel (*Sciurus carolinensis*), and muskrat (*Ondatra zibethicus*) (Navy, 2017c). Other smaller species likely include the southern short-tailed shrew (*Blarina carolinensis*), eastern mole (*Scalopus aquaticus*), Norway rat (*Rattus norvegicus*), house mouse (*Mus musculus*), and white-footed mouse (*Peromyscus leucopus*) (Navy, 2017c).

3.3.3.3 Invertebrates

Terrestrial invertebrate surveys have not been conducted at JEB Little Creek; however, a wide variety of species are likely present in the freshwater and terrestrial environments on the installation. Species likely comprise members of the phylum Mollusca, which includes slugs and snails; members of Annelida, which includes earthworms; and members of Anthropoda, which includes millipedes, centipedes, arachniods, and insects. No federally protected invertebrate species are known to occur at the installation.

3.3.3.4 Reptiles and Amphibians

Based on surveys and species typical of the Coastal Plain of Virginia, JEB Little Creek has the potential to support 44 reptile and 29 amphibians species (DoD, 2016b). Some of the reptile species observed on-site or typical of the habitats at JEB Little Creek include: common snapping turtle (*Chelydra serpentina serpentina*), yellow-bellied slider (*Trachemys scripta scripta*), eastern mud turtle (*Kinosternon subrubrum),* northern watersnake (*Nerodia sipedon*), eastern gartersnake (*Thamnophis sirtalis*), eastern ratsnake (*Pantherophis alleghaniensis*), common five-lined skink (*Plestidon fasciatus*), little brown skink (*Scincella lateralis*), eastern box turtle (*Terrapene carolina*), and red-eared slider (*Trachemys scripta elegans*) (Navy, 2017c). Amphibians of JEB Little Creek likely include American bullfrog (*Lithobates catesbeianus*), northern green frog (*L. clamitans melanota*), southern leopard frog (*L. sphenocephalus*), eastern red-backed salamander (*Plethodon cinereus*), Atlantic coast slimy salamander (*P. chlorobryonis*), Cope's gray treefrog (*Hyla chrysocelis*), green treefrog (*H. cinerea*), southern toad (*Anaxyrus terrestris*), and Fowler's toad (*A. fowleri*) (Navy, 2017c).

3.3.3.5 Birds

Bird surveys conducted at JEB Little Creek have documented at least 183 species, both on the installation and in association with adjacent waterbodies (Navy, 2017c). In the city of Virginia Beach, Virginia, 374 species of birds have been documented (eBird, 2017).

Several of the resident and seasonal bird species that are typical of habitats found in areas with mixed residential, commercial, and industrial developments with ocean and beach habitats in the Coastal Plain of Virginia and are common at JEB Little Creek include: American crow *(Corvus brachyrhynchos*), fish crow (*Corvus ossifragus*), Canada goose (*Branta canadensis*), rock pigeon (*Columba livia*), European starling (*Sturnus vulgaris*), common grackle (*Quiscalus quiscula*), red-winged blackbird (*Agelaius phoeniceus*), ring-billed gull (*Larus delawarensis*), laughing gull (*Leucophaeus atricilla*), herring gull (*Larus smithsonianus*), royal tern (*Thalasseus maximus*), double-crested cormorant (*Phalacrocorax auritus*), sanderling (*Calidris alba*), willet (*Tringa semipalmata*), great egret (*Ardea alba*), great blue heron (*Ardea herodias*), house sparrow (*Passer domesticus*), Carolina chickadee (*Poecile carolinensis*), tufted titmouse (*Baeolophus bicolor*), American robin (*Turdus migratorius),* eastern bluebird (*Sialia sialis*), northern cardinal (*Cardinalis cardinalis*), Carolina wren (*Thryothorus ludovicianus*), dark-eyed junco (*Junco hyemalis*), house finch (*Carpodacus mexicanus*), white-throated sparrow (*Zonotrichia albicollis*), chipping sparrow (*Spizella passerina*), yellow-rumped warbler (*Setophaga coronata*), American goldfinch (*Carduelis tristis*), northern mockingbird (*Mimus polyglottos*), mourning dove (*Zenaida macroura*), blue jay (*Cyanocitta cristata*), gray catbird (*Dumetella carolinensis*), downy woodpecker (*Picoides pubescens*), red-bellied woodpecker (*Melanerpes carolinus*), northern flicker (*Colaptes auratus*), turkey vulture (*Cathartes aura*), black vulture (*Coragyps atratus*), red-shouldered hawk (*Buteo lineatus*), and osprey (*Pandion haliaetus*).

The peregrine falcon (*Falco peregrinus*) which is a Virginia State threatened species has been observed on-site (Navy, 2017c). Bald eagles (*Haliaeetus leucocephalus*) have also been observed at JEB Little Creek; however, no nesting sites are known to exist (Navy, 2017c). These and other bird species utilize the site during various periods of the year for breeding, over-wintering, and to rest during migration.

3.3.3.6 Federally Protected Species and Critical Habitats

Several federally protected species, including sea turtles, piping plover (*Charadrius melodus*), roseate tern (*Sterna dougallii*), red knot (*Calidris canutus*), and northern long-eared bat (*Myotis septentrionalis*), have the potential to occur in particular habitats at JEB Little Creek. The roseate tern, piping plover, and red knot utilize beach habitats like those located at JEB Little Creek but usage would likely be limited to temporary foraging during migration or post breeding dispersals.

The northern long-eared bat hibernates during the winter in caves and mines but during the summer they typically roost underneath the bark of live and dead trees in wooded habitats. The larger wooded areas at JEB Little Creek offer potential habitat for the northern long-eared bat. A recent mist net survey for bats at the installation did not capture the northern long-eared bat; however, the species has been observed on other installations in the area and given the mobility of the species it is quite probable that it utilizes wooded habitats at JEB Little Creek.

Federally listed sea turtles (i.e., loggerhead, green, and Kemp's ridley) are known to occur in the Chesapeake Bay during the warm months of the year to feed (i.e., spring to fall). Acoustic and satellite telemetry studies conducted by the Navy have revealed a peak level of occurrence in the Chesapeake Bay offshore of JEB Little Creek in May with a relatively high number of individual loggerhead and

Kemp's ridley sea turtles detected in that location (Barco & Lockhart, 2016). The beaches along the coast of Virginia may also serve as nesting habitat for sea turtles during the spring and summer months, particularly June, July, and August (Boettcher, 2015). Loggerhead, green, and Kemp's ridley sea turtles have also been occasionally observed near the beach habitats of JEB Little Creek; however, these occurrences are rare and there is no evidence that these species utilize JEB Little Creek beaches for nesting (Navy, 2017c). Since 1970 when data collection efforts began, no sea turtle nests or nesting attempts have been documented at JEB Little Creek beaches (VDGIF, 2016).

As noted in Section 3.3.1.7.9 (Harbor Seal [*Phoca vitulina]*), there is a potential for harbor seals to haul out at JEB Little Creek.

3.3.4 Joint Expeditionary Base Fort Story

The following discussions provide a description of the existing conditions for each of the biological resources at JEB Fort Story. A complete list of wildlife species for the base is listed in the INRMP (Navy, 2017c).

3.3.4.1 Habitats and Vegetation

JEB Fort Story consists of a combination of developed and undeveloped habitats. Vegetated habitats in developed areas consist of manicured lawns, shrubs and trees composed of both native and non-native species. The undeveloped areas have diverse vegetation communities that can be divided into seven ecological communities including maritime live oak forests, maritime live oak-bluejack oak dune woodlands, forested wetlands, Northern bayberry dune scrub, live oak dune scrub, North Atlantic mixed dune grassland, and aquatic habitat (Navy, 2017c). VADCR-Digital Natural Heritage lists maritime live oak forests, maritime live oak-bluejack oak dune woodlands, and live oak dune scrub as critically imperiled and North Atlantic mixed dune grassland and Northern bayberry dune scrub as imperiled in the state (Fleming & Patterson, 2012).

Various surveys at JEB Fort Story have identified several state-listed plants considered rare in Virginia including Walter's sedge (*Carex striata*), pineland tick-trefoil (*Desmodium strictum*), viviparous spikerush (*Eleocharis vivipara*), coastal bedstraw (*Galium hispidulum*), American halfchaff sedge (*Lipocarpha maculate*), dune ground-cherry (*Physalis walteri*), Darlington's oak (*Quercus hemisphaerica*), bluejack oak, Spanish moss, wild olive, tall yellow-eyed grass (*Xyris platylepis*), and seacoast marsh elder (Navy, 2017c).

3.3.4.2 Mammals

Most of the terrestrial species of wildlife at JEB Fort Story are typical of an urban and suburban environment. Mammalian species observed at JEB Fort Story include Virginia opossum, eastern gray squirrel, eastern harvest mouse (*Reithrodontomys humulis*), white-footed mouse, red fox, gray fox, raccoon, striped skunk (*Mephitus mephitis*), evening bat (*Nycticeius humeralis*) and whitetail deer (Navy, 2017c). Additional mammals species typical of the Coastal Plain of Virginia may include eastern cottontail rabbit, muskrat, southern short-tailed shrew, eastern mole (*Scalopus aquaticus*), Norway rat (*Rattus norvegicus*), and house mouse (*Mus musculus*) (Navy, 2017c). The Rafinesque's eastern big-eared bat (*Corynorhinus rafinesquii macrotis*), which is a Virginia endangered species has been observed on-site utilizing abandoned buildings (Navy, 2017c).

3.3.4.3 Invertebrates

Invertebrate surveys have not been conducted at JEB Fort Story; however, a wide variety of species are likely present in the freshwater and terrestrial environments on the installation. Species likely comprise members of the phylum Mollusca, which includes slugs and snails; members of Annelida, which includes earthworms; and members of Anthropoda, which includes millipedes, centipedes, arachniods, and insects. No federally protected invertebrate species are known to occur at the installation.

3.3.4.4 Reptiles and Amphibians

Surveys for reptiles and amphibians at JEB Fort Story have identified 26 reptile and 14 amphibian species (Navy, 2017c). Amphibians identified include northern green frog, southern leopard frog, American bullfrog, Coastal Plain cricket frog (*Acris gyrllus gryllus*), Cope's gray treefrog, squirrel treefrog (*H. squirella*), northern spring peeper (*Pseudacris crucifer*), Fowler's toad, southern toad, eastern narrow-mouthed toad (*Gastrophryne carolinensis*), two-toed amphiuma (*Amphiuma means*), Atlantic Coast slimy salamander, eastern red-backed salamander, and marbled salamander (*Ambystoma opacum*).

Reptiles identified at JEB Fort Story include common five-lined skink, little brown skink, eastern fence lizard (*Sceloporus undulates*), eastern gartersnake, eastern six-lined racerunner (*Cnemidophorus sexlineatus*), eastern hognose snake (*Heterodon platirhinos*), eastern wormsnake (*Carphophis amoenus amoenus*), northern black racer (*Coluber constrictor constrictor*), eastern kingsnake (*Lampropeltis getula*), eastern mud snake (*Farancia abacura*), northern scarlet snake (*Aspidoscelis coccinea*), eastern ratsnake, brown watersnake (*Nerodia taxispilota*), northern rough greensnake (*Opheodrys aestivus*), northern copperhead (*Agkistrodon contortrix*), eastern cottonmouth (*A. piscivorus*), red-bellied cooter (*Pseudemys rubrventris*), common snapping turtle, eastern box turtle, eastern painted turtle (*Chrysemys picta*), and spotted turtle (*Clemmys guttata*).

3.3.4.5 Birds

Bird surveys conducted at JEB Fort Story have documented at least 110 species, both on the Installation and in association with adjacent waterbodies (Navy, 2017c). In the city of Virginia Beach, Virginia, 374 species of birds have been documented (eBird, 2017).

Several of the resident and seasonal bird species that are typical of habitats found in areas with mixed residential, commercial, and industrial developments with ocean and beach habitats in the Coastal Plain of Virginia and are common at JEB Fort Story include American crow, fish crow, Canada goose, rock pigeon, European starling, common grackle, red-winged blackbird, ring-billed gull, laughing gull, herring gull, royal tern, double-crested cormorant, sanderling, willet, great egret, great blue heron, house sparrow, Carolina chickadee, tufted titmouse, American robin, eastern bluebird, northern cardinal, Carolina wren, dark-eyed junco, house finch, white-throated sparrow, chipping sparrow, yellow-rumped warbler, American goldfinch, northern mockingbird, mourning dove, blue jay, gray catbird, downy woodpecker, red-bellied woodpecker, northern flicker, turkey vulture, black vulture, red-shouldered hawk, and osprey.

The peregrine falcon which is a Virginia threatened species has been observed on-site (Navy, 2017c). Bald eagles have been observed at JEB Fort Story; however, no nesting sites are known to exist. These and other bird species utilize the site during various periods of the year for breeding, over-wintering, and to rest during migration.

3.3.4.6 Federally Protected Species and Critical Habitats

Several federally protected species, including the roseate tern, red knot, piping plover, harbor seal, and northern long-eared bat have the potential to occur in particular habitats at JEB Fort Story. The roseate tern, piping plover, and red knot utilize beach habitats like those located at JEB Fort Story but usage would likely be limited to temporary foraging during migration or post breeding dispersals.

The northern long-eared bat hibernates during the winter in caves and mines but during the summer they typically roost underneath the bark of live and dead trees in wooded habitats. The larger wooded areas at JEB Fort Story offer potential habitat for the northern long-eared bat. A July 2015 mist net survey for bats at the installation did not capture the northern long-eared bat; however, the species was detected during an acoustic survey that was conducted from March 11 through November 16, 2015 (Navy, 2016a).

JEB Fort Story's location along the Atlantic shorelines in southeastern Virginia makes it a potential haul-out location for harbor seals. Individual harbor seals have been seen hauling out on the beaches of JEB Fort Story from late fall to early spring.

Sea turtles relevant to this study area that are known to feed in the Chesapeake Bay near JEB Fort Story include Kemp's ridley, loggerhead, and green sea turtles. Acoustic and satellite telemetry studies of sea turtle occurrence in Chesapeake Bay areas off of JEB Fort Story have shown a peak in occurrence in October, primarily consisting of loggerhead and Kemp's ridley sea turtles (Barco & Lockhart, 2016). These species have also occasionally been documented on the beaches of JEB Fort Story (Navy, 2017c). From 1970, when data collection efforts began, through 2015, three loggerhead sea turtle false crawls (when a female sea turtle comes ashore but does not lay a nest) and three loggerhead nests have been documented at JEB Fort Story (VDGIF, 2016). The potential for Kemp's ridley sea turtles to nest along the JEB Fort Story shoreline is also a concern because, along with loggerheads, this species is the most abundant in offshore areas of JEB Fort Story (Navy, 2017c). In 2015, 90 strandings of Kemp's ridley sea turtles were reported in the lower Chesapeake Bay (Swingle et al., 2016), some of which were in the vicinity of JEB Fort Story. No green sea turtle nests have been documented at JEB Fort Story. For the past several years, volunteers and USFWS employees have conducted patrols along the eastern beach areas of JEB Fort Story from June 1 through August 31 for potential nesting and the presence of stranded turtles. This was done in accordance with Memoranda of Understanding between JEB Fort Story and the Back Bay National Wildlife Refuge/USFWS. The USFWS cancelled the 2016 Memorandum of Understanding in January 2018. Nesting and stranded sea turtle management is performed in accordance with the JEB Fort Story INRMP and the Navy's Biological Assessment for Sea Turtle Management at JEB Fort Story dated May 2016, as supplemented (Navy, 2017c).

3.3.5 Dam Neck Annex and Camp Pendleton

The following discussions provide a description of the existing conditions for each of the biological resources at Dam Neck Annex and Camp Pendleton. A complete list of wildlife species for the base is listed in the INRMP Appendices (Navy, 2017d).

3.3.5.1 Habitats and Vegetation

Dam Neck Annex and Camp Pendleton consists of a combination of developed and undeveloped habitats. Vegetated habitats in developed areas consist of manicured lawns, shrubs and trees composed of both native and non-native species. The undeveloped areas have diverse vegetation communities that can be divided into nine ecological communities including maritime dune woodlands, maritime

evergreen forests, maritime dune grasslands, maritime scrub communities, interdunal wetlands, hardwood forest, mixed forest, pine forest, and early successional habitat (Navy, 2017d). VADCR-Digital Natural Heritage lists maritime dune woodlands as critically imperiled and maritime evergreen forests, maritime dune grasslands, and maritime scrub communities as imperiled in the state (Fleming & Patterson, 2012).

Surveys at Dam Neck Annex and Camp Pendleton have documented several state-listed rare plants including American lipocarpha (*Lipocarpha maculate*), black-fruited spikerush (*Rhynchospora fascicularis)*, umbrella sedge (*Fuirena breviseta*), creeping seedbox (*Ludwigia repens*), long beach seedbox (*Ludwigia brevipes*), white-topped fleabane (Erigeron vernus), bluejack oak, fasciculate beakrush (*Rhynchospora fascicularis* var. *fascicularis*), glossy-seeded star-grass (*Hypoxis sessilis*, formerly *H. longii*), and Elliott's rush (*Juncus elliottii*) (Navy, 2017d).

3.3.5.2 Mammals

The majority of terrestrial wildlife at Dam Neck Annex and Camp Pendleton are species typical of an urban and suburban environment in southeastern Virginia. Mammalian species observed at Dam Neck Annex and Camp Pendleton include whitetail deer, gray fox, raccoon, nutria (*Myocastor coypus*), Virginia opossum, eastern gray squirrel, North American least shrew (*Cryptotis parva*), southern short-tailed shrew, eastern harvest mouse, white-footed mouse, meadow vole (*Microtus pennsylvanicus*), woodland vole (*Microtus pinetorum*), eastern mole, marsh rice rat (*Oryzomys palustris*) and eastern cottontail (Navy, 2017d). Additional mammals species typical of the Coastal Plain of Virginia may include red fox, muskrat, Norway rat (*Rattus norvegicus*), and house mouse (*Mus musculus*) (Navy, 2017d).

3.3.5.3 Invertebrates

Invertebrate surveys have not been conducted at Dam Neck Annex or Camp Pendleton; however, a wide variety of species are likely present in the freshwater and terrestrial environments on the installations. The species present are most likely members of the phylum Mollusca, which includes slugs and snails; members of Annelida, which includes earthworms; and members of Anthropoda, which includes millipedes, centipedes, arachniods, and insects. No federally protected invertebrate species are known to occur at Dam Neck Annex and Camp Pendleton.

3.3.5.4 Reptiles and Amphibians

Surveys for reptiles and amphibians at Dam Neck Annex and Camp Pendleton have identified 26 reptile and 14 amphibian species (Navy, 2017d). Reptiles identified include the red-eared slider, yellow-bellied slider, eastern mud turtle, eastern box turtle, northern water snake, brown water snake, eastern ribbon snake (*Thamnophis sauritus*), eastern rat snake, five-lined skink, eastern fence lizard, and ground skink, eastern hognose (*Heterodon platyrhinos*), and eastern cottonmouth (*Agkistrodon piscivorous*) (Navy, 2017d). Amphibians observed included bullfrog, green frog, and southern leopard frog, red-backed salamander, Atlantic coastal slimy salamander, Cope's gray treefrog, and southern toad (Navy, 2017d).

3.3.5.5 Birds

Bird surveys conducted at Dam Neck Annex and Camp Pendleton have documented at least 167 species, both on the installation and in association with adjacent waterbodies (Navy, 2017d). In the city of Virginia Beach, Virginia, 374 species of birds have been documented (eBird, 2017).

Several of the resident and seasonal bird species that are typical of habitats found in areas with mixed residential, commercial, and industrial developments with ocean and beach habitats in the Coastal Plain of Virginia and are common at Dam Neck Annex and Camp Pendleton include: American crow, fish crow, Canada goose, rock pigeon, European starling, common grackle, red-winged blackbird, ring-billed gull, laughing gull, herring gull, royal tern, double-crested cormorant, sanderling, willet, great egret, great blue heron, house sparrow, Carolina chickadee, tufted titmouse, American robin, eastern bluebird, northern cardinal, Carolina wren, dark-eyed junco, house finch, white-throated sparrow, chipping sparrow, yellow-rumped warbler, American goldfinch, northern mockingbird, mourning dove, blue jay, gray catbird, downy woodpecker, red-bellied woodpecker, northern flicker, turkey vulture, black vulture, red-shouldered hawk, and osprey. Wilson's plover (*Charadrius wilsonia*), a Virginia endangered species, and the peregrine falcon and the gull-billed tern (*Gelochelidon nilotica*), both state threatened species, have been observed on-site (Navy, 2017d).

Bald eagles have been observed at Dam Neck Annex and Camp Pendleton. Review of the Center for Conservation Biology Mapping Portal identifies an eagle nest (Nest Code VB 0601) located just off the installation on Redwing Lake Golf Course next to Redwing Lake (Center for Conservation Biology, 2017a). These and other bird species utilize the site during various periods of the year for breeding, over-wintering, and to rest during migration.

3.3.5.6 Federally Protected Species and Critical Habitats

In August 2014, the federally protected piping plover was observed foraging on-site during early fall (Navy, 2017d). During this time, piping plovers are typically migrating south from Canada to winter nesting habitats. This individual was banded and the banding number verified. The individual was identified to be a first-year bird that was banded as a chick in June 2014 in Nova Scotia and was later observed in September 2014 in North Carolina (Gratto-Trevor, 2014). The roseate tern, piping plover, and red knot utilize beach habitats similar to those located at Dam Neck Annex and Camp Pendleton but usage would likely be limited to temporary foraging during migration or post breeding dispersals.

The northern long-eared bat hibernates during the winter in caves and mines but during the summer they typically roost underneath the bark of live and dead trees in wooded habitats. The larger wooded areas at Dam Neck Annex and Camp Pendleton offer potential habitat for the northern long-eared bat. A July 2015 mist net survey for bats at the installation did not capture the northern long-eared bat; however, the species was identified during the March – November 2015 acoustic survey (Tetra Tech, 2016).

Dam Neck Annex and Camp Pendleton's location along the Atlantic shorelines in southeastern Virginia makes it a potential haul-out location for harbor seals. Individual harbor seals have been seen hauling out on the beaches of Dam Neck Annex and Camp Pendleton from late fall to early spring.

Dam Neck Annex and Camp Pendleton's location along the Atlantic shorelines in southeastern Virginia also makes it a potential nest location for loggerhead, green, and Kemp's ridley sea turtles. However, no sea turtle nests have been documented at Camp Pendleton, although one nest was documented approximately one mile to the north on Croatan Beach in 2015. Two sea turtles species, loggerhead and Kemp's ridley, have successfully nested on Dam Neck Annex beaches. Between 1970, when data collection efforts began, and July 2017, four loggerhead sea turtle nests and three false crawls were documented (VDGIF, 2016; Navy, 2017d). The most recent loggerhead sea turtle nesting activity at Dam Neck Annex included two nests that were documented in June and July 2017. The incubation period for

both nests at the time this Draft EA was published is ongoing, so nesting success is not yet known. Before documentation of the 2017 nests, the last loggerhead sea turtle nesting at Dam Neck Annex was recorded in 2002. The first recorded Kemp's ridley nesting in Virginia occurred on Dam Neck Annex beaches in June 2012 and successfully hatched in August (VDGIF, 2016). The state's second Kemp's ridley nest was recorded in 2014 outside of study area beaches in False Cape State Park. Loggerhead sea turtles are the most common sea turtle in the Dam Neck Annex area, and Kemp's ridley sea turtles are frequently observed in the nearshore areas of Dam Neck Annex (Navy, 2017d). Green sea turtles have also been recorded in offshore areas of Dam Neck Annex; however, this species is known to nest in locations outside the Dam Neck Annex beaches. Green sea turtles have been documented nesting on Virginia beaches located north and south of Dam Neck Annex (Navy, 2017d). A green sea turtle nest was recorded on Sandbridge Beach in August 2005, which is only a few miles south of Dam Neck Annex (VDGIF, 2016); however, no green sea turtles have nested on Dam Neck Annex beaches. Daily sea turtle patrols are conducted from May 15 to August 31 by Dam Neck Annex natural resources staff to monitor for stranded turtles, turtle crawls, and nests (Navy, 2015; USFWS, 2016c).

3.3.6 Naval Auxiliary Landing Field Fentress

The following discussions provide a description of the existing conditions for each of the biological resources at NALF Fentress. A complete list of wildlife species for the base is listed in the INRMP Appendices (Navy, 2017e).

3.3.6.1 Habitats and Vegetation

Developed lands on NALF Fentress consist of a combination of developed and undeveloped habitats. Vegetated habitats in developed areas consist of manicured lawns, shrubs and trees composed of both native and non-native species. Vegetation in the developed areas primarily includes mowed lawn, shade trees, ornamental trees, shrubs, and row crops (Navy, 2017e). Additionally, NALF Fentress has significant areas of undeveloped lands including: forest, old field, freshwater emergent and scrub-shrub wetlands. The undeveloped areas are primarily mixed forest dominated by loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), tulip poplar (*Liriodendron tulipifera*), and red maple (*Acer rubrum*). Other common overstory species that occur on poorly drained sites include blackgum (*Nyssa sylvatica*), green ash (*Fraxinus pennsylvanica*), willow oak (*Quercus phellos*), swamp chestnut oak (*Q. michauxii*), water oak (*Q. nigra*), and cherrybark oak (*Q. pagodafolia*) (Navy, 2017e). Common midstory and shrub species include persimmon (*Diospyros virginiana*), fetterbush (*Leucothoe racemosa*), flowering dogwood (*Cornus florida*), wax myrtle (*Morella cerifera*), sassafras (*Sassafras albidum*), sweet pepperbush (*Clethera alnifolia*), ironwood (*Carpinus caroliniana*), American holly (*Ilex opaca*), red maple, pawpaw (*Asimina triloba*), and river birch (*Betula nigra*) (Navy, 2017e). Herbaceous species vary greatly according to site conditions and the density of canopy cover (Navy, 2017e).

Open fields immediately adjacent to the airfield are dominated by vegetation such as broomsedge (*Andropogon virginicus*), big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*), goldenrods (*Solidago* spp.), bonesets (*Eupatorium* spp.), partridge pea (*Cassia fasciculata*) and bushclovers (*Lespedeza* spp.) (Navy, 2017e). Scrub-shrub wetlands at NALF Fentress contain a variety of species including smooth alder (*Alnus serrulata*), saw greenbrier (*Smilax bona-nox*), black willow (*Salix nigra*), buttonbush (*Cephalanthus occidentalis*), wax myrtle, and numerous red maple and sweetgum saplings (Navy, 2017e). The freshwater emergent wetlands are dominated by soft rush (*Juncus effusus*), wool grass (*Scirpus cyperinus*), smartweeds (*Polygonum* spp.), lizard's tail (*Saururus cernuus*), golden ragwort (*Senecio aureus*), and cattail (*Typha* spp.).

3.3.6.2 Mammals

Terrestrial mammals that have been observed at NALF Fentress include whitetail deer, gray fox, red fox, raccoon, Virginia opossum, eastern cottontail rabbit, eastern gray squirrel, nutria, and muskrat. Smaller mammals including: southern short-tailed shrew, eastern mole, Norway rat, house mouse, and white-footed mouse have also been observed (Navy, 2017e).

3.3.6.3 Invertebrates

Terrestrial invertebrate surveys have not been conducted at NALF Fentress; however, a wide variety of species are likely present in the freshwater and terrestrial environments on the installation. Species likely comprise members of the phylum Mollusca, which includes slugs and snails; members of Annelida, which includes earthworms; and members of Anthropoda, which includes millipedes, centipedes, arachniods, and insects. No federally protected invertebrate species are known to occur at the installation.

3.3.6.4 Reptiles and Amphibians

Surveys for reptiles and amphibians at NALF Fentress have identified 25 reptile and 16 amphibian species (Navy, 2017e). Reptiles identified include the common snapping turtle, red-bellied cooter, eastern mud turtle, eastern box turtle, northern water snake, eastern rat snake, black racer, rough greensnake, copperhead, eastern gartersnake, eastern kingsnake, common five-lined skink, eastern fence lizard, and ground skink (Navy, 2017e). Amphibians observed included green frog, spring peeper, southern leopard frog, red-backed salamander, Atlantic coastal slimy salamander, southern toad, American toad, and Fowler's toad (Navy, 2017e). The Virginia state-listed endangered timber rattlesnake (*Crotalus horridus*) was last documented on NALF Fentress in May 2013.

3.3.6.5 Birds

Bird surveys conducted at NALF Fentress have documented at least 90 species, both on the installation and in association with adjacent habitats (Navy, 2017e). In Chesapeake, Virginia, 234 species of birds have been documented (eBird, 2017).

Several of the resident and seasonal bird species that are typical of habitats found in areas with mixed woodlands, agricultural and airfields in the Coastal Plain of Virginia and are common at NALF Fentress include: American crow, fish crow, Canada goose, rock pigeon, European starling, common grackle, red-winged blackbird, ring-billed gull, laughing gull, great egret, great blue heron, house sparrow, Carolina chickadee, tufted titmouse, American robin, eastern bluebird, northern cardinal, Carolina wren, dark-eyed junco, house finch, white-throated sparrow, chipping sparrow, yellow-rumped warbler, American goldfinch, northern mockingbird, mourning dove, blue jay, gray catbird, brown thrasher (*Toxostoma rufum*), wood thrush (*Hylocichla mustelina*), ovenbird (*Seiurus aurocapillus*), pine warbler (*Dendroica pinus*), red-eyed vireo (*Vireo olivaceous*), white-eyed vireo (*Vireo griseus*), Louisiana waterthrush (*Seiurus motacilla*), scarlet tanager (*Piranga olivacea*), summer tanager (*Piranga rubra*), downy woodpecker, red-bellied woodpecker, northern flicker, turkey vulture, black vulture, red-shouldered hawk, red-tailed hawk (*Buteo jamaicensis*), and osprey.

Bald eagles have been observed at NALF Fentress; however, no nesting sites are known to exist. These and other bird species utilize the site during various periods of the year for breeding, over-wintering, and to rest during migration.

3.3.6.6 Federally Protected Species and Critical Habitats

The federally protected northern long-eared bat was documented at NALF Fentress during a 2015 mist net survey (Tetra Tech, 2016). This species hibernates during the winter in caves and mines but during the summer they typically roost underneath the bark of live and dead trees in wooded habitats. The large wooded areas at NALF Fentress offer excellent summer habitat for the northern long-eared bat. No other federally protected species/or their critical habitats have been identified on the installation.

3.3.7 Northwest Annex

The following discussions provide a description of the existing conditions for each of the biological resources at Northwest Annex. A complete list of wildlife species for the base is listed in the INRMP Appendices (Navy, 2017f).

3.3.7.1 Habitats and Vegetation

Northwest Annex consists of a combination of developed and undeveloped habitats. Vegetated habitats in developed areas consist of manicured lawns, shrubs and trees composed of both native and non-native species. The undeveloped areas have diverse vegetation communities that can be divided into five ecological communities including mesic mixed hardwood forest, non-riverine flatwoods and swamps, Coastal Plain/Piedmont bottomland forest, loblolly pine forest, and early successional communities (Navy, 2017f). VADCR-Digital Natural Heritage lists non-riverine flatwoods and swamps as imperiled/vulnerable in the state (Fleming & Patterson, 2012).

3.3.7.2 Mammals

Surveys at Northwest Annex have documented 37 species of terrestrial mammals including whitetail deer, black bear (*Ursus americanus*), gray fox, red fox, bobcat (*Felis rufus*), raccoon, Virginia opossum, long-tailed weasel (*Mustela frenata*), eastern cottontail rabbit, marsh rabbit (*Sylvilagus palustris*), nutria, and muskrat. Small mammals observed at Northwest Annex include the southern short-tailed shrew, woodchuck (*Marmota monax*), eastern mole, Norway rat, house mouse, river otter (*Lutra canadensis*) and white-footed mouse, eastern gray squirrel, southern flying squirrel (*Glaucomys volans*), hispid cotton rat (*Sigmodon hispidus*), white-footed mouse, marsh rice rat, northern short-tailed shrew (*Blarina brevicauda*), North American least shrew, southeastern shrew (*Sorex longirostris longirostris*), meadow vole, pine vole (*Microtus pinetorum*), eastern harvest mouse, southern bog lemming (*Synaptomys cooperi*), and house mouse (Navy, 2017f). The state-listed threatened Dismal Swamp southeastern shrew (*Sorex longirostris fisheri*) has been documented on the station. Recent surveys have documented the federally threatened northern long-eared bat (Waller, 2015), and these are further discussed in Section 3.3.7.6 (Federally Protected Species and Critical Habitats).

3.3.7.3 Invertebrates

Terrestrial invertebrate surveys have not been conducted at Northwest Annex; however, a wide variety of species are likely present in the freshwater and terrestrial environments on the installation. Species likely comprise members of the phylum Mollusca, which includes slugs and snails; members of Annelida, which includes earthworms; and members of Anthropoda, which includes millipedes, centipedes, arachniods, and insects. No federally protected invertebrate species are known to occur at the installation.

3.3.7.4 Reptiles and Amphibians

Surveys and anecdotal observations at Northwest Annex have identified 35 reptile and 23 amphibian species (Navy, 2017f). Reptiles identified include the common snapping turtle, spotted turtle, red-eared slider, eastern mud turtle, eastern box turtle, eastern wormsnake, ring-necked snake (*Diadophis punctatus*), plain bellied watersnake (*Nerodia erythrogaster*), eastern rat snake, black racer, rough greensnake, eastern gartersnake, eastern kingsnake, eastern hog-nosed snake, broad-headed skink (*Plestiodon lateralis*), and common five-lined skink (Navy, 2017f). Amphibians observed include green treefrog, squirrel treefrog (*Hyla squirella*), Brimley's chorus frog (*Pseudacris brimleyi*), spring peeper, marbled salamander, red-backed salamander, and southern toad (Navy, 2017f). The state-listed endangered timber rattlesnake (*Crotalus horridus*) has a significant population on the annex.

3.3.7.5 Birds

Bird surveys conducted at Northwest Annex have documented at least 110 species, both on the installation and in association with adjacent habitats (Navy, 2017f). In Chesapeake, Virginia, 234 species of birds have been documented and 303 species of birds have been documented in Currituck County of North Carolina (eBird, 2017).

Several of the resident and seasonal bird species that are typical of mixed woodlands, agricultural, urban, and residential areas in the Coastal Plain of Virginia and are common at Northwest Annex include: American crow, fish crow, Canada goose, rock pigeon, European starling, common grackle, red-winged blackbird, ring-billed gull, laughing gull, great egret, great blue heron, house sparrow, Carolina chickadee, tufted titmouse, American robin, eastern bluebird, northern cardinal, Carolina wren, dark-eyed junco, house finch, white-throated sparrow, chipping sparrow, yellow-rumped warbler, American goldfinch, northern mockingbird, mourning dove, blue jay, gray catbird, brown thrasher, wood thrush, ovenbird, pine warbler, red-eyed vireo, white-eyed vireo, Louisiana waterthrush, scarlet tanager, summer tanager, downy woodpecker, red-bellied woodpecker, northern flicker, turkey vulture, black vulture, red-shouldered hawk, and red-tailed hawk.

Bald eagles have been observed at Northwest Annex; however, no nesting sites are known to exist. These and other bird species utilize the site during various periods of the year for breeding, over-wintering, and to rest during migration.

3.3.7.6 Federally Protected Species and Critical Habitats

The federally protected northern long-eared bat was documented at Northwest Annex during two separate survey events in 2015 (Tetra Tech, 2016). This species hibernates during the winter in caves and mines but during the summer they typically roost underneath the bark of live and dead trees in wooded habitats. The large wooded areas at Northwest Annex offer excellent summer habitat for the northern long-eared bat. No other federally protected species/or their critical habitats have been identified on the installation.

3.3.8 St. Juliens Creek Annex

The following discussions provide a description of the existing conditions for each of the biological resources at St. Juliens Creek Annex.

3.3.8.1 Habitats and Vegetation

St. Juliens Creek Annex is composed of a combination of developed and undeveloped lands. Vegetation in the developed areas consists of manicured lawns, planted shrubs, and trees. Undeveloped lands consist of forest, old field, and tidal emergent freshwater wetland habitats. The vegetation in the undeveloped areas is typical of the Virginia coastal plain and includes tree species such as loblolly pine, sweetgum, tulip poplar, and red maple. Common midstory and shrub species include flowering dogwood, wax myrtle, sassafras, ironwood, and American holly. The freshwater emergent wetlands are dominated by soft rush, wool grass, smartweeds, lizard's tail, golden ragwort, and cattail.

3.3.8.2 Mammals

Terrestrial mammal surveys have not been conducted at St. Juliens Creek Annex; however, common urban and suburban species likely include: red fox, raccoon, Virginia opossum, eastern cottontail, eastern gray squirrel, river otter, and muskrat. Other smaller species likely to be found include: the southern short-tailed shrew, eastern mole, Norway rat, house mouse, and white-footed mouse. Most of the wildlife species at St. Juliens Creek Annex are typical of an urban and suburban environment in southeastern Virginia.

3.3.8.3 Invertebrates

Terrestrial invertebrate surveys have not been conducted at St. Juliens Creek Annex; however, a wide variety of species are likely present in the freshwater and terrestrial environments on the installation. Species likely comprise members of the phylum Mollusca, which includes slugs and snails; members of Annelida, which includes earthworms; and members of Anthropoda, which includes millipedes, centipedes, arachniods, and insects. No federally protected invertebrate species are known to occur at the installation.

3.3.8.4 Reptiles and Amphibians

The reptiles and amphibians of St. Juliens Creek Annex are likely typical of urban and suburban environment in the Coastal Plain of Virginia. Reptile species likely include: eastern box turtle, eastern gartersnake, and common five-lined skink. Likely amphibian species include American bullfrog, green frog, spring peeper, gray treefrog, green treefrog, and Fowler's toad.

3.3.8.5 Birds

No survey for birds has occurred at St. Juliens Creek Annex. In the city of Chesapeake, Virginia, 234 species of birds have been documented (eBird, 2017). Several of the resident and seasonal bird species that are typical of habitats found in areas with mixed residential, commercial, and heavy industrial developments adjoining a river in the Coastal Plain of Virginia and are common at St. Juliens Creek Annex include American crow, fish crow, Canada goose, rock pigeon, European starling, common grackle, red-winged blackbird, ring-billed gull, laughing gull, herring gull, double-crested cormorant, great egret, great blue heron, house sparrow, Carolina chickadee, tufted titmouse, American robin, eastern bluebird, northern cardinal, Carolina wren, dark-eyed junco, house finch, white-throated sparrow, chipping sparrow, yellow-rumped warbler, American goldfinch, northern mockingbird, mourning dove, blue jay, gray catbird, downy woodpecker, red-bellied woodpecker, northern flicker, turkey vulture, black vulture, red-tailed hawk, and osprey. These and other bird species utilize the site during various periods of the year for breeding, over-wintering, and to rest during migration.

3.3.8.6 Federally Protected Species and Critical Habitats

No federally protected species and/or their critical habitat have been identified at St. Juliens Creek Annex. The December 2016 IPaC Report for St. Juliens Creek Annex lists the northern long-eared bat as a potential species for the site (USFWS, 2017). This species hibernates during the winter in caves and mines but during the summer they typically roost underneath the bark of live and dead trees in wooded habitats. The installation contains approximately 7 acres of wooded habitat that may provide summer habitat for the northern long-eared bat.

3.3.9 Naval Weapons Station Yorktown

The following discussions provide a description of the existing conditions for each of the biological resources at NWS Yorktown. A complete list of wildlife species for the base is listed in the INRMP (Navy, 2010a).

3.3.9.1 Habitats and Vegetation

NWS Yorktown consists of a combination of developed and undeveloped habitats. Vegetated habitats in developed areas consist of manicured lawns, shrubs and trees composed of both native and non-native species. The undeveloped areas have diverse vegetation communities that can be divided into 12 ecological communities including: coastal plain mesic calcareous ravine forest, coastal plain basic mesic forest, coastal plain basic seepage swamp, coastal plain depression wetlands, coastal plain dry calcareous forests and woodlands, mesic mixed hardwood forest, oak-heath forest, semi-permanent impoundments, tidal freshwater marshes, tidal mesohaline and polyhaline marshes, tidal shrub swamps, and pine plantations (Navy, 2010a).

VADCR-Digital Natural Heritage lists coastal plain dry calcareous forests and woodlands as critically imperiled and coastal plain depression wetlands as critically imperiled/imperiled, and coastal plain mesic calcareous ravine forest and coastal plain basic seepage swamp as imperiled in the state (Fleming & Patterson, 2012).

3.3.9.2 Mammals

Surveys at NWS Yorktown have documented 29 species of mammals including: whitetail deer, black bear, coyote (*Canis latrans*), gray fox, red fox, bobcat, raccoon, Virginia opossum, American beaver (*Castor canadensis*), woodchuck, eastern cottontail rabbit, and muskrat. Small mammals observed at NWS Yorktown include: the gray squirrel, southern flying squirrel, white-footed mouse, marsh rice rat, North American least shrew, southeastern shrew, southern short-tailed shrew, meadow vole, pine vole, Norway rat, eastern mole, and house mouse (Navy, 2010a). A complete list of wildlife species for the base is listed in the INRMP Appendices (Navy, 2010a).

3.3.9.3 Invertebrates

Invertebrate surveys have not been conducted at NWS Yorktown; however, a wide variety of species are likely present in the freshwater and terrestrial environments on the installation. Species likely comprise members of the phylum Mollusca, which includes slugs and snails; members of Annelida, which includes earthworms; and members of Anthropoda, which includes millipedes, centipedes, arachniods, and insects. No federally protected invertebrate species are known to occur at the installation.

3.3.9.4 Reptiles and Amphibians

Surveys for reptiles and amphibians at NWS Yorktown have identified 25 reptile and 21 amphibian species (Navy, 2010a). Reptiles identified include the common snapping turtle, red-bellied cooter, eastern mud turtle, eastern box turtle, northern water snake, eastern rat snake, black racer, rough greensnake, eastern worm snake (*Carphophis amoenus*), rough earthsnake (*Virginia striatula*), copperhead, five-lined skink, and ground skink (Navy, 2010a). Amphibians observed included bullfrog, green frog, spring peeper, Cope's gray treefrog, eastern cricket frog (*Acris crepitans*), southern leopard frog, pickerel frog (*Lithobates palustris*) green treefrog, upland chorus frog (*Pseudacris triseriata*), eastern narrow-mouthed toad (*Gastrophryne carolinensis*), American toad, Fowler's toad, red-backed salamander, Atlantic coastal slimy salamander, spotted salamander (*Ambystoma maculatum*), marbled salamander, red-spotted newt (*Notophthalmus viridescens*), and the Virginia state threatened Mabee's salamander (*Ambystoma mabeei*) (Navy, 2010a).

3.3.9.5 Birds

Bird surveys conducted at NWS Yorktown have documented at least 149 species, both on the installation and in association with adjacent waterbodies (Navy, 2010a). In York County, Virginia, 260 species of birds have been documented (eBird, 2017).

Several of the resident and seasonal bird species that are typical of mixed woodlands, industrial, and residential areas in the Coastal Plain of Virginia and are common at NWS Yorktown include: American crow, fish crow, Canada goose, rock pigeon, European starling, common grackle, red-winged blackbird, ring-billed gull, laughing gull, great egret, great blue heron, house sparrow, Carolina chickadee, tufted titmouse, American robin, eastern bluebird, northern cardinal, Carolina wren, dark-eyed junco, house finch, white-throated sparrow, chipping sparrow, yellow-rumped warbler, American goldfinch, northern mockingbird, mourning dove, blue jay, gray catbird, brown thrasher, wood thrush, ovenbird, pine warbler, red-eyed vireo, white-eyed vireo, Louisiana waterthrush, scarlet tanager, summer tanager, downy woodpecker, red-bellied woodpecker, northern flicker, turkey vulture, black vulture, red-shouldered hawk, and red-tailed hawk. A great blue heron rookery was identified during a 2013 survey completed by the Center for Conservation Biology. The rookery (Colony Code VA 2) was identified along the eastern edge of Indian Field Creek (Center for Conservation Biology, 2017b; Center for Conservation Biology, 2017c).

Bald eagles have been observed at NWS Yorktown and there are at least three nest locations last documented in 2016 located on the installation. The Center for Conservation Biology Mapping Portal identifies one nest along Felgates Creek (Nest Code YK0301), the second nest located along the northern installation boundary (Nest Code YK1604), and the third nest located in the southeastern portion of the installation (Nest Code YK1105). Two additional nests are located just north of the installation on National Park Service land next to the York River (Nest Codes YK1104 and YK 0901). These and other bird species utilize the installation and the associated waterways during various periods of the year for breeding, over-wintering, and to rest during migration.

3.3.9.6 Federally Protected Species and Critical Habitats

The federally protected northern long-eared bat was documented at NWS Yorktown during a 2014 mist net survey (Navy, 2014a) and again during a 2016 mist net survey (Navy, 2016b). This species hibernates during the winter in caves and mines but during the summer they typically roost underneath the bark of live and dead trees in wooded habitats. The large wooded areas at NWS Yorktown offer excellent

summer habitat for the northern long-eared bat. No other federally protected species/or their critical habitats have been identified on the installation. The installation is within the historical range of the federally threatened small whorled pogonia (*Isotria medeoloides*). The small whorled pogonia is a plant species that is typically found in mature hardwood stands of beech, birch, maple, oak, and hickory with an open understory, acidic soils, and a leaf layer (USFWS, 2016a). Small whorled pogonia has not been observed on the installation; however, it does contain suitable habitat in which the species could be found.

3.3.10 Cheatham Annex

The following discussions provide a description of the existing conditions for each of the biological resources at Cheatham Annex. A complete list of wildlife species for the base is listed in the INRMP (Navy, 2010a).

3.3.10.1 Habitats and Vegetation

Cheatham Annex consists of a combination of developed and undeveloped habitats. Vegetated habitats in developed areas consist of manicured lawns, shrubs and trees composed of both native and non-native species. The undeveloped areas have diverse vegetation communities that can be divided into nine ecological communities including coastal plain mesic calcareous ravine forest, coastal plain basic mesic forest, coastal plain basic seepage swamp, oak-heath forest, semi-permanent impoundments, tidal freshwater marshes, tidal mesohaline and polyhaline marshes, tidal shrub swamps, and pine plantations (Navy, 2010a). VADCR-Digital Natural Heritage lists coastal plain mesic calcareous ravine forest and coastal plain basic seepage swamp as imperiled in the state (Fleming & Patterson, 2012).

Jones Millpond (Jones Pond) is a 45-acre pond located in the southwest section of Cheatham Annex, south of the Colonial Parkway. It was formed by damming Cub Creek, a tributary of Queen's Creek just south of the Colonial Parkway overpass (Navy, 2010a). This pond is a freshwater, shallow, warm water pond. These ponds typically feature soft mud bottoms, relatively low dissolved oxygen content, and, in the summer, can feature extensive hydrilla (*Hydrilla verticillata*) growth. Hydrilla is an invasive exotic freshwater plant. Although it is non-native and invasive, it can provide habitat for fish as well as water quality benefits (National Park Service, 2010). Jones Pond does not have EFH.

3.3.10.2 Mammals

Surveys at Cheatham Annex have documented 29 species of terrestrial mammals including: whitetail deer, black bear, coyote, gray fox, red fox, bobcat, raccoon, Virginia opossum, American beaver (*Castor canadensis*), woodchuck, eastern cottontail rabbit, and muskrat. Small mammals observed at Cheatham Annex include: the gray squirrel, southern flying squirrel, white-footed mouse, marsh rice rat, North American least shrew, southeastern shrew, southern short-tailed shrew, meadow vole, pine vole, Norway rat, eastern mole, and house mouse (Navy, 2010a). A complete list of wildlife species for the base is listed in the INRMP Appendices (Navy, 2010a).

3.3.10.3 Invertebrates

Invertebrate surveys have not been conducted at Cheatham Annex; however, a wide variety of species are likely present in the freshwater and terrestrial environments on the installation. Species likely compose members of the phylum Mollusca, which includes slugs and snails; members of Annelida,

which includes earthworms; and members of Anthropoda, which includes millipedes, centipedes, arachniods, and insects. No federally protected invertebrate species are known to occur at the installation.

3.3.10.4 Fish

Jones Pond is used regularly for recreational fishing (Navy, 2010a). Fish species taken include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), pumpkinseed sunfish (*Lepomis gibbosus*), and redear sunfish (*Lepomis microlophus*) (Navy, 2010a). Forage fish (e.g., gizzard shad [*Dorosoma cepedianum*] and golden shiner [*Notemigonus crysoleucas*]) are present as well, but past populations were generally low due to a lack of planktonic food, in turn limiting game fish populations in the pond. This was due to the fact that Jones Pond once served as a drinking water reservoir and the water was treated with copper sulfate to improve water clarity and taste. However, as an indirect result, use of copper sulfate was highly toxic to fish in the pond. Jones Pond is no longer a water supply reservoir and treatments have ceased; therefore, fish populations are likely to rebound and fishing opportunities improve.

3.3.10.5 Reptiles and Amphibians

Surveys for reptiles and amphibians at Cheatham Annex have identified 25 reptile and 19 amphibian species (Navy, 2010a). Reptiles identified include the common snapping turtle, red-bellied turtle, eastern mud turtle, eastern box turtle, northern water snake, eastern rat snake, black racer, rough greensnake, eastern worm snake (*Carphophis amoenus*), rough earthsnake (*Virginia striatula*), copperhead, five-lined skink, and ground skink (Navy, 2010a). Amphibians observed included bullfrog, green frog, spring peeper, Cope's gray treefrog, eastern cricket frog (*Acris crepitans*), southern leopard frog, pickerel frog (*Lithobates palustris*) green treefrog, upland chorus frog (*Pseudacris triseriata*), eastern narrow-mouthed toad (*Gastrophryne carolinensis*), American toad, Fowler's toad, red-backed salamander, Atlantic coastal slimy salamander, spotted salamander (*Ambystoma maculatum*), marbled salamander, and red-spotted newt (*Notophthalmus viridescens*) (Navy, 2010a).

3.3.10.6 Birds

Bird surveys conducted at Cheatham Annex have documented at least 149 species, both on the installation and in association with adjacent waterbodies (Navy, 2010a). In York County of Virginia, 260 species of birds have been documented (eBird, 2017).

Several of the resident and seasonal bird species that are typical of mixed woodlands, agricultural, industrial, and residential areas in the Coastal Plain of Virginia and are common at Cheatham Annex include: American crow, fish crow, Canada goose, rock pigeon, European starling, common grackle, red-winged blackbird, ring-billed gull, laughing gull, great egret, great blue heron, house sparrow, Carolina chickadee, tufted titmouse, American robin, eastern bluebird, northern cardinal, Carolina wren, dark-eyed junco, house finch, white-throated sparrow, chipping sparrow, yellow-rumped warbler, American goldfinch, northern mockingbird, mourning dove, blue jay, gray catbird, brown thrasher, wood thrush, ovenbird, pine warbler, red-eyed vireo, white-eyed vireo, Louisiana waterthrush, scarlet tanager, summer tanager, downy woodpecker, red-bellied woodpecker, northern flicker, turkey vulture, black vulture, red-shouldered hawk, and red-tailed hawk. Two great blue heron rookeries were identified during a 2013 survey completed by the Center for Conservation Biology. The first rookery (Colony Code

VA 4) was identified along the northern edge of Cheatham Lake and the second (Colony Code VA 3) was documented on the southeast edge of Penniman Lake (Center for Conservation Biology, 2017d).

Bald eagles have been observed at Cheatham Annex and there is one nest location last documented in 2016 located on the installation. The Center for Conservation Biology Mapping Portal identifies the one nest along Jones Millpond (Nest Code YK0204). These and other bird species utilize the installation and the associated waterways during various periods of the year for breeding, over-wintering, and to rest during migration.

3.3.10.7 Federally Protected Species and Critical Habitats

The federally protected northern long-eared bat was documented at Cheatham Annex during a 2015 acoustic survey effort (Tetra Tech, 2016). This species hibernates during the winter in caves and mines but during the summer they typically roost underneath the bark of live and dead trees in wooded habitats. The large wooded areas at Cheatham Annex offer excellent summer habitat for the northern long-eared bat. No other federally protected species/or their critical habitats have been identified on the installation. The installation is within the historical range of the federally threatened small whorled pogonia (*Isotria medeoloides*). The small whorled pogonia is a plant species that is typically found in mature hardwood stands of beech, birch, maple, oak, and hickory with an open understory, acidic soils, and a leaf layer (USFWS, 2016a). Small whorled pogonia has not been observed on the installation; however, the installation does contain suitable habitat in which the species could be found.

3.3.11 First Landing State Park

The following discussions provide a description of the existing conditions for each of the biological resources at First Landing State Park.

3.3.11.1 Habitats and Vegetation

First Landing State Park is located next to JEB Fort Story with the Chesapeake Bay on the north side and a tidal estuary on the south side of the park. The habitats located at the park include cypress swamp, salt marsh, maritime forest, freshwater wetlands, dunes, and bay shoreline.

3.3.11.2 Mammals

Mammals at First Landing State Park are typical of the Coastal Plain of Virginia. The park is located adjacent to JEB Fort Story and is likely to have many of the same species (Section 3.3.4.2, JEB Fort Story, Mammals).

The northern long-eared bat hibernates during the winter in caves and mines but during the summer they typically roost underneath the bark of live and dead trees in wooded habitats. The larger wooded areas at First Landing State Park offer potential habitat for the northern long-eared bat (USFWS, 2015a).

3.3.11.3 Invertebrates

Invertebrates are likely to consist of many of the same species as JEB Fort Story (Section 3.3.4.3, JEB Fort Story, Invertebrates).

3.3.11.4 Reptiles and Amphibians

Reptiles and amphibians at First Landing State Park are typical of the Coastal Plain of Virginia. The park is located adjacent to JEB Fort Story and is likely to have many of the same species (Section 3.3.4.4, JEB

Fort Story, Reptiles and Amphibians). However, one additional noteworthy species documented at First Landing State Park but not on JEB Fort Story is the Virginia state-listed threatened barking treefrog, which was documented on-site in late 2016 (Petersen, 2017).

3.3.11.5 Birds

Birds at First Landing State Park are typical of the Coastal Plain of Virginia. The park is located adjacent to JEB Fort Story and is likely to have many of the same species (Section 3.3.4.5, JEB Fort Story, Birds). Two great blue heron rookeries were identified during a 2013 survey completed by the Center for Conservation Biology. The first rookery (Colony Code VA 235) was identified along the northern edge of White Hill Lake. The second rookery (Colony Code VA 236) was documented on the southern edge of the park and also included three great egret pairs (Center for Conservation Biology, 2017e; Center for Conservation Biology, 2017f).

3.3.11.6 Federally Protected Species and Critical Habitats

No critical habitat for federally protected terrestrial species is located on First Landing State Park. Several federally protected species, including the harbor seal and northern long-eared bat, have the potential to occur in particular habitats at First Landing State Park. Harbor seals have been seen hauling out on the beaches at First Landing State Park from late fall-early spring. The larger wooded areas at First Landing State Park offer potential habitat for the northern long-eared bat. In addition, review of the Center for Conservation Biology Mapping Portal identifies an eagle nest (Nest Code VB 1605) within the park.

3.3.12 Southern Branch of the Elizabeth River

The following discussion provides a description of the existing conditions for each of the biological resources along the Southern Branch of the Elizabeth River. No terrestrial habitats are utilized for training and, therefore, terrestrial wildlife discussions are limited to bird species that may overfly the area.

3.3.12.1 Habitats and Vegetation

The salinity profile of the study area as described in Neilson (1975) ranges between 10 to 20 practical salinity units, with salinity decreasing from the main stem of the Elizabeth River to the Southern Branch of the Elizabeth River. Sea level rise and increasing impervious surface drainage with development have likely elevated low water salinities and increased variability in surface salinity, respectively. The Southern Branch of the Elizabeth River is considered highly degraded but improving (Elizabeth River Steering Committee, 2014). Habitat quality of the Southern Branch generally decreases proceeding southward due to decreases in dissolved oxygen and increases in pollutants (Elizabeth River Steering Committee, 2014). The river is heavily utilized by commercial and recreational watercraft and in order to support this traffic it is periodically dredged. There are over 12,000 annual vessel transits in the Southern Branch (Drawbridge Operation Regulations, 2010). The majority of the width of the river in the project area is channel. The bottom consists primarily of mud and is contaminated from past industrial practices. Contaminants include polycyclic aromatic hydrocarbons and metals such as copper and zinc (Elizabeth River Steering Committee, 2014; NOAA, 1994). The river is approximately 700 feet wide in the area where high speed defensive tactical boat maneuvers would occur.

No submerged aquatic vegetation beds have been mapped in the Southern branch of the Elizabeth River (Virginia Institute of Marine Science, 2014a). Submerged aquatic vegetation would not be expected to occur in the Southern Branch of the Elizabeth River due to the depth profile and organic staining of the water column. Numerous tidal wetlands are found throughout the area, primarily in inlets and bays lining the waterway. These wetlands are composed mostly of saltmarsh cordgrass (*Spartina alterniflora*). Shipwrecks and other artificial structures including piers and bulkheads in the area may provide artificial substrate for macroalgae. Floating macroalgae may also occur in the area as dislodged seaweeds from the bottom or released incidentally from watercraft that are transiting through. The present state of the river bottom in the area with regards to accumulated debris is not known, however because the waterway has been heavily used for over a century it is likely that the bottom habitat is littered with human-made debris. Bottom cleanup efforts in other portions of the Elizabeth River have yielded debris including wheelchairs, ladders, tires, bicycles, chairs and tables (Harper, 2010).

Constructed oyster beds have been established in the Elizabeth River with ongoing occasional shell planting, however the potential for restoration is poor due to disease risk, habitat degradation, and user conflicts (Virginia Institute of Marine Science, 2016). Only a few oyster beds intersect with the area where high speed, defensive tactical boat maneuvers are conducted. These beds represent the lowest quality habitat for oysters.

The majority of shoreline in the area where high-speed defensive tactical boat maneuvers and ground forces insertion and extraction exercises occur consists of a mix of sheltered rip rap and emergent wetlands (NOAA, 2017).

Five federally managed species of fish, Atlantic butterfish (*Peprilus triacanthus*), summer flounder (*Peprilus triacanthus*), black sea bass (*Centropristis striata*), bluefish (*Pomatomus saltatrix*), and sandbar shark (*Carcharhinus plumbeus*), have EFH in the Southern Branch of the Elizabeth River (NOAA, 2016). However, the currently proposed Amendment 10 to the 2006 Consolidated Highly Migratory Species Fishery Management Plan (NOAA, 2016) has revised the EFH description for sandbar shark and according to the new description, sandbar shark EFH is not present in the study area. However, this amendment has not yet been finalized and is still under review. Table 3.3-2 describes the EFH present in the Southern Branch of the Elizabeth River.

Table 3.3-2. Essential Fish Habitat in the Southern Branch of the Elizabeth River

Management Unit	***Species***	***Life Stage/HAPC (with EFH present)***	***Applicable EFH Descriptions for Project Area***	***EFH Presence Account***
Atlantic mackerel, squid, and butterfish	Atlantic Butterfish	Juvenile	Inshore, EFH is the "mixing" (defined as 0.5 to 25.0 ppt) and/or "seawater" (defined as greater than 25 ppt) salinity zone portions of all the estuaries where butterfish eggs are "common," "abundant," or "highly abundant" in the Estuarine Living Marine Resources (ELMR) database on the Atlantic coast, from	The Southern Branch of the Elizabeth River is a "mixing" salinity zone estuary within the James River watershed. In the ELMR database, adults and juveniles are listed as "common" in the James River. Therefore EFH for this species is present in the project area.
		Adult		

Table 3.3-2. Essential Fish Habitat in the Southern Branch of the Elizabeth River [Continued]

Management Unit	*Species*	*Life Stage/HAPC (with EFH present)*	*Applicable EFH Descriptions for Project Area*	*EFH Presence Account*
			Passamaquoddy Bay, Maine to James River, Virginia.	
Bluefish	Bluefish	Juvenile	Inshore, EFH is all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Generally juvenile bluefish occur in North Atlantic estuaries …within the "mixing" and "seawater" zones	The Southern Branch of the Elizabeth River is a major "mixing" salinity zone estuary between the Penobscot Bay and St. Johns River. Therefore EFH for this species is present in the project area.
		Adult	Inshore, EFH is all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Adult bluefish are found in North Atlantic estuaries…and in South Atlantic estuaries … in the "mixing" and "seawater" zones.	
Summer flounder, scup and black sea bass	Black Sea Bass	Juvenile	Inshore, EFH is the estuaries where black sea bass are identified as being common, abundant, or highly abundant in the ELMR database for the "mixing" and "seawater" salinity zones.	The Southern Branch of the Elizabeth River is a "mixing" salinity zone estuary within the James River watershed. In the ELMR database, adults and juveniles are listed as "common" in the James River.
		Adult		
Summer flounder, scup and black sea bass (continued)	Summer Flounder	Larvae	Inshore, EFH is all the estuaries where summer flounder were identified as being present (rare, common, abundant, or highly abundant) in the ELMR database, in the "mixing" and "seawater" salinity zones.	The Southern Branch of the Elizabeth River is a "mixing" salinity zone estuary within the James River watershed. In the ELMR database, adults and juveniles are listed as "common" in the James River. Therefore EFH for this species is present in the study area.
		Juvenile		
		Adult		
		HAPC	All native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH is HAPC.	Tidal macrophytes are present in the study area. These consist predominantly of saltmarsh cordgrass. Juvenile summer flounder have been recorded to use saltmarsh cordgrass habitat during flood tides.

Table 3.3-2. Essential Fish Habitat in the Southern Branch of the Elizabeth River [Continued]

Management Unit	*Species*	*Life Stage/HAPC (with EFH present)*	*Applicable EFH Descriptions for Project Area*	*EFH Presence Account*
				Therefore HAPC for this species is present in the project area.
Large Coastal Shark	Sandbar Shark	HAPC	Important nursery and pupping grounds have been identified in shallow areas and the mouth of Great Bay, NJ, lower and middle Delaware Bay, lower Chesapeake Bay, MD and near the Outer Banks, NC, in areas of Pamlico Sound adjacent to Hatteras and Ocracoke Islands and offshore those islands.	The Southern Branch of the Elizabeth River is a shallow area within the lower Chesapeake Bay estuary system. Therefore HAPC for this species is present in the project area.

Key: EFH = essential fish habitat; ELMR = Estuarine Living Marine Resources; HAPC = Habitat Areas of Particular Concern

3.3.12.2 Mammals

Surveys for terrestrial mammals that spend some time in the water environment have not occurred along the Southern Branch of the Elizabeth River; however, mammal species along this branch of the river are typical of an urban and suburban environment. Common species include: northern river otter (*Lontra canadensis*), nutria (*Myocastor coypus*), American beaver (*Castor canadensis*), and muskrat (*Ondatra zibethicus*). Terrestrial species likely present along the adjacent shorelines include: whitetail deer, black bear, coyote, gray fox, red fox, bobcat, raccoon, Virginia opossum, woodchuck, eastern cottontail rabbit, gray squirrel, southern flying squirrel, white-footed mouse, marsh rice rat, North American least shrew, southeastern shrew, southern short-tailed shrew, meadow vole, pine vole, Norway rat, eastern mole, and house mouse.

3.3.12.3 Invertebrates

Salinity of the Southern Branch of the Elizabeth River is highly variable (Neilson, 1975), and the invertebrate species assemblage at any particular location would vary according to the local salinity. Invertebrates present in the training area are likely similar to those in other mid-Atlantic estuaries. Pelagic invertebrates consist of zooplankton and jellyfish. As described in Section 3.3.1 (Definition of the Resource), common benthic species likely include oysters, clams, shrimps, crabs, worms, and snails. Oyster reef restoration sites are present in the vicinity of St. Juliens Creek Annex (Mann et al., 2010), but are not known in the blank-fire training area.

3.3.12.4 Fish

The Southern Branch of the Elizabeth River is the most notoriously polluted section of the Elizabeth River. Before recent cleanup efforts began, only four species of fish could be found. Since the major cleanup efforts of 2009–2013, the number of fish species has risen from 4 to 26 (Elizabeth River Steering Committee, 2014). Representative fish species present in the Southern Branch of the Elizabeth River

now may include, but are not limited to, shad, carp, catfish, American eel, flounder, speckled trout, striped bass, yellow perch, longnose gar, sunfish, bass, spot, and croaker.

3.3.12.5 Reptiles and Amphibians

Given its proximity to St. Juliens Creek Annex, the Southern Branch of the Elizabeth River likely contains suitable habitat for similar reptile and amphibian species. The reptiles and amphibians of the Southern Branch of the Elizabeth River are likely typical of urban and suburban environments in the Coastal Plain of Virginia. Reptile species likely include eastern box turtle, eastern gartersnake, and common five-lined skink. Likely amphibian species include American bullfrog, green frog, spring peeper, gray treefrog, green treefrog, and Fowler's toad.

3.3.12.6 Birds

In Chesapeake, Virginia, 234 species of birds have been documented (eBird, 2017). Several of the resident and seasonal bird species that are typical of mixed woodlands, agricultural, urban, and residential areas in the Coastal Plain of Virginia and are common in the City include: American crow, fish crow, Canada goose, rock pigeon, European starling, common grackle, red-winged blackbird, ring-billed gull, laughing gull, great egret, great blue heron, house sparrow, Carolina chickadee, tufted titmouse, American robin, eastern bluebird, northern cardinal, Carolina wren, dark-eyed junco, house finch, white-throated sparrow, chipping sparrow, yellow-rumped warbler, American goldfinch, northern mockingbird, mourning dove, blue jay, gray catbird, brown thrasher, wood thrush, ovenbird, pine warbler, red-eyed vireo, white-eyed vireo, Louisiana waterthrush, scarlet tanager, summer tanager, downy woodpecker, red-bellied woodpecker, northern flicker, turkey vulture, black vulture, red-shouldered hawk, and red-tailed hawk. Bald eagles have been observed along the proposed training route. These and other species would be expected to utilize the various areas along the training route during various periods of the year. Use will vary per species but may include breeding, over-wintering, and to rest during migration.

Bald eagles have been observed along the Southern Branch of the Elizabeth River and there are two nests last documented in 2016 located near the confluence of Deep Creek and the Southern Branch of the Elizabeth River. The Center for Conservation Biology Mapping Portal identifies the nests approximately 300 feet apart on this peninsula (Nest Code CP1503 and Nest Code CP1604) and approximately 1,000 feet from the main channel of river. These and other bird species utilize the nearby lands and waters during various periods of the year for breeding, over-wintering, and to rest during migration.

3.3.12.7 Federally Protected Species and Critical Habitats

One fish species protected under the ESA, the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), may occur in the vicinity of Naval Station Norfolk. The Atlantic sturgeon occurs in the Chesapeake Bay system and is abundant year-round near Naval Station Norfolk. Juveniles, sub-adults, and adults are found in this area at various times of the year. The species spawns in the James and York Rivers. Atlantic sturgeons also occur in the Elizabeth River. However, based on telemetry data of tagged fish, they do not appear to use the Elizabeth River as extensively as the James or York Rivers (Hager, 2015). There is currently no evidence that the Elizabeth River or Atlantic Intracoastal Waterway are being used as a passage between the Chesapeake Bay area and North Carolina waters, but that does not rule out the possibility that transient individuals could be found in the Southern Branch of the Elizabeth River.

The Southern Branch of the Elizabeth River is an inshore waterway that connects to the Chesapeake Bay by way of the Elizabeth River to the south. Marine mammal species found in the Chesapeake Bay tributaries may potentially enter the Elizabeth River; however, the bottlenose dolphin and West Indian manatee are the most likely to occur. Though unlikely, harbor seals could potentially occur in the Southern Branch of the Elizabeth River during the winter months. The bottlenose dolphin is the most common marine mammal in the Chesapeake Bay area (Section 3.3.1.7.7, Definition of the Resource, Atlantic Bottlenose Dolphin). The range of the inshore variety of the bottlenose dolphin encompasses the entire Virginia coast, within 1 mile of shore, and the Chesapeake Bay and its estuarine tributaries from late spring through winter (Blaylock, 1985). Manatees have been sighted in Virginia's inland and coastal waters of Virginia from June through October when water temperatures exceed 20° C (Cummings et al., 2014). There were 112 manatee sightings in Virginia waters from 1991 to 2012, including several in the Atlantic Intracoastal Waterway and Elizabeth River (Cummings et al., 2014). There is no critical habitat for the manatee in Virginia.

Sea turtles species that are known to feed in the Chesapeake Bay from spring to fall include loggerhead, Kemp's ridley, and green sea turtles. No sea turtles have been documented in the part of the Southern Branch of the Elizabeth River where training activities occur. Acoustic and satellite telemetry studies funded by the Navy and conducted by the Virginia Aquarium and Marine Science Center have documented one Kemp's ridley sea turtle near the mouth of the Elizabeth River and the James River during the summer and another Kemp's ridley in the Elizabeth River (Barco & Lockhart, 2016; Barco & Lockhart, 2015). Results from the tag study also show loggerheads foraging around the mouth of the Elizabeth River. The location of the acoustic receivers in the Elizabeth River from the monitoring study is outside the portion of the Southern Branch of the Elizabeth River included in the study area, and the loggerhead foraging areas were not near the Southern Branch of the Elizabeth River where training activities would occur. Since sea turtle occurrence is documented outside the boundaries of this part of the study area, they are not considered further in the analysis for training activities in the Southern Branch of the Elizabeth River.

3.4 Cultural Resources

3.4.1 Definition of the Resource

This discussion of cultural resources includes prehistoric and historic archaeological sites; historic buildings, structures, and districts; and physical entities and human-made or natural features important to a culture, a subculture, or a community for traditional, religious, or other reasons. Cultural resources can be divided into three major categories:

- Archaeological resources (prehistoric and historic) are locations where human activity measurably altered the earth or left deposits of physical remains.
- Architectural resources include standing buildings, structures, landscapes, and other built-environment resources of historic or aesthetic significance.
- Traditional cultural properties may include archaeological resources, structures, neighborhoods, prominent topographic features, habitat, plants, animals, and minerals that Native Americans or other groups consider essential for the preservation of traditional culture.

The Navy has conducted inventories of cultural resources at all of the Navy installations in this EA to identify historic properties that are listed or potentially eligible for listing in the National Register of Historic Places (NRHP) (Navy, 2012b). For areas outside of the Navy installations where training activities

that have a potential to impact cultural resources, data sources consulted include the NRHP online spreadsheets of the NRHP and National Historic Landmark (National Park Service, 2015a), NRHP geospatial dataset (National Park Service, 2015b), the Virginia Cultural Resources Information System, and the NOAA shipwreck databases (Electronic Navigation Chart and Automated Wreck and Obstruction Information System).

3.4.1.1 Area of Potential Effect

The area of potential effect (APE) for cultural resources is the geographic area or areas within which an undertaking (project, activity, program or practice) may cause changes in the character or use of any historic properties present. The APE is influenced by the scale and nature of the undertaking and may be different for various kinds of effects caused by the undertaking. For this EA, the Navy determined that the APEs for direct impacts (effects) includes areas of each Navy installation or non-Navy owned training location, where existing and planned training activities will be conducted that have the potential to affect historic properties. The APE for indirect impacts (effects) is the boundary of the installation, park, or waterway. The APE of each Navy installation or non-Navy owned training location is described in more detail in each subsection of Section 4.4 (Environmental Consequences, Cultural Resources).

3.4.1.2 General Information on Shipwrecks and Underwater Obstructions

Ships and boats of all kinds, including fishing vessels, passenger vessels, freighters, tankers, warships, and submarines have been sunk, lost, or run aground in the Chesapeake Bay and western Atlantic Ocean. It is unlikely that most of these submerged resources have been formally evaluated for NRHP eligibility by the Virginia State Historic Preservation Officer (SHPO) since they have not been proposed to be impacted by Navy activity in the past, nor are they being proposed to be impacted in association with the Proposed Action in this EA. In lieu of formal eligibility evaluations, Navy cultural resources experts have preliminarily indicated their likely ineligibility based on the available information (namely available maps and literature) on these resources.

3.4.1.3 Native American Resources

There are no traditional cultural properties or sacred sites identified at any of the Navy installations or non-Navy training sites evaluated in this EA. The Navy sent letters to the Pamunkey Indian tribe, Catawba Indian Nation, Absentee Shawnee Tribe, Cherokee Nation, Eastern Band of Cherokee Indians, and United Keetoowah Band of the Cherokee Indians in Oklahoma on June 13, 2017, requesting information about any traditional cultural properties. Letters to tribes and any responses received are contained in Appendix A (Agency Correspondence).

Federal recognition of the Pamunkey Indian tribe of Virginia was established in 2015. In addition, two federally recognized tribes have requested to review previous federal projects located in the Hampton Roads area: the Catawba Indian Nation and the United Keetoowah Band of the Cherokee Indians in Oklahoma. In accordance with EO 13175, DoD Instruction 4710.02, and Secretary of the Navy Instruction 11010.14A, the Navy consults with federally recognized Indian Tribes on a government-to-government basis on actions with the potential to significantly affect protected tribal resources, tribal treaty rights, or Indian lands.

3.4.2 Regulatory Framework

Cultural resources are governed by federal laws and regulations, including the National Historic Preservation Act (NHPA), Archaeological and Historic Preservation Act, American Indian Religious Freedom Act, Archaeological Resources Protection Act of 1979, and the Native American Graves Protection and Repatriation Act of 1990. Cultural resources also may be covered by state, local, and territorial laws.

National Historic Preservation Act. Federal agencies' responsibility for protecting historic properties is defined primarily by Sections 106 and 110 of the NHPA. Section 106 requires federal agencies to take into account the effects of their undertakings on historic properties. Section 110 of the NHPA requires federal agencies to establish—in conjunction with the Secretary of the Interior—historic preservation programs for the identification, evaluation, and protection of historic properties.

Cultural resources that are listed in the NRHP or eligible for listing in the NRHP are "historic properties" as defined by the NHPA. The list was established under the NHPA and is administered by the National Park Service on behalf of the Secretary of the Interior. The NRHP includes properties on public and private land. Properties can be determined eligible for listing in the NRHP by the Secretary of the Interior or by a federal agency official with concurrence from the applicable State Historic Preservation Office, in this case, the Virginia SHPO. NRHP-eligibility of shipwrecks is determined pursuant to the Abandoned Shipwreck Act (43 2101-2106), in accordance with NRHP's eligibility criteria, which appear in regulations at 36 CFR part 60. A NRHP-eligible property has the same protections as a property listed in the NRHP. The historic properties include archaeological and architectural resources.

Archaeological and Historic Preservation Act. This legislation amended the Reservoir Salvage Act of 1960 requiring federal agencies to provide for the preservation of historical and archaeological data which might otherwise be lost or destroyed as the result of any federally licensed activity or program causing an alteration of terrain.

American Indian Religious Freedom Act. The Act requires federal agencies to eliminate interference with the free exercise of Native religion, based on the First Amendment, and to accommodate access to and use of religious sites to the extent that the use is practicable and is not inconsistent with an agency's essential functions.

Archaeological Resources Protection Act of 1979. The Act governs the excavation of archaeological sites on federal and Indian lands in the United States, and the removal and disposition of archaeological collections from those sites.

Native American Graves Protection and Repatriation Act of 1990. The Act requires federal agencies and institutions that receive federal funding to return Native American cultural items to lineal descendants and culturally affiliated Indian tribes and Native Hawaiian organizations.

EO 13175, Consultation and Coordination with Indian Tribal Governments. The Executive Order directs agencies to establish an accountable process to ensure meaningful and timely input by tribal officials in the development of any regulatory policies that have tribal implications.

DoD Instruction 4710.02, DoD Interactions with Federally-Recognized Tribes. This instruction implements DoD policy, assigns responsibilities, and provides procedures for DoD interactions with federally recognized tribes in accordance with EO 13175.

Secretary of the Navy Instruction 11010.14A, Department of the Navy Policy for Consultation with Federally Recognized Indian Tribes. This policy clarifies Navy procedures and responsibilities for consultation with federally recognized Indian tribes, including Alaska Native governments, on issues with the potential to impact protected tribal resources, tribal rights, or Indian lands.

3.4.3 Joint Expeditionary Base Little Creek

3.4.3.1 Architectural

Architectural assessments have been conducted at JEB Little Creek to identify building, structures, or districts that are eligible for inclusion in the NRHP. The most recent assessment, conducted in September and October 2010, was implemented to review and expand the existing historic context, field inspect previously recorded architectural resources, and record additional previously unrecorded buildings and structures that were built prior to 1962 (Navy, 2012b). Collectively, the architectural assessments evaluated the NRHP eligibility of all permanent buildings and structures at JEB Little Creek, (Navy, 2012b). No potentially significant properties have been identified at JEB Little Creek (Navy, 2012b).

3.4.3.2 Archaeological

There have been four archaeological investigations covering JEB Little Creek, which occurred between 1987 and 2001. Two of these archaeological studies consisted of underwater investigations and two consisted of terrestrial investigations described as “assessments.” There have been no sites identified within the boundaries of JEB Little Creek (Navy, 2012b). Additionally, a Virginia SHPO letter dated August 5, 2004 (Department of Historic Resources File # 2003-0460), concurred that undertakings at JEB Little Creek have little potential to affect archaeological resources because of the extensive disturbance that has previously occurred (Navy, 2012b).

3.4.4 Joint Expeditionary Base Fort Story

3.4.4.1 Architectural

Architectural assessments have been conducted at JEB Fort Story to identify building, structures, or districts that are eligible for inclusion in the NRHP.

As a result of the architectural assessments at JEB Fort Story, the Navy, in consultation with the Virginia Department of Historic Resources and the Keeper of the NRHP, has identified one NRHP -eligible historic district: the Fort Story Historic District, which includes 84 contributing architectural resources. Two additional Navy architectural resources at JEB Fort Story have been individually listed in, or determined eligible for listing on, the NRHP: Building 591 (the Norfolk Southern Train Station or Chesapeake Transit Company Railroad Station); and Building 734 (Weather Bureau/Cape Henry House, the Commanding Officer’s Quarters). Building 734 has been privatized and, therefore, does not fall under Navy cultural resource treatment responsibilities. Three additional architectural resources are located within the installation boundaries; however, the resources are not owned by the Navy: the “Old” Cape Henry Lighthouse (owned by Preservation Virginia); the “New” Cape Henry Lighthouse (owned by the U.S. Coast Guard [USCG]); and the Cape Henry Memorial Cross (owned by the National Park Service). These five additional architectural resources are located within the boundaries of the NRHP -eligible Fort Story Historic District but are not contributing resources to the historic district (Navy, 2012b).

3.4.4.1.1 Building 591

Building 591 (the Norfolk Southern Train Station or Chesapeake Transit Company Railroad Station) was built in 1902. Owned by the Navy, Building 591 is individually NRHP -eligible under Criterion A (Properties Associated with Historic Events) because of its association with the development of Virginia Beach (Navy, 2013b).

3.4.4.1.2 "Old" Cape Henry Lighthouse

The "Old" Cape Henry Lighthouse, the first lighthouse built by the federal government, was constructed in 1792. Owned by Preservation Virginia, the "Old" Cape Henry Lighthouse was designated a National Historic Landmark on January 29, 1964 (National Register Number 66000910) (Navy, 2014b).

3.4.4.1.3 "New" Cape Henry Lighthouse

The "New" Cape Henry Lighthouse, also known as the Cape Henry (Second Tower) Light Station, was built in 1881. Owned by the USCG and part of the USCG reservation at JEB Little Creek-Fort Story, the "New" Cape Henry Lighthouse was listed in the NRHP on December 2, 2002 (National Register Number 02001439) (Navy, 2014b).

3.4.4.1.4 Cape Henry Memorial, Colonial National Historical Park

The Cape Henry Memorial is a component of the Colonial National Historical Park, which comprises a number of nationally significant properties in the Historic Triangle of Jamestown, Colonial Williamsburg, and Yorktown (Navy, 2014b). Located on a parcel of land at JEB Fort Story that is owned by the National Park Service, the Cape Henry Memorial site contains three separate memorials. First is the Cape Henry Memorial Cross, a stone cross that was erected in 1935 by the Daughters of American Colonists to memorialize the First Landing at Cape Henry. The First Landing at Cape Henry refers to the 1607 landing of the English, who went on to establish Jamestown, Virginia, the first permanent English settlement in America (Navy, 2014b). The cross is considered NRHP -eligible. A second memorial was dedicated in 1981 to commemorate the Battle of the Capes, which took place within visual distance of Cape Henry during the American Revolution. The Battle of the Capes was the closing engagement of the Revolutionary War between the French fleet, led by Admiral de Grasse, in support of the Continental Army under George Washington, and the English fleet. In addition to the battle monument, the Battle of the Capes is commemorated with the third memorial—a statue of Admiral de Grass (National Park Service, 2015c).

3.4.4.1.5 Fort Story Historic District

The Fort Story Historic District was determined NRHP-eligible under Criterion A (Properties Associated with Historic Events) in the areas of military history and government, because of JEB Little Creek-Fort Story's role in coastal defense during World Wars I and II, amphibious training from 1940 through present, and under Criterion Exception G for the architectural resources associated with the Nike Missile Program from 1958 to 1974. Collectively, the 84 contributing elements of the NRHP-eligible Fort Story Historic District convey JEB Little Creek-Fort Story's significance as a 20th century military installation (Navy, 2012b).

3.4.4.2 Archaeological

Onshore or terrestrial surveys have been conducted at JEB Fort Story to identify archaeological resources that are eligible for inclusion in the NRHP. Although the majority of Fort Story has not been surveyed, the limited surveys identified one prehistoric archaeological site and seven historic archaeological sites (Navy, 2014c).

Results of the onshore/terrestrial archaeological surveys indicated that five of the archaeological resources at JEB Fort Story are NRHP-eligible or potentially eligible, listed in Table 3.4-1.

Table 3.4-1. JEB Fort Story Archaeological Sites Eligible and Potentially Eligible for the National Register of Historic Places

Resource Number	*Resource Type*	*Description*	*National Register Status*
44VB0061	Prehistoric/Ethnographic Archaeological Site	artifact scatter stretched for about 200 feet along shoreline. Possibly eroding out from sand dunes	Potentially Eligible
44VB0332	Historic Archaeological Site	elevated concrete gun mount	Fort Story Historic District Contributing Element
44VB0333	Historic Archaeological Site	portion of railway	Potentially Contributing to the Fort Story Historic District
44VB0334	Historic Archaeological Site	brick and mortar feature	Potentially Eligible
44VB0336	Historic Archaeological Site	circular concrete gun emplacement site	Fort Story Historic District Contributing Element

Three of the NRHP-eligible and potentially archaeological resources are also contributing resources to the NRHP-eligible Fort Story Historic District (Navy, 2012b). None of the other four archaeological resources at JEB Fort Story were determined or recommended NRHP-eligible (Navy, 2014c).

3.4.5 Dam Neck Annex and Camp Pendleton

3.4.5.1 Architectural

Dam Neck Annex, which encompasses a portion of the former Camp Pendleton, has been subject to Phase I architectural surveys of buildings/structures constructed between 1942 and 1962 (Navy, 2012b). The buildings composing the former Surface-Launched Guided Missile School were identified as a potential historic district requiring further evaluation, which consists of three contributing properties in the southwest corner of the complex (Navy, 2012b). For the purposes of Section 106 of the NHPA, these resources are considered historic properties until the Navy receives official concurrence from the Virginia SHPO.

Within Camp Pendleton is the Camp Pendleton Historic District, which contains 121 contributing buildings and structures and eight additional contributing sites, which include six cultural landscapes, including 600 feet of beachfront and the Rifle Range, just behind the beach. Camp Pendleton State Military Reservation is defined by the intact landscape created by the dominant building type, World War II-era temporary buildings, and the examples of earlier 20th century military and residential building types (National Park Service, 2013).

3.4.5.2 Archaeological

Phase I identification and Phase II testing of archaeological resources has been ongoing at NAS Oceana, which includes Dam Neck Annex and Camp Pendleton, since the 1980s. At Dam Neck Annex and Camp

Pendleton, 14 archaeological sites have been identified, 2 of which are either eligible or potentially eligible for inclusion in the NRHP (Table 3.4-2).

Table 3.4-2. Dam Neck Annex Archaeological Site Data

Resource Number	*Resource Type*	*Description*	*National Register Status*
44VB0082	Historic	20th Century	Not Eligible
44VB0083	Historic Archaeological Site	19th Century	Not Eligible
44VB0084	Historic Archaeological Site	20th Century	Not Eligible
44VB0085	Historic Archaeological Site	Historic/Unknown	Not Eligible
44VB0086	Historic Archaeological Site	19th Century	Not Eligible
44VB0087	Historic Archaeological Site	19th Century	Not Eligible
44VB0088	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st quarter	Not Eligible
44VB0091	Historic Archaeological Site	19th Century: 1st quarter	Not Eligible
44VB0308	Prehistoric/Ethnographic Archaeological Site	Late Woodland	Eligible
44VB0309	Historic Archaeological Site	18th Century: 4th quarter, 19th Century: 1st quarter	Not Eligible
44VB0343	Historic Archaeological Site	19th Century, 20th Century	Potentially Eligible
44VB0344	Historic Archaeological Site	20th Century: 1st half	Not Eligible
44VB0345	Historic Archaeological Site	18th Century: 2nd half, 20th Century: 1st quarter	Not Eligible
44VB0346	Historic Archaeological Site	18th Century, 19th Century, 20th Century	Not Eligible

3.4.6 Naval Auxiliary Landing Field Fentress

3.4.6.1 Architectural

An architectural survey and assessment at NALF Fentress conducted in 1996 identified no buildings or structures eligible for the NRHP (Navy, 2012b). An additional survey of resources constructed between 1948 and 1962 that have become 50 years old since the previous survey was completed, and no potentially significant properties were identified (Navy, 2012b).

3.4.6.2 Archaeological

There are six reports and four archaeological investigations of NALF Fentress, which occurred between 1994 and 2010. There have been 24 sites identified on this facility: 1 has been recommended as eligible; 22 as potentially eligible; and 1 as not eligible (Table 3.4-3).

Table 3.4-3. NALF Fentress Archaeological Site Data

Resource Number	*Resource Type*	*Description*	*National Register Status*
44CS0006	Undetermined Archaeological Site	No description available	Potentially Eligible
44CS0009	Prehistoric/Ethnographic Archaeological Site	Prehistoric/Unknown	Potentially Eligible
44CS0010	Prehistoric/Ethnographic Archaeological Site	Prehistoric/Unknown	Potentially Eligible
44CS0011	Prehistoric/Ethnographic Archaeological Site	Prehistoric/Unknown	Potentially Eligible
44CS0156	Multicomponent Archaeological Site	18th Century, 20th Century	Eligible

Table 3.4-3. NALF Fentress Archaeological Site Data [Continued]

Resource Number	*Resource Type*	*Description*	*National Register Status*
44CS0157	Multicomponent Archaeological Site	18th Century, 19th Century, 20th Century, Prehistoric	Potentially Eligible
44CS0158	Historic Archaeological Site	Historic/Unknown	Potentially Eligible
44CS0159	Historic Archaeological Site	19th Century: 4th quarter, 20th Century	Potentially Eligible
44CS0160	Multicomponent Archaeological Site	Historic/Unknown, Woodland	Potentially Eligible
44CS0161	Historic Archaeological Site	19th Century: 4th quarter	Potentially Eligible
44CS0162	Historic Archaeological Site	20th Century	Potentially Eligible
44CS0163	Multicomponent Archaeological Site	19th Century, 20th Century, Early/Middle Woodland	Potentially Eligible
44CS0164	Historic Archaeological Site	Historic/Unknown	Potentially Eligible
44CS0165	Historic Archaeological Site	19th Century: 4th quarter, 20th Century	Potentially Eligible
44CS0166	Historic Archaeological Site	19th Century: 4th quarter, 20th Century	Potentially Eligible
44CS0167	Historic Archaeological Site	19th Century: 4th quarter	Potentially Eligible
44CS0168	Historic Archaeological Site	Historic/Unknown	Potentially Eligible
44CS0169	Historic Archaeological Site	Historic/Unknown	Potentially Eligible
44CS0170	Historic Archaeological Site	18th Century, 19th Century	Potentially Eligible
44CS0183	Historic Archaeological Site	Historic/Unknown	Potentially Eligible
44CS0184	Historic Archaeological Site	20th Century	Potentially Eligible
44CS0185	Historic Archaeological Site	19th Century: 4th quarter, 20th Century	Potentially Eligible
44CS0186	Historic Archaeological Site	19th Century: 4th quarter, 20th Century	Potentially Eligible
44CS0315	Historic Archaeological Site	No description available	Not Eligible

Key: NREC = Contributing Element of a National Register Eligible Historic District.

3.4.7 Northwest Annex

3.4.7.1 Architectural

An architectural survey and assessment of Northwest Annex conducted in 1995 identified no buildings or structures eligible for the NRHP (Navy, 2012b). An additional survey of resources constructed between 1948 and 1962 that have become 50 years old since execution of the Regional Programmatic Agreement has been completed, and no potentially significant properties were identified (Navy, 2012b).

3.4.7.2 Archaeological

There are 11 reports for archaeological investigations of this facility, which occurred between 1987 and 2010. There are 52 archaeological sites identified at Northwest Annex. One site has been recommended as eligible for the NRHP; 35 as not eligible; and 16 as potentially eligible, of which 2 sites have been recommended for avoidance due to identified human remains (Navy, 2012b) (Table 3.4-4).

Table 3.4-4. Northwest Annex Archaeological Site Data

Resource Number	*Resource Type*	*Description*	*National Register Status*
31CK0125	Historic Archaeological Site	No description available	Not Eligible
31CK0126	Historic Archaeological Site	No description available	Not Eligible
31CK0127	Prehistoric/Ethnographic Archaeological Site	No description available	Not Eligible
44CS0143	Historic Archaeological Site	19th Century: 2nd half	Not Eligible
44CS0144	Historic Archaeological Site	19th Century: 2nd/3rd quarter	Not Eligible
44CS0145	Historic Archaeological Site	18th Century: 2nd half, 19th Century, 20th Century	Not Eligible
44CS0146	Prehistoric/Ethnographic Archaeological Site	Woodland	Not Eligible
44CS0147	Prehistoric/Ethnographic Archaeological Site	Woodland	Not Eligible
44CS0148	Historic Archaeological Site	19th Century: 2nd half	Not Eligible
44CS0149	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st half	Not Eligible
44CS0150	Historic Archaeological Site	19th Century: 2nd half	Not Eligible
44CS0189	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st half	Not Eligible (DHR)
44CS0196	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st half	Potentially Eligible (DHR #2003-0035)
44CS0197	Undetermined	No description available	Not Eligible (DHR #2003-0035)
44CS0198	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st quarter	Potentially Eligible (DHR #2003-0035)
44CS0199	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st half	Potentially Eligible (DHR #2003-0035)
44CS0200	No Data	No description available	Not Eligible (DHR #2003-0035)
44CS0201	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st half,	Potentially Eligible (DHR #2003-0035)
44CS0202	Historic Archaeological Site	19th Century: 4th quarter	Not Eligible (DHR #2003-0035)
44CS0203	Multicomponent	19th Century: 4th quarter, 20th Century: 1st half,	Potentially Eligible (DHR #2003-0035)
44CS0204 & 31CK0128	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st half	Not Eligible (DHR #2003-0035)
44CS0205	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st half	Potentially Eligible (DHR #2003-0035)
44CS0206	Historic Archaeological Site	19th Century: 2nd/3rd quarter	Not Eligible (DHR #2003-0035)
44CS0207	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st half	Not Eligible (DHR #2003-0035)
44CS0208	Historic Archaeological Site	No description available	Potentially Eligible (DHR #2003-0035)
44CS0209	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st half	Not Eligible (DHR #2003-0035)

Table 3.4-4. Northwest Annex Archaeological Site Data [Continued]

Resource Number	*Resource Type*	*Description*	*National Register Status*
44CS0210	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st half	Not Eligible (DHR #2003-0035)
44CS0211	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st half	Not Eligible (DHR #2003-0035)
44CS0212	Historic Archaeological Site	19th Century: 2nd half	Not Eligible (DHR #2003-0035)
44CS0213	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st half	Not Eligible (DHR #2003-0035)
44CS0214	Historic Archaeological Site	18th Century: 4th quarter, 19th Century: 2nd half	Potentially Eligible (DHR #2003-0035)
44CS0215	Multicomponent	20th Century: 1st quarter, Prehistoric/Unknown	Not Eligible/Human Remains; No Further Work (DHR #2003-0035); Sites 44CS0214 and 44CS0215 should be considered as a unit in the future
44CS0216 & 31CK0124	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st half	Not Eligible (DHR #2003-0035)
44CS0217	Historic Archaeological Site	18th Century: 2nd half, 19th Century: 1st quarter,	Potentially Eligible (DHR #2003-0035)
44CS0218	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st half	Not Eligible (DHR #2003-0035)
44CS0219	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st half	Not Eligible (DHR #2003-0035)
44CS0220	Historic Archaeological Site	Historic/Unknown	Not Eligible (DHR #2003-0035)
44CS0221	Historic Archaeological Site	18th Century: 2nd half, 19th Century, 20th Century	Potentially Eligible (DHR #2003-0035)
44CS0222	Historic Archaeological Site	18th Century, 19th Century, 20th Century	Potentially Eligible (DHR #2003-0035)
44CS0223	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st half	Not Eligible (DHR #2003-0035)
44CS0224	Multicomponent	19th Century, Prehistoric/Unknown	Not Eligible (DHR #2003-0035)
44CS0225	Historic Archaeological Site	No description available	Human Remains; Avoidance Recommended (DHR #2003-0035)
44CS0226	Historic Archaeological Site	20th Century: 1st quarter	Human Remains; Avoidance Recommended (DHR #2003-0035)
44CS0227	Historic Archaeological Site	Historic/Unknown	Not Evaluated
44CS0228	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st half	Not Eligible (DHR #2003-0035)
44CS0229	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st half	Not Eligible (DHR #2003-0035)
44CS0230	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st half	Not Eligible (DHR #2003-0035)

Table 3.4-4. Northwest Annex Archaeological Site Data [Continued]

Resource Number	*Resource Type*	*Description*	*National Register Status*
44CS0231	Historic Archaeological Site	19th Century: 1st half	Not Eligible (DHR #2003-0035)
44CS0232	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st quarter	Potentially Eligible (DHR #2003-0035)
44CS0241	Prehistoric/Ethnographic Archaeological Site	Woodland	Potentially Eligible
44CS0242	Historic Archaeological Site	18th Century, 19th Century: 1st quarter	Eligible
44CS0243	Historic Archaeological Site	19th Century: 2nd half	Not Eligible (DHR #2010-1663)

Key: DHR = Virginia Department of Historic Resources.
Note: Site eligibility with Virginia SHPO concurrence is listed with "-DHR" suffix, including DHR Project Review File Number where available.

3.4.8 St. Juliens Creek Annex

3.4.8.1 Architectural

An intensive architectural survey and assessment of 234 architectural resources built at the installation prior to 1989 was conducted in 1997, which resulted in the identification of one potential historic district, encompassing 43 contributing resources related to the World War I industrial complex (Navy, 2012b). The remaining resources were recommended as being not eligible for NRHP consideration (Navy, 2012b). The St. Juliens Creek Annex Historic District represents an integrated military-industrial complex associated with the production and storage of naval munitions during World War I. The defined period of significance, spanning the years 1897 to 1919, encompasses the period during which St. Juliens Creek Annex helped produce the majority of the Mark VI mines used in the North Sea Mine Barrage. All of the surviving World War I era buildings were determined to be associated with this historic event (Table 3.4-5) (Navy, 2012b).

Table 3.4-5. Contributing Resources in the St. Juliens Creek Annex Historic District

Building Number	*Building Name*	*Preservation Priority Category*	*Building Number*	*Building Name*	*Preservation Priority Category*
1	Administrative	2	70	Warehouse	2
2	Technical Library	2	71	Warehouse	2
3	NAVSEA Support Center	2	72	Warehouse	2
4	Administrative	2	73	Warehouse	2
6	Administrative	2	74	Warehouse	2
7	Storage	2	75	Storage	2
8	Administrative	2	76	Warehouse	2
10	Administrative	3	77	Warehouse	2
11	Administrative	2	78	Warehouse	2
12	Administrative	2	79	Warehouse	2
16	Cryogenics School	2	80	Storage	2

Table 3.4-5. Contributing Resources in the St. Juliens Creek Annex Historic District [Continued]

Building Number	*Building Name*	*Preservation Priority Category*	*Building Number*	*Building Name*	*Preservation Priority Category*
17	Cryogenics School	2	81	Storage	2
18	Cryogenics School	2	83	Warehouse	2
38	Warehouse	2	84	Storage	2
40	Storage	2	86	Storage	2
47	Repair Shop	2	87	Storage	2
51	General Warehouse	3	88	Storage	2
59	Warehouse	2	H	Administration	2
60	Warehouse	2	M1	ILO Outfitting	3
61	Warehouse	2	M3	ILO Outfitting	3
68	Private Contractor Storage	2	M5	ILO Outfitting	3
69	Administration	3			

An additional survey of resources constructed between 1948 and 1962 that have become 50 years old since execution of the Regional Programmatic Agreement has been completed, and no potentially significant properties were identified (Navy, 2012b).

The Cradock Historic District in the city of Portsmouth is located approximately 100 meters north of St. Juliens Creek Annex. The district encompasses the planned community of Cradock, built on 310 acres by the U.S. government to provide residential housing for the rapid influx of workers at the Norfolk Naval Shipyard during World War I. The NRHP-eligible Cradock Historic District is outside the APE of the USFF training activities considered in this EA.

3.4.8.2 Archaeological

There are three reports from three archaeological investigations covering this facility. These include a Phase I investigation in 1992, a Phase I investigation in 1997, and a Phase I investigation and characterization study in 2010. Three of the seven sites were concurred with as potentially eligible for listing, and four sites were concurred with as not eligible for listing by the Virginia Department of Historic Resources (Table 3.4-6). The 2010 investigation and characterization study also determined the remainder of St. Juliens Creek Annex was disturbed and retained no potential to contain intact and significant archaeological deposits.

Table 3.4-6. St. Juliens Creek Annex Archaeological Site Data

Resource Number	*Resource Type*	*Description*	*National Register Status*
44CS0288	Multicomponent Archaeological Site	No description available	Not Eligible; DHR File #2009-1303
44CS0289	Historic Archaeological Site	late 19th through mid-20th Century	Not Eligible; DHR File #2009-1303
44CS0290	Historic Archaeological Site	No description available	Not Eligible; DHR File #2009-1303
44CS0291	Historic Archaeological Site	No description available	Not Eligible; DHR File #2009-1303
44PM0048	Historic Archaeological Site	18th Century: 4th quarter, 19th Century: 1st quarter	Potentially eligible; DHR File # 2009-1303

Table 3.4-6. St. Juliens Creek Annex Archaeological Site Data [Continued]

Resource Number	*Resource Type*	*Description*	*National Register Status*
44PM0049	Historic Archaeological Site	18th Century: 4th quarter, 19th Century: 1st quarter	Potentially eligible; DHR File # 2009-1303
44PM0050	Multicomponent Archaeological Site	Woodland	Potentially eligible; DHR File # 2009-1303

Key: DHR = Virginia Department of Historic Resources.
Note: Site eligibility with Virginia SHPO concurrence is listed with "-DHR" suffix, including DHR Project Review File Number where available.

3.4.9 Naval Weapons Station Yorktown

3.4.9.1 Architectural

Intensive architectural surveys and assessment of architectural resources built at NWS Yorktown prior to 1951 have been conducted in 1996 and 2011. Significant resources identified in 1996 included the previously documented Kiskiack Historic Property, listed on the NRHP in 1969; and the Mason's Row Historic District, determined NRHP-eligible. A 2011 study of resources constructed between 1948 and 1962 has identified an additional potential historic district at NWS Yorktown. The buildings composing the former Skiffes Creek Annex area were identified as a potential historic district. For the purposes of Section 106 of the NHPA, these resources are considered historic properties until the Navy receives official concurrence from the Virginia SHPO. (Navy, 2012b).

3.4.9.1.1 Kiskiack Historic Property

Kiskiack (Building C-14), also known as the Lee House, is the oldest building owned by the Navy, and is one of the few documented buildings in Virginia dating to the first half of the eighteenth century. Listed in the NRHP along with 265 surrounding acres in 1969, this typical "gentry house" is a one-and-a-half-story brick dwelling laid in Flemish bond, with a molded water table and two massive interior chimneys. The house is considered to meet the highest level of significance due to its extreme rarity and the high quality of its original surviving fabric (Navy, 2012b). This property is both a historic building and an archaeological site.

3.4.9.1.2 Mason's Row Historic District

The most significant surviving resources from the interwar period (between World War I and World War II) at NWS Yorktown are the nine dwellings comprised by the Mason's Row Historic District, dramatically situated on a terrace overlooking the York River. The Mason's Row Historic District has been determined eligible at the state level for inclusion in the NRHP under Criterion C. The properties in the Mason's Row Historic District have been privatized and, therefore, do not fall under Navy cultural resource treatment responsibilities.

3.4.9.1.3 Colonial National Historic Park (owned by National Park Service)

The Colonial Parkway, which is an element of the Colonial National Historic Park, is a 23-mile scenic roadway stretching from the York River at Yorktown to the James River at Jamestown. It connects Virginia's historic triangle: Jamestown, Williamsburg, and Yorktown. Several million travelers a year use this route to enjoy the natural and cultural beauty of Virginia (National Park Service, 2016). It passes along the northeastern shoreline boundary of NWS Yorktown. The Colonial Parkway and its meticulously

crafted landscape do not occur within any of the training sites of NWS Yorktown, but passes adjacent to the Home Station Training Lanes.

3.4.9.2 Archaeological

There are 29 reports and 25 archaeological investigations of this facility, which occurred at NWS Yorktown between 1980 and 2011. Of the 367 sites that have been identified 15 have been recommended eligible for the NRHP, 124 as potentially eligible, 225 as not eligible, and 3 as unknown (Table 3.4-7).

Table 3.4-7. NWS Yorktown Archaeological Sites Eligible and Potentially Eligible for the National Register of Historic Places

Resource Number	*Resource Type*	*Description*	*National Register Status*
44JC0397	Historic Archaeological Site	No description available	Potentially Eligible
44JC0879	Historic Archaeological Site	No description available	Potentially Eligible
44JC0880	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44JC1070	Historic Archaeological Site	No description available	Potentially Eligible
44JC1073	Multicomponent Archaeological Site	No description available	Potentially Eligible
44JC1074	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44NN0066	Historic Archaeological Site	No description available	Potentially Eligible
44NN0067	Historic Archaeological Site	No description available	Potentially Eligible
44YO0031	Historic Archaeological Site	No description available	Potentially Eligible
44YO0002	Multicomponent Archaeological Site	No description available	Eligible
44YO0032	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0033	Historic Archaeological Site	No description available	Potentially Eligible
44YO0036	Historic Archaeological Site	No description available	Potentially Eligible
44YO0318	Historic Archaeological Site	No description available	Potentially Eligible
44YO0319	Historic Archaeological Site	No description available	Potentially Eligible
44YO0321	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0322	Historic Archaeological Site	No description available	Potentially Eligible
44YO0323	Historic Archaeological Site	No description available	Potentially Eligible
44YO0324	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0325	Historic Archaeological Site	18th Century	Potentially Eligible
44YO0332	Historic Archaeological Site	18th Century	Potentially Eligible
44YO0333	Historic Archaeological Site	18th Century	Potentially Eligible
44YO0334	Historic Archaeological Site	18th Century	Potentially Eligible
44YO0335	Undetermined	No description available	Potentially Eligible
44YO0370	Historic Archaeological Site	18th Century	Potentially Eligible
44YO0372	Historic Archaeological Site	18th Century	Potentially Eligible
44YO0385	Historic Archaeological Site	18th Century, 19th Century	Potentially Eligible
44YO0407	Historic Archaeological Site	No description available	Potentially Eligible

Table 3.4-7. NWS Yorktown Archaeological Sites Eligible and Potentially Eligible for the National Register of Historic Places [Continued]

Resource Number	*Resource Type*	*Description*	*National Register Status*
44YO0418	Historic Archaeological Site	No description available	Potentially Eligible
44YO0419	Historic Archaeological Site	No description available	Potentially Eligible
44YO0422	Historic Archaeological Site	No description available	Potentially Eligible
44YO0504	Historic Archaeological Site	No description available	Potentially Eligible
44YO0549	Historic Archaeological Site	No description available	Potentially Eligible
44YO0550	Historic Archaeological Site	No description available	Potentially Eligible
44YO0551	Historic Archaeological Site	No description available	Potentially Eligible
44YO0552	Historic Archaeological Site	No description available	Potentially Eligible
44YO0554	Historic Archaeological Site	No description available	Potentially Eligible
44YO0555	Historic Archaeological Site	No description available	Potentially Eligible
44YO0558	Multicomponent Archaeological Site	18th Century: 2nd half, 19th Century, Woodland	Potentially Eligible
44YO0626	Multicomponent Archaeological Site	Prehistoric/Unknown	Potentially Eligible
44YO0628	Historic Archaeological Site	18th Century: 4th quarter, 19th Century: 1st quarter	Potentially Eligible
44YO0629	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0634	Historic Archaeological Site	18th Century: 2nd quarter, 19th Century: 1st quarter	Potentially Eligible
44YO0635	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0637	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0640	Prehistoric/Ethnographic Archaeological Site	Prehistoric/Unknown	Potentially Eligible
44YO0641	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0642	Multicomponent Archaeological Site	18th Century, 19th Century: 1st quarter, Woodland	Potentially Eligible
44YO0644	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0645	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0648	Multicomponent Archaeological Site	18th Century: 4th quarter, Woodland	Potentially Eligible
44YO0650	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0653	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0654	Historic Archaeological Site	No description available	Potentially Eligible
44YO0655	Historic Archaeological Site	No description available	Potentially Eligible
44YO0657	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0658	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0661	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible

Table 3.4-7. NWS Yorktown Archaeological Sites Eligible and Potentially Eligible for the National Register of Historic Places [Continued]

Resource Number	*Resource Type*	*Description*	*National Register Status*
44YO0666	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0670	Historic Archaeological Site	No description available	Potentially Eligible
44YO0676	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0679	Historic Archaeological Site	No description available	Potentially Eligible
44YO0680	Historic Archaeological Site	No description available	Potentially Eligible
44YO0682	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0683	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0685	Historic Archaeological Site	19th Century: 2nd/3rd quarter	Potentially Eligible
44YO0691	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0692	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0694	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0695	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0696	Multicomponent Archaeological Site	Prehistoric/Unknown	Potentially Eligible
44YO0698	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0700	Historic Archaeological Site	No description available	Potentially Eligible
44YO0701	Historic Archaeological Site	No description available	Potentially Eligible
44YO0703	Historic Archaeological Site	No description available	Potentially Eligible
44YO0802	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0805	Historic Archaeological Site	No description available	Potentially Eligible
44YO0812	Historic Archaeological Site	No description available	Potentially Eligible
44YO0814	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0818	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0822	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0824	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0827	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0829	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0831	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0832	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0835	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0837	Multicomponent Archaeological Site	No description available	Potentially Eligible

Table 3.4-7. NWS Yorktown Archaeological Sites Eligible and Potentially Eligible for the National Register of Historic Places [Continued]

Resource Number	*Resource Type*	*Description*	*National Register Status*
44YO0844	Historic Archaeological Site	No description available	Potentially Eligible
44YO0847	Historic Archaeological Site	No description available	Potentially Eligible
44YO0850	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0854	Historic Archaeological Site	No description available	Potentially Eligible
44YO0857	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0861	Historic Archaeological Site	No description available	Potentially Eligible
44YO0863	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0864	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0865	Historic Archaeological Site	No description available	Potentially Eligible
44YO0869	Historic Archaeological Site	No description available	Potentially Eligible
44YO0870	Historic Archaeological Site	No description available	Potentially Eligible
44YO0878	Historic Archaeological Site	No description available	Potentially Eligible
44YO0883	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0884	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0885	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0890	Historic Archaeological Site	No description available	Potentially Eligible
44YO0895	Historic Archaeological Site	No description available	Potentially Eligible
44YO0899	Historic Archaeological Site	No description available	Potentially Eligible
44YO0905	Historic Archaeological Site	No description available	Potentially Eligible
44YO0911	Historic Archaeological Site	No description available	Potentially Eligible
44YO0914	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0919	Historic Archaeological Site	No description available	Potentially Eligible
44YO0932	Historic Archaeological Site	No description available	Potentially Eligible
44YO0933	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0937	Historic Archaeological Site	No description available	Potentially Eligible
44YO0938	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0940	Historic Archaeological Site	No description available	Potentially Eligible
44YO0944	Historic Archaeological Site	No description available	Potentially Eligible
44YO0951	Multicomponent Archaeological Site	No description available	Potentially Eligible
44YO0954	Historic Archaeological Site	No description available	Potentially Eligible
44YO0958	Historic Archaeological Site	No description available	Potentially Eligible
44YO0963	Historic Archaeological Site	No description available	Potentially Eligible
44YO0974	Historic Archaeological Site	No description available	Potentially Eligible
44YO0976	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0984	Historic Archaeological Site	No description available	Potentially Eligible

Table 3.4-7. NWS Yorktown Archaeological Sites Eligible and Potentially Eligible for the National Register of Historic Places [Continued]

Resource Number	*Resource Type*	*Description*	*National Register Status*
44YO0991	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO1025	Prehistoric/Ethnographic Archaeological Site	No description available	Potentially Eligible
44YO0002	Multicomponent Archaeological Site	No description available	Eligible
44YO0034	Historic Archaeological Site	No description available	Eligible
44YO0414	Historic Archaeological Site	19th Century: 3rd quarter	Eligible
44YO0643	Multicomponent Archaeological Site	No description available	Eligible
44YO0687	Prehistoric/Ethnographic Archaeological Site	No description available	Eligible
44YO0693	Multicomponent Archaeological Site	No description available	Eligible
44YO0798	Prehistoric/Ethnographic Archaeological Site	No description available	Eligible
44YO0799	Multicomponent Archaeological Site	No description available	Eligible
44YO0800	Prehistoric/Ethnographic Archaeological Site	No description available	Eligible
44YO0801	Multicomponent Archaeological Site	No description available	Eligible
44YO0807	Multicomponent Archaeological Site	No description available	Eligible
44YO0845	Historic Archaeological Site	No description available	Eligible
44YO0882	Historic Archaeological Site	No description available	Eligible
44YO0896	Historic Archaeological Site	No description available	Eligible
44YO0980	Historic Archaeological Site	No description available	Eligible
44NN0322	Multicomponent Archaeological Site	Confidential	Potentially Eligible
44YO0064	Historic Archaeological Site	18th Century	Potentially Eligible
44YO1092	Undetermined	No description available	Potentially Eligible

3.4.10 Cheatham Annex

3.4.10.1 Architectural

A Phase I architectural survey and assessment of the 319 architectural resources built at Cheatham Annex between 1718 and 1994 conducted in 1995 resulted in none of them being considered eligible for inclusion the NRHP (Navy, 2012b). An additional survey of resources constructed between 1948 and 1962 that have become 50 years old since execution of the Regional Programmatic Agreement has been completed, and no potentially significant properties were identified (Navy, 2012b).

Colonial National Historic Park (owned by National Park Service)

The Colonial Parkway, which is an element of the Colonial National Historic Park, passes along the southern boundary of the main portion of Cheatham Annex, and along the northern boundary of Training Area F. The Colonial Parkway, and its meticulously crafted landscape that integrates the region's natural and cultural resources, do not occur within any of the training sites of Cheatham Annex.

3.4.10.2 Archaeological

There have been 16 archaeological surveys at Cheatham Annex from 1980 through 2012; one of these was an underwater archaeological survey in the vicinity of Cheatham Annex. The terrestrial investigations have identified 57 sites, although 3 of the sites (44YO0113, 44YO0314, and 44YO0315) were consolidated into 1 site (44YO0059) (Table 3.4-8). Of the identified sites, 1 has been determined to be eligible for the NRHP, 28 have been determined not eligible, and the remaining 25 sites have not been formally evaluated, and are considered potentially eligible until formal evaluation is completed. In addition, a recent Navy field inspection identified the presence of 14 earthwork sites in the woods abutting the Cheatham Annex Field Training Zones and a furnace structure within training zone D (Larson & O'Neill, 2017).

Table 3.4-8. Cheatham Annex Archaeological Sites Eligible and Potentially Eligible for the National Register of Historic Places

Resource Number	*Resource Type*	*Description*	*National Register Status*
N.A.	Historic Archaeological Site	20th Century	Potentially Eligible
N.A.	Historic Archaeological Site	20th Century	Potentially Eligible
N.A.	possible cemetery (1943 Cheatham Annex maps)	Undetermined	Potentially Eligible
44YO0054	Historic Archaeological Site	19th Century: 3rd quarter	Potentially Eligible
44YO0059	Multicomponent Archaeological Site	18th Century	Potentially Eligible
44YO0096	Prehistoric/Ethnographic Archaeological Site	Prehistoric/Unknown	Potentially Eligible
44YO0121	Multicomponent Archaeological Site	44YO0059, 44YO00315, 44YO0314	Potentially Eligible
44YO0122	Historic Archaeological Site	19th Century: 2nd half	Potentially Eligible
44YO0188	Historic Archaeological Site	Historic/Unknown	Potentially Eligible
44YO0207	Historic Archaeological Site	Historic/Unknown	Potentially Eligible
44YO0460	Multicomponent Archaeological Site	18th Century, Middle Woodland	Potentially Eligible
44YO0461	Historic Archaeological Site	19th Century	Potentially Eligible
44YO0462	Prehistoric/Ethnographic Archaeological Site	Prehistoric/Unknown	Potentially Eligible
44YO0463	Prehistoric/Ethnographic Archaeological Site	Prehistoric/Unknown	Potentially Eligible
44YO0464	Historic Archaeological Site	17th Century	Potentially Eligible
44YO0597	Prehistoric/Ethnographic Archaeological Site	Prehistoric/Unknown	Potentially Eligible
44YO0598	Historic Archaeological Site	17th Century, 18th Century, 19th Century: 1st quarter	Potentially Eligible
44YO0600	Historic Archaeological Site	17th Century, 18th Century, 19th Century, 20th Century	Potentially Eligible
44YO0601	Prehistoric/Ethnographic Archaeological Site	Woodland	Potentially Eligible
44YO0604	Multicomponent Archaeological Site	Historic/Unknown, Woodland	Potentially Eligible

Table 3.4-8. Cheatham Annex Archaeological Sites Eligible and Potentially Eligible for the National Register of Historic Places [Continued]

Resource Number	*Resource Type*	*Description*	*National Register Status*
44YO0605	Multicomponent Archaeological Site	17th Century, 18th Century, Woodland	Potentially Eligible
44YO0606	Multicomponent Archaeological Site	19th Century: 4th quarter, 20th Century, Woodland	Potentially Eligible
44YO0610	Historic Archaeological Site	null	Potentially Eligible
44YO0615	Multicomponent Archaeological Site	20th Century, Woodland	Potentially Eligible
44YO0617	Multicomponent Archaeological Site	18th Century, Woodland	Potentially Eligible
44YO0618	Multicomponent Archaeological Site	19th Century, Woodland	Potentially Eligible
44YO0620	Multicomponent Archaeological Site	Woodland	Potentially Eligible
44YO0621	Multicomponent Archaeological Site	20th Century, Woodland	Potentially Eligible
44YO1060	Multicomponent Archaeological Site	Late Woodland	Eligible

Source: (Larson & O'Neill, 2017; Navy, 2017f)

3.4.11 First Landing State Park

3.4.11.1 Architectural and Archaeological

First Landing State Park, previously known as Seashore State Park Historic District, is situated in Virginia Beach, Virginia between the Chesapeake Bay and Broad Bay at Cape Henry. To the south of State Road 60 (Shore Drive) is a majority of the lands associated with the park. This area is swampland and reflects the natural beauty of what was originally called "the Desert." This area features cypress and live oak trees along with the extensive trail system developed during the by the Civilian Conservation Corps. At the southeast end of the park is a boat ramp and secondary beach along Linkhorn Bay at the Narrows. Within the main body of the park are five Civilian Conservation Corps-era overnight cabins. The most notable feature of the park is the landforms, trails and natural beauty. Contributing resources within the Property include eight buildings, six archaeological sites, and 10 structures. The contributing resources include the Circulation System, various cabins and cabin area; campgrounds and picnic areas; beach areas; a trail system; the former restaurant, kitchen and bath house; the Superintendent's House; and a bunk house. First Landing State Park/Seashore State Park is eligible for listing in the NRHP under Criteria A and C for its association with the Civilian Conservation Corps and state park development in Virginia, and its integrity of design in its park plan and buildings.

3.4.12 Southern Branch of the Elizabeth River

3.4.12.1 Architectural

The vessel movement route that will be used during the course of existing and proposed training activities in the Southern Branch of the Elizabeth River passes two NRHP-listed or -eligible architectural resources on shore: the St. Juliens Creek Annex Historic District (see Section 3.4.8, St. Juliens Creek Annex) and the Camp E.W. Young Historic District (State No. 131-5388), which is located on the south shore approximately 0.3 mile upstream from the blank-fire weapons training location.

3.4.12.2 Archaeological

The vessel movement route that will be used during the course of existing and proposed training activities in the Southern Branch of the Elizabeth River passes two NRHP-eligible (potentially) archaeological resources on shore (Table 3.4-9).

Table 3.4-9. Southern Branch of the Elizabeth River Training Route Archaeological Sites Potentially Eligible for the National Register of Historic Places

Resource Number	*Resource Type*	*Description*	*National Register Status*
45CS0005	Prehistoric/Ethnographic Archaeological Site	Native American, Middle and Late Archaic Periods	Potentially Eligible
44CS0078	Historic Archaeological Site	No description available	Potentially Eligible

There are no previously identified NRHP-eligible or -listed cultural resources within the APE of the Southern Branch of the Elizabeth River where existing blank-fire weapons training occur. The existing blank-fire weapons training site is approximately 1 mile northwest of the Albemarle and Chesapeake Canal historic site and 1.5 miles northwest of the Great Bridge Battlefield historic area and the archaeological site associated with the battle (44CS0022).

3.4.12.3 Shipwrecks and Other Underwater Sites

No previously identified NRHP-eligible or -listed submerged shipwreck sites or other underwater sites are present within the vicinity of the vessel movement routes that may be used during the course of existing and proposed training activities in the Southern Branch of the Elizabeth River. However, submerged shipwreck site 44CS0273 is in the northern portion of the route near Newton Creek, but it is considered by the Virginia Department of Historical Resources to be not eligible for the NRHP.

3.5 Ambient Noise

3.5.1 Definition of the Resource

Sound is present in all physical environments. It is a vibration of particles in the medium (e.g., air, water) produced by some source and received by a listener or microphone. The listener translates the perceived motion into electrical impulses that are interpreted by the auditory system within the brain. Sound in an environment is often used to convey information, communicate, or obtain information about the environment or the listener's surroundings. In these cases, the sound is referred to as a "signal." Examples of signals are human speech, animal vocalizations, and sounds used for detection of underwater targets (sonars and fish-finders).

Noise is undesired sound (American National Standard Institute, 1994). Whether a sound is noise often depends on the receiver (i.e., the animal or system that detects the sound). For example, small explosives and sonar used to generate sounds that can locate an enemy submarine produce signals that are useful to Sailors engaged in anti-submarine warfare but are assumed to be noise when detected by marine mammals.

Ambient noise refers to the combination of all "background" sounds present in an environment, from both anthropogenic and natural sources. Animal vocalizations, vessel movements, and sound from environmental sources such as wind and waves all contribute to the ambient noise level at a given

location. Changes in the ambient noise of a system may affect the physiology and behavior of human and non-human listeners, and could potentially interfere with the ability of listeners to communicate or to detect critical information in their environment.

Within this EA, measurements of sound will be given as sound pressure level in units called decibels (dB). The dB scale provides a simplified relationship between sound pressure and the way it is perceived by the receiver, expressing the logarithmic strength of measured sound pressure relative to a standardized reference pressure. The reference pressure used when calculating sound pressure level in dB depends on the medium in which the sound was measured. For airborne sounds, the reference value is 20 micropascals (µPa, or 10^{-6} pascals), expressed as "dB re 20 µPa." For measurements of underwater sound, the standard reference pressure is 1 µPa, and is expressed as "dB re 1µPa." Because sound levels measured in air and water are not directly comparable, it is important to include the correct reference pressure when giving a sound level in dB.

Sound intensity varies widely (from a soft whisper to a jet engine), and it is measured on a logarithmic scale to accommodate this wide range. The logarithm, and its use, is nothing more than a mathematical tool that simplifies dealing with very large and very small numbers. For example, the logarithm of the number 1,000,000 is 6, and the logarithm of the number 0.000001 is −6. Because the dB scale is logarithmic, two sound sources operating together do not generate a noise level that is an arithmetic addition of the two noise levels. In general, adding two equal noise sources will result in a 3 dB increase. Adding a sound level that is greater than 10 dB less than another sound source will result in almost no increase in overall sound level.

The frequency (or pitch) of sound is measured in cycles per second, or hertz (Hz). This measurement reflects the number of times per second the medium (e.g., air) vibrates from the acoustic energy. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified as sirens or screeches.

Airborne sounds are commonly referenced to human hearing using a method which weights sound frequencies according to measures of human perception, de-emphasizing very low and very high frequencies which are not perceived well by humans. This is called A-weighting, and the decibel level measured is called the A-weighted sound level (dBA). Sounds given in dBA are assumed to be referenced to 20 µPa unless otherwise noted.

The word "metric" is used to describe a standard of measurement. As used in environmental noise analysis, there are many different types of noise metrics. Each metric has a different physical meaning, or interpretation, and each metric was developed by researchers attempting to represent the effects of environmental noise. The metrics supporting the assessment of noise from activities evaluated in this document are maximum sound level (Lmax), and peak level (dBP).

Maximum sound level (Lmax). The Lmax is the highest sound level measured during a non-impulsive noise event such as a vehicle pass-by. In the case of a vehicle pass-by, the noise level varies as the vehicle moves closer to or farther away from the observer on the ground. Lmax, which reflects the loudest one-eighth of a second time period, is a useful metric for judging a noise event's interference with activities. Conversations, for example, are more likely to be interrupted by noise exceeding 60 dBA Lmax (the level at which conversations are typically held). Maximum noise levels provide information on specific noise events. All Lmax noise levels stated in this EA reflect A-weighted (denoted dBA) sounds.

Un-weighted Peak Noise level (dBP). Impulsive noise events, such as thunder and munitions noise, are very short-lived and are often described by their instantaneous peak noise level. Peak noise levels are not frequency-weighted because, while impulsive noise energy at extremely low and extremely high frequencies is not heard well, it can still result in other physical effects (e.g., rattle of structures). Because munitions noise levels are so strongly influenced by meteorological conditions (e.g., winds), the peak noise level reaching a particular location after a particular noise event may vary significantly. In this EA, peak noise levels will be described for average sound propagation (weather) conditions. As discussed further in Section 3.5.2 (Regulatory Framework), peak noise levels are useful as predictors of community reaction and physiological effects.

Standards set forth in U.S. Department of the Army (Army) Regulation 200-1, Environmental Protection and Enhancement, are used to assess noise impacts of munitions training. Three "Noise Zones" are defined based on specific noise levels (Table 3.5-1). Noise-sensitive land uses, such as housing, schools, and medical facilities are considered to be acceptable within Noise Zone 1, normally not recommended (i.e., not compatible) in Noise Zone 2, and not recommended (i.e., not compatible) in Noise Zone 3. As shown in Table 3.5-1, small arms (i.e., .50 caliber and smaller) noise levels below 87 dBP define Noise Zone 1, levels between 87 and 104 dBP define Noise Zone 2, and noise levels above 104 dBP define Noise Zone 3.

Table 3.5-1. Small Arms Noise Zone Definitions

Noise Zone	*Small Arms Peak Noise Level*
Noise Zone 1	<87 dBP
Noise Zone 2	87 to 104 dBP
Noise Zone 3	>104 dBP

Key: dBP = decibel peak

Peak noise levels do not reflect the frequency of occurrence of noise events. Small arms Noise Zones, which are defined based on peak noise levels, are applicable near firing ranges where small arms munitions noise is a near-constant occurrence. Although noise compatibility guidelines are not directly applicable to environments in which small arms noise occurs on a less-than-daily basis, the dBP levels were designated based on human experiences. Noise levels between 87 and 104 dBP have some potential for disruption of common activities while noise levels exceeding 104 dBP have a greater potential for disturbance.

Explosives noise can often be heard for an instant at large distances from the detonation. As shown in Table 3.5-2, noise levels less than 115 dBP typically result in a low risk of complaints, levels between 115 and 130 dBP result in a moderate risk of complaints, and noise levels exceeding 130 dBP result in a high risk of complaints. At peak noise levels above 140 dBP, there is some risk of permanent physiological damage to unprotected human ears.

Table 3.5-2. Risk of Noise Complaints and Other Impacts

Risk of Complaints / Physiological Damage	*Explosives Peak Noise Level*
Low	<115 dBP
Moderate	115 to 130 dBP
High	>130 dBP
Risk of permanent physiological damage to unprotected human ears	>140 dBP

Key: dBP = decibel peak

Noise levels experienced depend on specific circumstances affecting the noise source and/or person receiving the noise. For example, noise level is substantially lower for persons indoors than outdoors due to the sound attenuation (typically by about 20 dB). In this document, for the purposes of characterizing noise levels, the distance to the closest noise-sensitive location (e.g., residence, campground) will be stated, and the outdoor noise level at this distance will be categorized (e.g., less than 87 dBP, above 87 but below 104 dB, or above 104 but below 140 dBP). Noise levels will be stated for events that are realistically expected to occur. For example, noise levels are stated for firing from the training area boundary toward the interior of the training area (which is expected to occur) but are not stated for firing from the boundary outward (which would not be expected to occur). Noise-sensitive locations were identified through interpretation of publicly-available aerial photography.

3.5.1.1 Airborne Noise Sources

3.5.1.1.1 Munitions and Equipment

Table 3.5-3 lists the distances at which blank and live ammunition types decrease to below three peak levels (87 dBP, 104 dBP, and 140 dBP). Larger rounds require more propellant and generate higher noise levels. Blank rounds, which contain propellant but do not fire a bullet, generate lower noise levels than the live round of equivalent size.

Table 3.5-3. Small Arms Peak Noise Levels

Munitions Description	*87 dBP [1]*		*104 dBP [1]*		*140 dBP [2]*	
	Distance (feet) [3]	*Distance (meters) [3]*	*Distance (feet) [3]*	*Distance (meters) [3]*	*Distance (feet) [3]*	*Distance (meters) [3]*
5.56 mm blank	740	230	120	40	40	10
7.62 mm blank	3,270	1,000	850	260	40	10
9 mm blank [4]	2,300	700	700	210	40	10
.50-caliber blank	4,180	1,270	1,010	310	70	20
12-gauge live/blank [4]	2,830	860	840	260	40	10

Source: Small Arms Range Noise Assessment Model; Army Pamphlet 385-63
Key: dBP = decibel peak; mm = millimeter.
Notes:
1. Small Arms Range Noise Assessment Model was used to calculate distances at which noise levels drop below 87 and 104 dBP.
2. Distances to 140 dBP calculated based on hearing hazard distances published in Army Pamphlet 385-63; used 7.62 mm distance to 140 dBP as surrogate for 12-gauge as no distance is published for 12 gauge; Estimated distance to blank rounds threshold assuming 6 dB noise level reduction per doubling of distance and assuming that blank rounds are 10 dB less loud than live rounds.
3. rounded up to nearest 10 feet or 10 meters
4. 9 mm and 12-gauge shotgun live round noise levels are presented as surrogates for equivalent blank rounds because blank rounds noise is not available in Small Arms Range Noise Assessment Model reference noise level database; 12 gauge live rounds includes the firing of LA51/52 rounds; airburst detonation of LA51/52 rounds is considered separately.

Peak noise levels associated with individual large-arms and explosives firing events at various distances are listed in Table 3.5-4. The type of explosive (e.g., Composition C4) and the quantity of explosive are both important in determining the destructive power and noise level of an explosion. The total amount of explosive material included in an explosive device is sometimes referred to as “net explosive weight.” Ground-burst simulators and propane-powered explosives simulators are not intended to be

destructive, but instead are used during training to create a realistic battlefield soundscape. Smoke grenades and flares generate a negligible amount of noise and were not considered in this analysis.

Table 3.5-4. Large Arms Noise Levels[1]

Munitions Description	*115 dBP [1]*		*130 dBP [1]*		*140 dBP [2]*	
	Distance (feet)[3]	*Distance (meters)[3]*	*Distance (feet) [3]*	*Distance (meters) [3]*	*Distance (feet)*	*Distance (meters)*
Ground Burst Simulator, M116A1/E2, 0.07 pounds (0.03 kg) black powder	1,130	340	390	120	150	50
0.2 pounds (0.1 kg) NEW	2,950	900	1,050	320	460	140
1.25 pounds (0.6 kg) Composition C4	5,860	1,790	1,850	560	810	250
M998, 8.8 pounds (4 kg) Composition C3	8,220	2,510	2,940	900	1,720	520

Key: dBP = decibel peak; kg = kilogram; NEW = net explosive weight measured in pounds TNT (2,4,6-Trinitrotoluene) equivalent.
Notes:
1. BNOISE2™ used to calculate distance to 115 and 130 dBP.
2. Distances to 140 dBP calculated based on NEW relationship in Army Pamphlet 385-63; except M116 based on U.S. Army (2006)
3. Rounded to the nearest 10

DoD design criteria published at Military Standard 1474E requires that all practical approaches be taken to reduce military equipment source noise levels. The primary intent of this policy is to minimize the potential for speech communication interference and hearing loss risk among personnel operating the equipment. However, design elements such as mufflers on generators also benefit non-DoD personnel. A typical muffled generator operating at a distance of 600 feet produces a maximum noise level of approximately 59 dBA (Federal Highway Administration, 2006). This noise level is below the sound level of a normal conversation (i.e., 60 dBA) and would not generally interrupt speech communication.

3.5.1.1.2 Ground Vehicles and Surface Vessels

Ground vehicles and surface vessels would be used within the proposed training areas. Noise levels associated with several representative vehicle types are listed in Table 3.5-5 and Table 3.5-6.

Table 3.5-5. Ground Vehicle Noise Levels

Vehicle Type	*Approximate Noise Level (dBA) at 50 feet and low speed*
M1165 troop/cargo/radio MRC truck (HMMWV) [1]	65
MK 23 Cargo (medium tactical vehicle) [1]	77
MK 16 Tractor (logistical vehicle) [1]	78
M9 ACE Combat Excavator (support engineering equipment, construction vehicle) [1]	85
Stryker LAV (light armored vehicle) [1]	84
Dump Truck [2]	84

Source: U.S. Army (2004); calculated using Federal Highway Administration Roadway Construction Noise Model
Key: dBA = A-weighted decibels; HMMWV = High Mobility Multipurpose Wheeled Vehicle.

Table 3.5-6. Amphibious Assault Vehicle Noise Levels

Mode of Operation	*Noise Level (dBA) at 100 feet*
Full-power on soft, dry sand	72
Full Power in surf	71
Paved Road at approx. 45 MPH	88
Idling on Pavement	73

Source: (Navy, 2002)
Key: dBA = A-weighted decibels; MPH = miles per hour.

LCAC are high-speed amphibious landing craft vehicles capable of travel over both water and land. Noise from LCACs is generated by the engine and fans on the craft, which are used for movement. Noise levels recorded while the craft is operating at high power (92 percent) have been measured as being up to 92 dBA at a distance of 300 feet from the vehicle (Bell Aerospace, 1985).

3.5.1.2 Underwater Noise Sources

Underwater noise is produced by a number of different sources and platforms. Most platforms are currently in use for training and operational purposes in the study area. These sources are addressed in order of whether the sound originates in air or in water. Note that decibel levels are not equivalent between measurements taken in air and underwater due to differences in reference pressures and density of the media.

3.5.1.2.1 Munitions and Equipment

Noise associated with weapons firing from vessels that may contribute to the underwater noise environment happens within the study area at a designated area on the Southern Branch of the Elizabeth River. Only blank fire occurs from vessels. Sound level intensity decreases with increased distance from the firing location and increased angle from the line of fire (Pater, 1981). While there are no existing measurements of the sound pressure levels of underwater noise created by small arms fire over water, sound waves would enter the water primarily in a narrow cone beneath the sound source (analogous to aircraft noise). The region of underwater sound influence would be equivalent to a 13 degree cone underneath the fired weapon, the duration of sound influence would be very brief at any point, and sound level for the small amount of acoustic energy that propagates through the water surface would diminish quickly. The acoustical impedance mismatch between air and underwater environments would contribute to the low sound levels expected underwater. Underwater noise would be expected to attenuate quickly according to the practical spreading model (4.5 dB of transmission loss per doubling of distance). Multiple, rapid gun firings would occur from a single firing point toward a target area. Vessels participating in gunfire activities would maintain enough forward motion to maintain steerage, normally at speeds of a few knots. Acoustic impacts from weapons firing would often be concentrated in space and duration.

3.5.1.2.2 Vessels

Naval vessels (including ships and small craft) all produce noise underwater. The main source of such noise is propeller cavitation (pressure areas that surround the blades), which varies in frequency and level based on the size of the propeller and speed of the vessel. Within the study area, smaller boats are the most common sources of vessel noise.

Small Vessels

A variety of smaller craft, such as service vessels for routine operations and small boats used for inshore operations, would be operating within the study area. These small craft types, sizes, and speeds vary, but in general, they emit higher-frequency noise than larger ships. Small craft (for purposes of this discussion – less than 85 feet in length), which are all classified as support craft, have much more variable speeds (dependent on the mission). Small vessels which would be used during the Proposed Action are listed in Table 3.5-7; for complete descriptions, see Appendix D (Platform Glossary).

Table 3.5-7. Small Vessels that May Be Used as Part of the Proposed Action

Platform	*Size (feet)*
Riverine Command Boat	53
Riverine Patrol Boat	40
Rigid Hull Inflatable Boat	36
Sea Ark	34
Riverine Assault Boat	33
Combat Rubber Raiding Craft (aka Zodiac or F470)	16

Noise from small vessel movements is typically non-impulsive, continuous, and relatively broadband, containing energy from 100 Hz to more than 10 kilohertz (kHz), and can range from 150 to 190 dB re 1µ Pa at 1 meter, depending on vessel size and speed (Erbe, 2002; Hildebrand, 2009). Noise would be expected to attenuate quickly according to the practical spreading model (4.5 dB of transmission loss per doubling of distance). Noise levels for small craft can be negligible (Combat Rubber Raiding Craft propelled with oars) or substantial, depending on the mission requirements and speed of the vessel. In some cases, vessels may exceed average speeds; in others, vessels may be stopped or moving slowly to maintain steerage. An example of such operations is launch and recovery of a small rigid hull inflatable boat.

Unmanned Underwater Vehicles

In-water devices, as discussed in this analysis, include unmanned vehicles such as remotely operated vehicles. The remotely operated vehicle used in the study area (i.e., Jones Pond at Cheatham Annex) is the SEABOTIX (Appendix D, Platform Glossary). For self-propelled devices like the SEABOTIX, there is generally some cavitation noise from propellers; however, noise from this platform is generally minimal, and the source characteristics are expected to be similar to those from small vessels but at lower amplitudes due to the reduced size and speed of the platform.

3.5.1.3 Regional Ambient Noise Environment

Whereas Sections 3.5.1.1.1 (Munitions and Equipment) and 3.5.1.1.2 (Ground Vehicles and Surface Vessels) described noises generated by specific notable ongoing activities (e.g., munitions firing or the operations of tactical vehicles), this section will provide a description of the overall ambient noise environment which also includes a background of civilian vehicle traffic noise, airport noise, construction noise, natural sounds, and other sources of sound. The existing ambient noise at the various locations covered under this EA varies with exact location within a site, the existing land and water uses, and the natural environments present. For some sites, ambient noise levels have been previously measured during a different project. For those sites at which ambient noise levels have not been measured, noise levels can be assumed to be similar to measured levels at sites with similar land uses.

3.5.1.3.1 Airborne Noise

Airborne ambient sound levels vary within the study area with the primary determinant of ambient noise level being the intensity of human activity. Ambient background daytime noise levels in urbanized areas typically vary between 60 to 70 dBA, whereas suburban neighborhoods typically experience ambient noise levels of approximately 45 to 50 dBA (USEPA, 1974). In rural areas, natural sounds (e.g., bird calls) are dominant most of the time, while noise on the open water is mostly a function of sea state. The Navy has previously measured airborne ambient noise levels at a high-use industrial waterfront similar to the waterfront areas in several of the installations in the study area; daytime noise levels ranged from 60 dBA to 104 dBA in a high-use area of Naval Base Kitsap, Bangor, Washington (Navy, 2013c). Long periods of relative quiet were punctuated by loud events (e.g., the close passing of a forklift), resulting in the average sound level over the course of an entire day (64 dBA) being closer to the lower end of the range of levels than to the higher end. Evening and nighttime levels ranged from 64 to 96 dBA, with an average level of approximately 64 dBA. In highly used training areas, noise sources are similar to those found along industrial waterfronts including heavy-duty ground vehicles, generators, and other equipment. Tactical vehicle and munitions operations generate temporary increases in noise level above those that would normally be experienced in civilian industrialized areas. Noise levels associated with tactical vehicle and munitions training operations at individual installations will be discussed in the training location discussions.

3.5.1.3.2 Underwater Noise

Underwater noise levels at the proposed training locations are likely to vary widely based on location (Urick, 1983; Richardson et al., 1995). Natural noise sources can include wind, waves, precipitation, and biological sources such as fish and cetaceans. These sources produce sound in a wide variety of frequency ranges (Urick, 1983; Richardson et al., 1995) and can vary over long (days to years) and short (seconds to hours) time scales. In shallow waters, precipitation may contribute up to 35 dB to the existing sound level, and increases in wind speed of 5 to 10 knots can cause a 5 dB increase in ambient ocean noise between 20 Hz and 100 kHz (Urick, 1983).

Anthropogenic noise sources also contribute to ambient noise levels, particularly in ports and other high use areas in coastal regions. Normal activities include vessel traffic (from large ships, support vessels, and security boats), loading and maintenance operations, and other activities (sonar and echo-sounders from commercial and recreational vessels, construction, etc.) which all generate underwater sound (Urick, 1983). Additionally, noise produced by mechanized equipment on wharves or adjacent shorelines may contribute to underwater ambient noise levels.

The underwater acoustic environment in the Southern Branch of the Elizabeth River is likely to be dominated by noise from day-to-day vessel activities. While there are no current measurements of ambient noise levels along the Southern Branch of the Elizabeth River, Table 3.5-8 shows expected noise levels and frequency ranges from a variety of sources. While there are no current measurements of ambient noise levels at Jones Pond on Cheatham Annex, small vessels (e.g., bass fishing boats) are likely the only existing underwater noise sources.

Table 3.5-8. Expected Underwater Noise Levels and Frequency Ranges

Noise Source	*Frequency Range (Hz)*	*Underwater Noise Level (dB re 1 µPa)*
Small vessels[1]	250–6,000	151 dB rms at 1 meter
Large vessels[2]	20–1,500	170 =–180 dB rms at 1 meter
Tug docking barge[3]	200–1,000	149 dB rms at 100 meters

Sources: [1] Lesage, Barrette, Kingsley, & Sjare (1999); [2] Richardson, Greene, Malme, & Thomson (1995); [3] Blackwell & Greene (2003)
Key: dB re 1 µPa = decibels referenced to 1 micropascal; Hz = hertz; rms = root mean square.

3.5.2 Regulatory Framework

As discussed briefly in Section 3.5.1 (Definition of the Resource), the DoD has published regulations that address noise and potential noise effects. The U.S. Army has published noise level thresholds at Army Regulation 200-1 that relate to community impacts. Where small arms noise levels between 87 and 104 dBP occur on a daily basis (i.e., Noise Zone 2) noise-sensitive land uses are normally not recommended. Where noise levels exceed 104 dBP (i.e., Noise Zone 3) on a daily basis, noise-sensitive land uses are not recommended. Although peak noise-based small arms noise compatibility guidelines are not directly applicable to environments in which small arms noise occurs on a less-than-daily basis, the dBP levels were designated based on human experiences. Noise levels between 87 and 104 dBP have some potential for disruption of common activities while noise levels exceeding 104 dBP have a greater potential for disturbance.

Underwater noise is not directly regulated; however, regulatory requirements for impacts on biological resources are discussed in Section 3.3 (Biological Resources). Existing data for the effects of underwater noise on human swimmers indicate that recreational divers experience no negative effects from exposure to narrowband sonar signals at or below 154 dB re 1µPa in the range from 600 Hz to 2.5 kHz (NATO Undersea Research Centre, 2006). Thresholds for military divers are higher, and would be overseen by the training command when necessary.

3.5.3 Joint Expeditionary Base Little Creek

3.5.3.1 Airborne Noise

Noise levels on and near JEB Little Creek are affected by ongoing military training activities (e.g., helicopter overflights) as well as by the location of the installation in a highly developed area of Norfolk near the Norfolk International Airport (i.e., portions of JEB Little Creek lie under the flight paths used by aircraft approaching and departing from the Norfolk International Airport). Vehicle traffic noise is a relatively constant noise source in the ambient noise environment whereas aircraft overflights, tactical vehicle operations, and munitions firing are intermittent noise sources. The Explosive Ordnance Disposal (EOD) pit at the Normandy Dune is used by non-Navy EOD units on an occasional basis for detonations of explosive charges. These events generate elevated noise levels in nearby residential areas (e.g., Chesapeake Beach), but are relatively infrequent.

Noise-sensitive locations near JEB Little Creek include residential developments located to the west, south, and east of the installation (see Figure 2-4). The East Beach residential area located west of the installation with the closest residence at approximately 1,400 feet from LCAC parking spots. A berm has been constructed between the LCAC apron and East Beach providing some noise attenuation. With the

berm in place, LCAC Lmax at the closest residence is expected to be approximately 67 dB. TA Anzio Beach is east of the parking apron and is approximately 2,000 feet from the closest off-installation residence. TA Iwo Jima is approximately 1,600 feet from the nearest off-installation residence. Little Creek Cove, TA Mud Flats, and TA Rodriguez Field are about 1,500 feet from the Morale, Welfare, and Recreation (MWR) Recreational Vehicle Park and approximately 2,200 feet from the closest off-base residences. TAs Signal Point and Alpha/Bravo/Charlie Dunes are located north of the TA Mud Flats and are slightly farther from the recreational vehicle park and off-installation residences.

3.5.4 Joint Expeditionary Base Fort Story

3.5.4.1 Airborne Noise

Ambient airborne noise sources at JEB Fort Story include military training operations noise (e.g., surface vehicles, aircraft, and munitions) as well as noise from civilian sources (e.g., surface vehicles and aircraft).

The installation is bordered to the west and south by First Landing State Park which is used for a variety of noise-sensitive activities including camping, hiking, and fishing. The First Landing State Park campground is located approximately 370 feet from the Explosive Training Areas, 3,500 feet from TA Omaha Beach, and 650 feet from TA Utah Beach. EOD Range 1 is about 2,500 feet from the closest noise sensitive location (a portion of a hiking trail on First Landing State Park) and about 4,800 feet from the closest residences which are located east of the installation. Building 900 in TA Omaha Beach is about 4,100 feet from the campground at First Landing State Park. As mentioned on the First Landing State Park website, park guests may experience unusual sights and loudness; training maneuvers usually, but not always, cease by 10 p.m. and these activities pose no risk to park guests. A beachfront residential area borders the installation to the southwest immediately adjacent to TA Inchon Beach and TA Wilderness.

3.5.5 Dam Neck Annex and Camp Pendleton

3.5.5.1 Airborne Noise

Airborne noise sources at Dam Neck Annex and Camp Pendleton include military training operations noise (e.g., surface vehicles, aircraft, and munitions) as well as noise from civilian sources (e.g., surface vehicles).

Residential areas are located immediately north and south of the installation. High-density residential developments are located approximately 950 feet north of the Shipboard Trainer, immediately adjacent to Camp Pendleton Beach, approximately 1,200 feet from Dam Neck Annex North Beach, and approximately 2,300 feet from Baum Village. The closest privately owned residences to the LCAC overland maneuver course are approximately 3,200 feet to the west and 2,900 feet to the north.

3.5.6 Naval Auxiliary Landing Field Fentress

3.5.6.1 Airborne Noise

While rotary-wing aircraft operate at NALF Fentress, the sound environment is dominated by fixed-wing jet aircraft noise (Navy, 2014d). Other airborne ambient noise sources include military surface vehicles and munitions noise as well as noise from civilian sources (e.g., surface vehicles).

The area surrounding NALF Fentress is rural and characterized by residential and commercial developments interspersed between open or agricultural lands.

3.5.7 Northwest Annex

3.5.7.1 Airborne Noise

Airborne noise sources at Northwest Annex include military training operations noise (e.g., surface vehicles, aircraft, and munitions) as well as noise from civilian sources (e.g., surface vehicles and aircraft). The installation is surrounded by scattered residences and large swaths of open land, forested land, and agricultural land. Munro Village is approximately 5,000 feet from the nearest residence.

3.5.8 St. Juliens Creek Annex

3.5.8.1 Airborne Noise

Ambient noise sources on the installation include military training operations noise (e.g., surface vehicles, aircraft, and munitions) as well as noise from civilian sources (e.g., surface vehicles and aircraft). The installation is bordered by residential areas to the north and east. Industrial land uses and open water, which are located primarily to the north, west, and south, are generally not noise-sensitive. Residences are located immediately adjacent to the Building 277 fenced compound. The St. Juliens Creek Annex pier and harbor training area are located 2,600 feet from the nearest off-installation residence. The field training area is located approximately 2,100 feet from the nearest off-installation residences.

3.5.9 Naval Weapons Station Yorktown

3.5.9.1 Airborne Noise

Ambient noise sources on the installation include military training operations noise (e.g., surface vehicles, aircraft, and munitions) as well as noise from civilian sources (e.g., surface vehicles and aircraft). Firing of pistols at a range located near the southern boundary of the installation results in peak noise levels exceeding 87 dBP at up to approximately 4,000 feet from the installation boundary. A 7.62 mm rifle firing range is proposed to be established near the pistol range. Once the new range is operational, potentially disturbing noise levels (87 to 104 dBP) would be experienced at Water County USA as well as in larger portions of the Williamsburg Country Club and Busch Gardens Europe (Navy, 2014e). Munitions noise is qualitatively different from the sounds typical of amusement parks, and is therefore more likely to be noticeable in an ambient noise environment dominated by sounds made by children.

Noise-sensitive locations near the installation include the town of Lackey and residences located along the eastern boundary of the weapons station on and near Yorktown Road. To the south, the weapons station is bordered by Interstate 64, which generates a steady elevated noise level. To the west of the installation, the neighborhood of King's Creek, Water Country USA, and a shopping center are located approximately 5,800 feet from the NWS Yorktown EOD Demolition Range. A new residential development is planned for construction immediately west of the shopping center.

The Home Station Training Lanes at NWS Yorktown are located approximately 300 feet from the Colonial Parkway which runs through a thin strip of land owned by the National Park Service. The

parkway and adjacent shoreline are used for a variety of recreational activities including fishing, biking, and picnicking.

3.5.10 Cheatham Annex

3.5.10.1 Airborne Noise

Ambient noise sources on the installation are similar to those described for NWS Yorktown (Section 3.5.9.1, NWS Yorktown, Airborne Noise) including military training operations noise (e.g., surface vehicles, aircraft, and munitions) as well as noise from civilian sources (e.g., surface vehicles and aircraft). Noise-sensitive locations near Cheatham Annex include the neighborhood of King's Creek which is located immediately east of Training Area F. Water Country USA and a shopping center are located slightly farther from the training area. Interstate 64 borders the southern of the installation, and generates a steady noise source throughout most daylight hours and much of the night. The neighborhood of Queens Creek is located west of the installation at a distance of approximately 1,800 feet from Training Area F.

3.5.10.2 Underwater Noise – Jones Pond

Jones Pond at Cheatham Annex is located within a land training area. No underwater noise measurements exist for Jones Pond, but existing noise sources include small recreational fishing boats and natural sources (e.g., rain).

3.5.11 First Landing State Park

3.5.11.1 Airborne Noise

First Landing State Park is adjacent to JEB Fort Story, an active military installation supporting aviation, munitions, and ground vehicle training (see Section 3.5.4, JEB Fort Story). Noise sources at the park itself include natural sounds, vehicle traffic on the few roadways designated for motorized vehicle traffic, and the sounds of visitors, over 1 million of which visit the park each year for physical recreation, camping, and outdoor education. Adjoining land areas to the west, south and east of the park are primarily residential.

3.5.12 Southern Branch of the Elizabeth River

3.5.12.1 Airborne Noise

The Southern Branch of the Elizabeth River transits primarily industrial areas, few residential areas, as well as some areas that are wild and undeveloped. Surface vessels (military and civilian), human activity along the shoreline, and natural sounds are common noise sources. Narrow portions of the Southern Branch of the Elizabeth River in populated areas are, for the most part, no-wake zones meaning that surface vessels must maintain low speeds and engine power settings. While operating at low speeds, surface vessels generate relatively low noise levels. Noise-sensitive locations include residences along the shorelines.

3.5.12.2 Underwater Noise

No noise measurements exist for this segment of river, but the sheltered riverine location indicates that underwater ambient noise levels and spectra in the Southern Branch of the Elizabeth River are likely

similar to those in other sheltered sites, which averaged from 92 to 112 dB re 1 µPa (Amoser & Ladich, 2010). In the industrial areas of this site, activities along the shoreline may introduce relatively continuous underwater noise during projects such as pile driving and other in-water construction. However, given the narrowness of the channel and curvature of the shoreline, the noise from industrial activities is not expected to propagate far from the source location. Recreational and military surface vessel traffic is likely the highest noise contributor throughout this site; in narrow portions of the waterway, vessel speed limits are in place and would limit noise emissions. Environmental noise from waves is unlikely due to the sheltered location. Airborne noise sources are unlikely to be substantial contributors to the underwater acoustic environment.

3.6 Public Health and Safety

3.6.1 Definition of the Resource

Public Health and Safety considers those water and land activities that have the potential to affect the safety, health, and well-being of the public within the study area. The primary goal is to identify and prevent potential accidents or impacts on the general public.

Water and land safety considers the possible presence of members of the public within the areas where Navy activities would be conducted. Water safety includes naval movements through inland waterways, such as rivers, as well as activities in and around coastal areas. This is a concern only for those training activities occurring in open waters, where activities might be co-located with recreational or commercial vessels passing through the area. Most training is conducted on the eight study area installations and public access is physically controlled at these sites. However, some training is conducted on open waterways (i.e., Southern Branch of the Elizabeth River), and public access to areas on these waterways is not physically controlled.

There are few concerns about potential public exposure to training activities on beaches or land areas in the study area, since most of those activities would take place within the boundaries of the respective military installations, which are not generally open to the public, or within parts of installations restricted to public access. The one study area location where land training occurs off-installation is First Landing State Park and, as discussed in Section 4.6 (Public Health and Safety), no public health and safety concerns are presented by the park trail use for physical fitness training.

A safe environment is one in which there is no, or optimally reduced, potential for death, serious bodily injury or illness, or property damage. Various stressors in the environment can adversely affect public health and safety. Identification and control or elimination of these stressors can reduce risks to public health and safety to acceptable levels or eliminate risk entirely.

All areas where there may be release of military munitions are contained within installation boundaries and public areas are located well outside of safety exclusion zones (explosive quantity safety distances) established for ordnance storage areas. As a result, impacts to public health are not carried forward.

3.6.1.1 Common Safety Practices

Military and civilian activities have taken place simultaneously in the region for decades, though for public safety reasons military activities are typically confined to secured military installations and ranges. Where military and civilian activities coexist in the same space (First Landing State Park and Southern Branch of the Elizabeth River) there are rules and practices that guide the Navy's safe use of the shared

areas. During all training exercises, the Navy implements standard operating procedures (SOPs) to ensure that Navy activities do not negatively interact with civilian activities, preventing potential conflicts and harm to civilians.

Whether military or civilian, vessel operators have a duty to abide by maritime requirements as administered by the USCG. While in transit, Navy surface vessel operators are alert at all times, travel at a safe speed for the prevailing conditions, use state-of the-art satellite navigational systems, and are trained to take proper action to avoid collisions. For all moving Navy vessels, including smaller rigid-hulled inflatable boats, personnel watch surrounding waters to ensure that potential obstacles are identified. Navy Lookout personnel are highly qualified and experienced observers of the marine environment.

For on-shore training, the use of explosives, such as conducting open detonations, present fire hazards that require rigid controls. As discussed in Section 3.6.2 (Regulatory Framework) below, there are various requirements for fire prevention and protection during explosives use, as well as regulations as to the location, condition, and preparation of the training area. Standby firefighting forces are present during open detonation operations.

All study area installations where explosive training occurs have developed SOPs designed to provide safety and security in coordination with the appropriate authorities. These SOPs include provisions that limit access only to trained and authorized personnel; procedures that minimize the possibility of a non-permitted or uncontrolled detonation, release, discharge, or migration of ammunition or explosives when such release, discharge, or migration may endanger human health or the environment. They also include provisions for prompt notification of emergency response and environmental agencies and the potentially affected public in the event of an actual or potential detonation or uncontrolled release, discharge or mitigation. SOPs are coordinated with the appropriate federal, state, and local emergency response authorities such as law enforcement, fire departments, or hospitals and any established local emergency planning committees.

3.6.2 Regulatory Framework

The Navy implements numerous guidance documents which provide a process for maintaining readiness in peacetime and achieving success in combat while safeguarding people and resources, including:

Office of the Chief of Naval Operations Instruction 5100.23G, *Navy Safety and Occupational Health Program Manual* (Navy, 2011a), provides policy and outlines responsibilities for the implementation of the total Navy Safety and Occupational Health program. The Safety and Occupational Health program encompasses all safety disciplines such as weapons and explosives safety, off-duty safety, traffic safety, and occupational health.

Navy Fire and Emergency Services Program, Office of the Chief of Naval Operations Instruction 11320.23G (Navy, 2013d), provides policy, guidance, structure, standardization and establish responsibilities for the provision of fire and emergency services at Navy installations. The delivery of Fire and Emergency Services on Navy installations is accomplished through an integrated system composed of prevention, fire protection engineering, public education, emergency medical services, structural firefighting, aircraft rescue and firefighting, shipboard firefighting, technical rescue, wildland firefighting, incident command, hazardous materials and chemical, biological, radiological, nuclear, and high-yield explosive response.

Naval Sea Systems Command Operating Procedure 5 Volume 1, *Ammunition and Explosives Safety Ashore* (Navy, 2010b), provides explosives safety information and regulations regarding conventional ammunition, ammunition components, explosives, and related hazardous material operations at all Naval activities (i.e., any Navy or Marine Corps establishment whose mission directly involves or supports the storage, issue, and receipt of ammunition, loading/downloading of ammunition on aircraft, or through which ammunition is transferred to, from, or between Naval or commercial ships at Chief of Naval Operations-approved berths), to include privately owned land. These safety regulations are intended to control the hazards associated with these operations and are the minimum requirements necessary for protecting personnel and property. The manual also establishes minimum Explosives Safety Quantity Distance requirements for the use of all munitions.

Office of the Chief of Naval Operations Instruction 8020.14A, *Department of the Navy Explosives Safety Management Policy Manual* (Navy, 2013e), establishes Navy explosives safety policy and assign management oversight responsibilities. It also establishes basic explosives safety standards and minimum Explosives Safety Quantity Distance criteria to be observed by DoD components. These standards and criteria apply to U.S. military and civilian personnel, contractors involved in management, and operations involving the manufacturing, assembly, testing, ordnance assessment, siting, handling, transportation, and storage of explosive materials. The goal is to minimize risk of incidents that might severely impact the operational readiness and capabilities of the fleet and supporting infrastructure.

Additionally, the public health and safety regulatory framework includes the application of USCG Inland Navigation Rules, 33 CFR parts 83–88. These rules apply to all vessels upon the inland waters of the United States and are designed to ensure safe operations within the confined spaces of inland waterways. The rules require that every vessel proceed at all times at a safe speed so that it can take proper and effective action to avoid collision. Vessels must also maintain a look-out by sight and hearing as well as by all available means appropriate to make a full appraisal of the situation. Additionally, vessels must use all available means appropriate to determine if a risk of collision exists, and if so, make every appropriate attempt to avoid such collisions.

3.6.3 Regional Conditions

For Navy installations, all training areas are located within their respective installation boundary and are off-limits to the general public. All training is conducted in accordance with established safety procedures, as discussed in Section 3.6.1.1 (Common Safety Practices). During training, the Navy establishes safety zones in beach areas to exclude all non-participants, including the general public.

For non-installation training locations, Navy training event activities are consistent with activities also conducted by the public such as physical fitness along trails at First Landing State Park and vessel movement along the Southern Branch of the Elizabeth River. No officially designated ranges, surface danger zones, or restricted areas are associated with the Southern Branch of the Elizabeth River and the area is open to the public. All training on the Southern Branch of the Elizabeth River is conducted according to procedures previously described for safe vessel operation, and for the blank-fire portion of the exercise, Navy personnel verify that the training area is safely clear of non-participating personnel or the general public before commencing blank-fire operations.

The Navy's Fire and Emergency Services Department operates on every Navy facility within the region of influence, and responds to every emergency. The on-site Senior Fire Officer has the full authority to

organize the initial emergency response actions related to fires, hazardous material spills, or other emergency situations, and also has the decision authority in all matters of safety and human welfare.

All Navy initial emergency response and cleanup actions are performed by the facility response team, which consists of the Fire Department personnel and trained facility personnel on scene. These trained employees are required to meet various Navy and Occupational Safety and Health Administration training standards for all response operations.

If a significant fire or other incident were to occur, Navy response actions would be coordinated in accordance with local civilian emergency planning committee response plans. This would be accomplished as part of existing reciprocal agreements between surrounding jurisdictions and the installations to provide supplemental Fire and Emergency Services assistance when requested by either the jurisdiction or the installation. Available responding agencies include law enforcement, emergency medical services, fire services, local environmental agencies, health care, media, industry, and local officials.

The Navy Safety Center's Data Management and Analysis Department coordinates the Navy Safety Center's efforts in collecting, checking, retrieving and analyzing mishap and hazard data to enhance command culture, combat readiness and global war-fighting capabilities by saving lives and preserving resources through risk identification and mishap prevention. A safety database query of events involving small vessels in Hampton Roads over the past five years, revealed 77 mishap events. Small vessel mishaps often involved military personnel injury during slips, trips, and falls, and frequently occurred during high sea state conditions or otherwise during the course of conducting realistic training exercises. There were no recorded mishap events involving the interaction of Navy vessels with public or civilian vessels in the Hampton Roads area, to include the Southern Branch of the Elizabeth River (Navy, 2017g).

3.7 Hazardous Materials and Waste

3.7.1 Definition of the Resource

Hazardous materials (substances) are defined under various federal statutes, including the CAA (42 U.S.C. section 7412), Toxic Substances Control Act (15 U.S.C. section 2606), and the CWA (33 U.S.C. section 1317(a)). They are generally considered to be any substances that, due to quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health, welfare, or the environment. Examples of hazardous materials include petroleum products/fuels and paint-related products. Hazardous waste is a solid waste as defined in 40 CFR section 261.3 that exhibits either a specific characteristic or is listed as defined in 40 CFR section 261.3. Examples include waste solvents, contaminated fuels, or oil-based paint wastes.

This category also includes reactive hazardous waste, which includes military munitions-related wastes presenting an explosive hazard.

Under the Resource Conservation and Recovery Act, the Military Munitions Rule identifies when conventional and chemical military munitions are considered solid waste. Military munitions are not considered solid waste based on two conditions stated in 40 CFR section 266.202(a)(1)(i-iii). Specifically, munitions are not considered hazardous waste when they are (1) used for their intended purpose, including training of military personnel and explosive emergency response specialists, research and development activities, and recovery, collection, and destruction during range clearance events and

(2) unused and being repaired, reused, recycled, reclaimed, disassembled, reconfigured, or subjected to other material recovery activities. These two conditions cover the uses of munitions included in the Proposed Action; therefore, the Resource Conservation and Recovery Act does not apply.

In addition, routine vehicle and vessel maintenance is conducted at the homebase installations and is not part of Proposed Action training events. As a result, hazardous waste that may be generated as part of maintenance activities is conducted in compliance with installation plans and permits and, therefore, hazardous waste is not discussed further.

This section also addresses hazardous constituents (primarily metals) that could be released from ordnance used in firing range or field training activities, as well as management and reporting activities related with these constituent releases.

Hazardous constituents generally can be defined as hazardous materials present at low concentrations in a generally non-hazardous matrix, such that their hazardous properties do not produce acute effects. Expended training material such as targets and detonation residues can release hazardous constituents to the environment upon use. Hazardous constituents are commonly found in the explosive, propellant, and pyrotechnic elements of munitions. In addition to the hazardous constituents from energetic chemicals, hazardous constituents may also leach from solid components of munitions, such as small arms ammunition. Munitions constituents associated with energetic chemicals typically include nitroamines such as cyclotrimethylenetrinitramine and nitroaromatics such as trinitrotoluene. (Compound C4 is primarily composed of cyclotrimethylenetrinitramine.) During detonation, most of the munitions constituents are consumed, resulting in the generation of small quantities of gaseous products (i.e., carbon monoxide, carbon dioxide, steam, and nitrogen). Solid residues (e.g., scrap metals and plastics) may also be generated from the body of the munition or from the devices used to trigger the energetic materials. The constituents associated with small arms ammunition commonly used at operational ranges include lead, antimony, copper, and zinc.

Proposed activities may also impact existing U.S. Navy Environmental Restoration Program (ERP) sites. The ERP is used by the Navy to identify, characterize, clean up, and restore sites contaminated with toxic and hazardous substances, low-level radioactive materials, petroleum, oils, lubricants, or other pollutants and contaminants. The ERP has established a process to evaluate past disposal sites, control the migration of contaminants, identify potential hazards to human health and the environment, and remediate the sites.

3.7.1.1 Common Hazardous Material and Waste Practices

The following elements regarding the management of hazardous materials and wastes are common for all Navy activities in the study area.

The Navy requires that all hazardous materials be labeled, handled, stored, transported, issued, tracked, used, and disposed of in a manner compliant with Occupational Safety and Health Administration requirements, and other applicable regulations. To facilitate this process, Navy installations use the Consolidated Hazardous Material Reutilization and Inventory Management Program (CHRIMP). Under the CHRIMP, all hazardous materials are centrally controlled and issued to work centers on an as-needed basis. Serviceable, partially used, or excess materials are returned for potential redistribution, reuse, recycling, or as a last resort for disposal. The CHRIMP also supports shelf-life management and

extension and transfer of unused new stock to other Navy work centers or DoD commands in lieu of disposal.

The Navy has implemented spill prevention, control, and countermeasure plans (where appropriate). These plans contain specific guidelines to minimize the potential release of fuel and other hazardous materials. They include preventative measures, such as requirements for secondary containment, control of drainage from containment areas, corrosion protection of buried metallic tanks and piping, inspection and integrity testing of tanks and piping, security requirements for oil storage areas, and personnel training requirements. They also contain specific requirements for responding to and mitigating any releases. The Personal Watercraft Norfolk Oil Recovery Team, located at Naval Station Norfolk, maintains a full-time oil spill response staff and equipment capable of containing and cleaning up an oil spill. In the event of a large oil spill, the recovery team can call upon other local Navy facilities or a commercial contractor.

3.7.2 Regulatory Framework

The following federal laws and regulations pertain to the management of hazardous materials and hazardous wastes:

Comprehensive Environmental Response, Compensation, and Liability Act. The law was enacted in 1980 and focuses on closed waste site problems, spill responses, issues of liability, and cleanup funding. This law was reauthorized in 1986 by the Superfund Amendments and Reauthorization Act and is codified in 40 CFR parts 350–372.

Resource Conservation and Recovery Act. The law was enacted in 1976 and is codified in 40 CFR parts 146, 148, and 260–299. These parts regulate facilities that manage and/or dispose of hazardous wastes.

Hazardous Material Transportation Act. The law was enacted in 1975 and is codified in 49 CFR parts 106–180. These parts prescribe the requirements of the Department of Transportation governing the transportation of (including hazardous wastes) by rail car, aircraft, vessel, and motor vehicle.

Military Munitions Rule (62 FR 6621, February 12, 1997). The regulations became effective (under the Resource Conservation and Recovery Act) on August 12, 1997. These regulations define when military munitions become waste and how these will be managed.

On a state level, Virginia has been delegated Resource Conservation and Recovery Act authority for hazardous waste management. The Virginia DEQ maintains some state-specific hazardous management requirements and has adopted almost all of the federal regulations for hazardous treatment, storage, and disposal. A permit is required for facilities that treat, store (long term), and/or dispose of hazardous waste.

The Navy has also developed various guidance documents for the proper management of hazardous materials and hazardous wastes:

Office of the Chief of Naval Operations Manual 5090.1, *Environmental Readiness Program Manual*. This manual implements the policy set forth in Chief of Naval Operations Instruction 5090.1D, Environmental Readiness Program. The manual contains the Navy's policy guidance for environmental readiness. It discusses requirements, delineates responsibilities, and issues policy guidance for the management of the environmental, natural, and cultural resources for all Navy ships and shore activities.

Hazardous Materials Minimization, Hazardous Waste Reutilization, and Disposal Guide. This guide is to communicate regulatory requirements and management procedures relevant to the utilization of hazardous materials, and minimization and disposal of hazardous waste for Navy installations located within the Hampton Roads area.

Office of the Chief of Naval Operations Instruction 5100.23G, *Navy Safety and Occupational Health Program Manual*. This instruction formally implements the Navy Occupational Safety and Health Program and addresses issues related to the hazard communications program and exposure to hazardous materials in the workplace.

Naval Sea Systems Command Operating Procedure 5, Volume 1, Seventh Revision, Change 10, *Ammunition and Explosives Ashore, Safety Regulations for Handling, Storing, Production, Renovation, and Shipping*. This manual acquaints personnel engaged in operations that involve ammunition, explosives, and other hazardous materials (including associated chemicals and raw materials) with the characteristics and hazards of these items and specifies standardized safety regulations for the research, development, production, renovation, care, handling, storage, preparation for shipment, and disposal of these items.

3.7.3 Joint Expeditionary Base Little Creek

From a management/regulatory perspective, JEB Little Creek and JEB Fort Story are considered as one installation, and, therefore, the discussion herein applies also in Section 3.7.4 (JEB Fort Story).

3.7.3.1 Hazardous Materials

All hazardous materials at JEB Little Creek are purchased, stored, used, and disposed of in compliance with applicable regulations and procedures. JEB Little Creek has also implemented standard spill plans and procedures to prevent the release of hazardous materials, or to respond and contain a spill should one occur.

3.7.3.2 Hazardous Constituents

At JEB Little Creek, hazardous constituents may be generated as a result of small arms qualification and marksmanship training at the Rodriguez range (blank and live rounds). The most common ammunition used at the range includes 5.56 mm, 9 mm, and 12-gauge shotgun ammunition. While the Rodriguez range is within JEB Little Creek and its activities contribute to the affected environment, small arms range training is not within the scope of this EA.

Primary chemical constituents from ammunition training are associated with brass casings and lead bullets (for live rounds), and include copper, lead, and zinc. Smaller quantities of non-hazardous solid waste, such as plastic, paper, scrap metal, etc., may also be generated depending on the type of ordnance used. Established procedures require that metallic debris (e.g., brass casings) be collected after training. These items are sent off for recycling and not disposed of as solid waste. Additionally, periodic range clearances are conducted on small arms ranges to collect and dispose of lead rounds.

Releases to the environment from ordnance utilized in proficiency and qualification training require reporting to USEPA under the Emergency Planning and Community Right-to-Know Act Toxic Release Inventory (TRI) program. The Navy has established procedures to comply with Toxic Release Inventory reporting requirements and tracks all ordnance use on its ranges. Table 3.7-1 presents the quantity of

lead (the only chemical that exceeded applicable thresholds) reported under TRI during calendar year 2015 (latest available year) at JEB Little Creek-Fort Story.

Table 3.7-1. Reported Chemical Releases During 2015 for JEB Little Creek and JEB Fort Story

Location	*Total On-site Disposal or Other Releases (lead) (pounds)*	*Total Off-site Disposal or Other Releases (lead) (pounds)*
JEB Little Creek	230	14,099
JEB Fort Story	524	27

Source: (USEPA, 2016h)

3.7.3.3 Environmental Restoration Sites

Various facility-wide studies and investigations have been completed at JEB Little Creek-Fort Story in response to the Navy's ERP. A total of 140 potentially contaminated sites, areas, Solid Waste Management Units, or Military Munitions Response Program sites at JEB Little Creek-Fort Story have been identified for evaluation. The following five sites at JEB Little Creek overlap proposed training area: Site 9 (Driving Range Landfill), Site 10 (Sewage Treatment Plant), Solid Waste Management Unit 120 (VC-6 Satellite Accumulation Area), Solid Waste Management Unit 7B (Small Boats Sandblast Yard), and 134 (Portable Waste Oil Tanks). All have received regulatory closure, although Site 9, Site 10, and Solid Waste Management Unit 7A/B have land use controls associated with them. The controls prohibit digging into or disturbing the existing soil cover, prohibit residential development on the site, and prohibit use of the shallow aquifer groundwater beneath the sites other than for environmental monitoring and testing (Landin, 2016).

3.7.4 Joint Expeditionary Base Fort Story

3.7.4.1 Hazardous Materials

From a management/regulatory perspective, JEB Little Creek and JEB Fort Story are considered as one installation, and, therefore, the discussion in Section 3.7.3.1 (JEB Little Creek, Hazardous Materials) applies for JEB Fort Story.

3.7.4.2 Hazardous Constituents

JEB Fort Story employs similar types of ordnance as at JEB Little Creek as part of training on the explosives training areas, and are managed under the same system.

Primary chemical constituents from ammunition training are associated with brass casings and lead bullets (for live rounds), and include copper, lead, and zinc. Smaller quantities of non-hazardous solid waste, such as plastic, paper, scrap metal, etc., may also be generated depending on the type of ordnance used. Established procedures require that metallic debris (e.g., brass casings) be collected after training. These items are sent off for recycling and not disposed of as solid waste; however, it is not possible to collect lead rounds from live-fire training as these are released on the range. As noted in the JEB Little Creek discussion, small arms range training is not within the scope of this EA.

Releases to the environment from ordnance utilized in proficiency and qualification training require reporting to USEPA under the Emergency Planning and Community Right-to-Know Act TRI program. The Navy has established procedures to comply with TRI reporting requirements and tracks all ordnance use on its ranges. Table 3.7-1 presents the quantity of lead (the only chemical that exceeded applicable thresholds) reported under TRI during calendar year 2015 (latest available year) at JEB Little Creek-Fort Story.

3.7.4.3 Environmental Restoration Sites

As previously stated, investigations at JEB Little Creek-Fort Story have identified a total of 140 potentially contaminated sites. At JEB Fort Story, the following five sites overlap proposed training areas: UXO 0002S (Small Arms Range), Site 3S (Landfill 02), Site 4S (Landfill 03/Pond), Site 6S Reserve Site (JP-4 Fuel Tank Farm), and Site 11S (80th Division Reserve Site). Land use controls associated with restoration sites prevent digging or contact with groundwater resulting from digging without proper controls in place. Additionally, at Site 11S, the withdrawal of groundwater is prohibited except for environmental monitoring and testing (Landin, 2016).

3.7.5 Dam Neck Annex and Camp Pendleton

3.7.5.1 Hazardous Materials

At Dam Neck Annex and Camp Pendleton, hazardous materials are not stored at training locations that are included in the analysis for this EA. Hazardous materials that may be used during training (e.g., fuels contained in vehicles or equipment) are managed in accordance with all applicable regulatory requirements, including having appropriate spill response equipment in case of any releases.

3.7.5.2 Hazardous Constituents

Hazardous constituents are primarily generated as a result of small arms qualification and marksmanship training at the Camp Pendleton, Baum Village, and Dam Neck Annex, North Beach training areas. The most common ammunition used at these locations includes primarily blank 5.56 mm and 7.62 mm rounds. Established procedures require that metallic debris (e.g., brass casings) be collected for recycling after training. Other non-hazardous debris is disposed of as solid waste. Table 3.7-2 presents the quantity of lead (the only chemical that exceeded applicable thresholds) reported under TRI during 2015 (latest available year) at Camp Pendleton and Dam Neck Annex.

Table 3.7-2. Reported Chemical Releases During 2015 for Camp Pendleton

Location	*Total On-site Disposal or Other Releases (lead) (pounds)*	*Total Off-site Disposal or Other Releases (lead) (pounds)*
Camp Pendleton (Ranges)[1]	167	-
Dam Neck Annex	13,113	2,586

Source: (USEPA, 2016h)

1. Small arms range training is not within the scope of this EA but range activities contribute to the affected environment.

3.7.5.3 Environmental Restoration Sites

Investigations have identified no ERP sites at Dam Neck Annex; however, eight Military Munitions Response Program sites have been identified. Six of these sites have been found to require No Further Action, with two sites requiring further investigation (Skeet and Trap Range and Moving Target/Mortar Range-South) (Navy, 2017h). These two sites requiring further investigation do not overlap with any training locations that are included in the analysis for this EA. No ERP sites are located at Camp Pendleton.

3.7.6 Naval Auxiliary Landing Field Fentress

3.7.6.1 Hazardous Materials

At NALF Fentress, hazardous materials are not stored at training locations that are included in the analysis for this EA. Hazardous materials that may be used during training (e.g., fuels contained in vehicles or equipment) are managed in accordance with all applicable regulatory requirements, including having appropriate spill response equipment in case of any releases.

3.7.6.2 Hazardous Constituents

Hazardous constituents are primarily generated as a result of small arms training around bunker training areas. The most common ammunition used at these locations includes 5.56 mm and 9 mm blank or marking rounds. Blank and marking rounds do not contain lead bullets, and brass casings are collected for recycling; consequently, NALF Fentress does not have any chemicals that exceeded TRI reporting thresholds.

3.7.6.3 Environmental Restoration Sites

Previous investigations indicated no further action was necessary at NALF Fentress ERP sites; however, based on the Assistant Secretary of the Navy, Energy, Installations and Environment's October 2014 statement, Sites 14 and 17, in addition to several other potential source areas at NALF Fentress, were identified for further evaluation. These potential sites include current and historical firefighting training areas, historical crash or abandoned aircraft sites, and current and historical wastewater irrigation fields. Additionally, two Military Munitions Response Program sites have been identified. Of these, the Machine Gun Boresight Range overlaps proposed training locations. Potential sources of contamination present at the former range are debris related to small-arms firing range ammunition, and potential munitions constituent associated with these types of ammunition are composed of lead, antimony, arsenic, copper, nickel, and zinc. Further investigations have been recommended to identify potential risks associated with this site (Navy, 2017h).

3.7.7 Northwest Annex

3.7.7.1 Hazardous Materials

At Northwest Annex, hazardous materials are not stored at training locations that are included in the analysis for this EA. Hazardous materials that may be used during training (e.g., batteries) are managed in accordance with all applicable regulatory requirements, including having appropriate spill response equipment in case of any releases.

3.7.7.2 Hazardous Constituents

Hazardous constituents are primarily generated as a result of small arms training at the U.S. Marine Corps small arms range; range activities contribute to the affected environment but are not part of the scope of the EA. The most common ammunition used at this location includes 7.62 mm and .50-caliber ball and tracer ammunition, as well as 40 mm practice and high explosive grenades. Established procedures require that metallic debris (e.g., brass casings, scrap metal) be collected for recycling after training. Other non-hazardous debris is disposed of as solid waste. Table 3.7-3 presents the quantity of lead (the only chemical that exceeded applicable thresholds) reported under TRI during 2015 (latest available year) at Northwest Annex.

Table 3.7-3. Reported Chemical Releases During 2015 for Northwest Annex

Location	*Total On-site Disposal or Other Releases (lead) (pounds)*	*Total Off-site Disposal or Other Releases (lead) (pounds)*
Northwest Annex Range[1]	12,677	9

Source: (USEPA, 2016h)

1. Small arms range training is not within the scope of this EA but range activities contribute to the affected environment.

3.7.7.3 Environmental Restoration Sites

Investigations have identified no ERP sites at Northwest Annex; consequently, these are not discussed.

3.7.8 St. Juliens Creek Annex

3.7.8.1 Hazardous Materials

At St. Juliens Creek Annex, hazardous materials are not stored at training locations that are included in the analysis for this EA. Hazardous materials that may be used during training (e.g., fuels contained in vehicles or equipment) are managed in accordance with all applicable regulatory requirements, including having appropriate spill response equipment in case of any releases.

3.7.8.2 Hazardous Constituents

Hazardous constituents are primarily generated as a result of small arms training around bunker training areas. The most common ammunition used at these locations includes 5.56 mm, 7.62 mm and 9 mm blank rounds. Blank rounds do not contain lead bullets, and brass casings are collected for recycling; consequently, St. Juliens Creek Annex did not have any chemicals that exceeded TRI reporting thresholds.

3.7.8.3 Environmental Restoration Sites

Investigations at St. Juliens Creek Annex have identified 59 potentially contaminated sites, Military Munitions Response Program sites, Solid Waste Management Units, and Areas of Concern have been identified for evaluation at St. Juliens Creek Annex. Four sites are currently active: ERP Sites 2, 4, and 21, and Military Munitions Response Program Area unexploded ordnance 1. Fifty-five sites have been categorized as requiring No Further Action. Only two sites, Site 3 (Rubbish/Ash Fill Dump C) and Site 5 (Waste Ordnance Burn Ground), overlap proposed training locations. Site 3, which was used as a historical landfill, has received regulatory closure. Site 5 was used from the 1930s to the 1970s to dispose of waste ordnance materials by open burning. Tetryl, trinitrotoluene, asbestos, fuzes, solvents, paint sludge, pesticides, and various types of refuse were also disposed of at the site. The site has undergone various investigations and removal actions, with the latest removal action completed in 2012. Post-removal reporting and regulatory closure actions are ongoing (Navy, 2017a).

3.7.9 Naval Weapons Station Yorktown

3.7.9.1 Hazardous Materials

NWS Yorktown stores or uses a large variety of products containing hazardous materials that are associated with day-to-day operations and maintenance activities. All hazardous materials at NWS Yorktown are purchased, stored, used, and disposed of in compliance with applicable regulations and procedures. NWS Yorktown has also implemented standard spill plans and procedures to prevent the release of hazardous materials, or to respond and contain a spill should one occur.

3.7.9.2 Hazardous Constituents

Hazardous constituents are primarily generated as a result of small arms training at the Home Station Training Lanes and the EOD Demolition Lane. The most common ammunition used at these locations includes 7.62 mm and .50-caliber blank rounds, 9 mm and 5.56 mm blank and live rounds (live-fire range activities contribute to the affected environment but are not part of the scope of the EA), smoke hand grenades, 12-gauge shotgun shells, and small explosive charges. Established procedures require that metallic debris (e.g., brass casings) be collected for recycling after training. Other non-hazardous debris is disposed of as solid waste. Table 3.7-4 presents the quantity of lead (the only chemical that exceeded applicable thresholds) reported under TRI during 2015 (latest available year) at NWS Yorktown.

Table 3.7-4. Reported Chemical Releases During 2015 for NWS Yorktown

Location	*Total On-site Disposal or Other Releases (lead) (pounds)*	*Total Off-site Disposal or Other Releases (lead) (pounds)*
NWS Yorktown[1]	394	11

Source: (USEPA, 2016h)

1. Small arms range training is not within the scope of this EA but range activities contribute to the affected environment.

3.7.9.3 Environmental Restoration Sites

A 1994 investigation identified 16 sites for remedial investigation and 19 Site Screening Areas. Subsequently, six additional Site Screening Areas were identified for consideration under Comprehensive Environmental Response, Compensation, and Liability Act (Navy, 2017i). Based on these investigations, Site Screening Area 1 (currently Site 23), Site Screening Area 6 (currently Site 24), Site Screening Area 7 (currently Site 25), Site Screening Area 10 (currently Site 28), Site Screening Area 16 (currently Site 16), Site Screening Area 18 (currently Site 26), Site Screening Area 20 (currently Site 29), and Site Screening Area 24 (currently Site 30) were determined to warrant remedial investigation/ feasibility study efforts. The investigations also identified 21 Area of Concerns. With the exception of Areas of Concern 5, 6, and 7, the Navy in partnership with USEPA and the Virginia DEQ agreed that no action was warranted for all other Areas of Concern. However, one additional Area of Concern (Area of Concern 23, currently Site 31) was added in 2007. In addition, in 2007, the Navy initiated investigations of numerous Military Munitions Response Program sites including the Skeet Range. Investigations at these sites have been or will be conducted following Comprehensive Environmental Response, Compensation, and Liability Act guidance. In all, 63 contamination sites have been identified and investigated at the installation. Additionally, two unexploded ordnance sites have been identified. Of these, 45 have received regulatory closure with No Further Action required. The remaining sites are undergoing some level of additional investigation or monitoring (Navy, 2017i). Three of the sites overlap proposed training locations: Site Screening Area 00002 (Former EOD Burning/Disposal Area), Solid Waste Management Unit 00019 (Beaver Road/Ponds 11 & 12 Drainage Area) and Site 00024 (Aviation Field/Excavation). Only Solid Waste Management Unit 00019 has any land use controls/restrictions implemented, which prohibit the residential use of the area (Peed, 2016).

3.7.10 Cheatham Annex

3.7.10.1 Hazardous Materials

Cheatham Annex stores and uses a large variety of products containing hazardous materials as part of day-to-day operations and maintenance activities. All hazardous materials at Cheatham Annex are purchased, stored, used, and disposed of in compliance with applicable regulations and procedures.

Cheatham Annex has also implemented standard plans and procedures to prevent the release of hazardous materials, or to respond and contain a spill should one occur.

3.7.10.2 Hazardous Constituents

Hazardous constituents are primarily generated as a result of weapons firing of blanks at the Cargo Load Trainer, Field TAs, and the Pier, and the live firing of weapons at the Small Arms Training Center. The most common ammunition used at these locations includes 9 mm and 5.56 mm blank and 12-gauge shotgun shells. Established procedures require that metallic debris (e.g., brass casings) be collected for recycling after training. Other non-hazardous debris is disposed of as solid waste. Table 3.7-5 presents the quantity of lead (the only chemical that exceeded applicable thresholds) reported under TRI during 2015 (latest available year) at Cheatham Annex.

Table 3.7-5. Toxic Release Inventory Reported Chemical Releases During 2015 for Cheatham Annex

Location	*Total On-site Disposal or Other Releases (lead) (pounds)*	*Total Off-site Disposal or Other Releases (lead) (pounds)*
Cheatham Annex	3,687	228

Source: (USEPA, 2016h)

3.7.10.3 Environmental Restoration Sites

A total of 21 potentially contaminated locations (12 ERP sites and 9 Areas of Concern) have been identified at Cheatham Annex. Out of the 12 ERP sites, 9 have received regulatory closure with No Further Action required. Three sites (Site 4 -Outdated Medical Supply Disposal Area, Site 7 - Old DuPont Disposal Area, and Site 9 - Transformer Storage Area) are still undergoing investigation efforts. Two of the nine Areas of Concern were determined to be associated, and were grouped, with previously identified ERP sites, with the other seven Areas of Concern undergoing additional investigations. Additionally, one Military Munitions Response Program site (Marine Pistol and Rifle Range) was identified and determine to require No Further Action (Navy, 2017j).

Two sites, Area of Concern 9 (Penniman Lake Historical Industrial Areas) and Site 00012 (Disposal Site Near Water Tower) overlap proposed training areas (Navy, 2017j).

3.7.11 First Landing State Park

Navy operations are limited to personnel; therefore, issues related to hazardous waste and hazardous constituents would not apply and are not evaluated further. In addition, the Navy does not store or manage hazardous materials at this location; the VADCR manages hazardous materials and wastes generated during general park operations. No ERP sites are located at First Landing State Park.

3.7.12 Southern Branch of the Elizabeth River

Navy operations are limited to vessel operations; therefore, issues related to hazardous waste and hazardous materials would not apply and are not evaluated further. No ERP sites are located in the Southern Branch of the Elizabeth River.

Trace hazardous constituents can be generated as a result of small arms training using blank 5.56 mm, 7.62 mm, and 0.50-caliber rounds. Blank ammunition does not contain lead bullets, and brass casings are collected for recycling in most cases. During small arms training with blank ammunition on vessels,

most casings ejected from weapons fall into the vessel and are collected from within the vessel and sent off-site for recycling. Even with this collection, it is estimated that approximately 15 percent of the casings are released to the water in this training area. As noted in Section 3.2 (Water Resources), the Elizabeth River has been identified as one of the country's most polluted waterways based on the effects of past industrial activities and waste disposal practices; however, the sediments are not unacceptably contaminated. Regional efforts have resulted in improvements in water quality and the removal of contaminated sediments.

3.8 Socioeconomics

3.8.1 Definition of the Resource

This section focuses on commercial and recreational transportation and fishing along the Southern Branch of the Elizabeth River and recreational activities throughout the study area. Commercial and recreational transportation includes vessel movement in public waterways.

United States Fleet Forces military tactical vehicle operations in this EA primarily occur at training locations where the vehicles are based or the vehicles are off- and on-loaded from amphibious vessels. Occasionally, military tactical vehicle movement would occur between training locations. This vehicle movement would be conducted within the existing regional transportation infrastructure and represents a negligible number of vehicles within that system. In addition, the Department of Transportation typically incorporates into their NEPA documents all potential vehicles such as commercial, military, and personal that may use a particular public roadway. Therefore, on-road vehicle transportation is not carried forward in the discussion of commercial and recreational transportation.

3.8.2 Regulatory Framework

USACE maintains federal navigation channels, including navigation channels in many of the tributaries to the Chesapeake Bay such as the Southern Branch of the Elizabeth River. Therefore, maintenance activities are not discussed further in this section.

USCG Notices to Mariners. The USCG Notices to Mariners provide information to private and commercial vessels on temporary closures of waterspace areas. These navigational warnings are distributed by broadcast notices on maritime frequency radio, weekly publications by the USCG Navigation Center, and global positioning navigation charts. They provide information about the duration and location of closures due to activities that are potentially dangerous to surface vessels. Vessels are responsible for being aware of any Notices to Mariners that are in effect.

3.8.3 Regional Conditions

3.8.3.1 Commercial and Recreational Transportation and Fishing

The Atlantic Intracoastal Waterway "Route A" is locally known as the Albemarle and Chesapeake Canal Route. The channel traverses the Southern Branch of the Elizabeth River for 5.2 miles (i.e., one of the locations of Navy inland training events), the Virginia Land Cut (the Albemarle and Chesapeake Canal) for 8.3 miles, and North Landing River for 13.7 miles (USACE, 2000). The authorized depth is 12 feet. The Great Bridge Lock in Chesapeake, Virginia prevents salt water intrusion into the canal and North Landing River (USACE, 2000). The only segment of the Atlantic Intracoastal Waterway analyzed in this EA is the segment through the Southern Branch of the Elizabeth River.

Route A serves as the primary transportation link for the Atlantic Intracoastal Waterway system in this area. Navigation traffic is characterized by significant amounts of commercial and recreational activity. The majority of commercial traffic is regional for the Hampton Roads area and includes transport of sand, gravel, crushed rock, and petroleum products (USACE, 2000). Recreational vessel transportation has grown significantly as a direct result of the growth in population. The Southern Branch of the Elizabeth River along with the Albemarle and Chesapeake Canal route services both locally based recreation traffic and coastal traffic in route to destinations along the Atlantic and Gulf of Mexico coastlines.

Recreational fishing and crabbing occurs in all the waters of the Southern Branch of the Elizabeth River by boat and from shoreline locations. There are public marinas and boat ramps throughout the Elizabeth River, Albemarle and Chesapeake Canal, and North Landing River. Although fishing does occur in these waters, the Virginia Department of Health has issued fish consumption advisories to educate local fishermen. Due to polychlorinated biphenyls contamination, fishermen in the James River Basin, including the Southern Branch of the Elizabeth River are advised not to eat gizzard shad, carp, blue catfish, or flathead catfish. Fishermen in this basin are advised to reduce consumption of the following species of fish to two per month: blue catfish, flathead catfish, channel catfish, white catfish, largemouth bass, bluegill sunfish, American eel, quillback carpsucker, smallmouth bass, creek chub, yellow bullhead catfish, white perch, striped bass, bluefish, croacker, spot, blueback herring, and hickory shad. All other species should not be consumed but once per day due to kepone contamination. Also, specifically on the Southern Branch of the Elizabeth River, the public is advised not to eat the "mustard," green gland, tomalley portion of the blue crab due to polychlorinated biphenyls and dioxins contamination.

3.8.3.2 Recreational Activities

There are 36 State Parks in Virginia managed by the VADCR. The annual economic impact of Virginia State Parks is estimated at $208 million with an attendance record of over 8.99 million visitors (Progress Index, 2015). Local economies benefit greatly from state parks. In Virginia, every dollar of general fund money allocated to state parks in the state budget generates 12 dollars to local economies (VADCR, 2014).

The Hampton Roads region is a well-known tourism destination due to the abundant opportunities for recreational activities. Recreational activities throughout the region include hunting, golfing, fishing, swimming, wildlife viewing, hiking, camping, biking, and walking, amongst many other outdoor and indoor activities. Total tourism expenditures in the region have been estimated at $3.9 million, approximately 19 percent of the state's overall tourism expenditures (Virginia Tourism Corporation, 2013). The majority of visitors to the Hampton Roads region are likely to visit an ocean beach and a historical site. Well known historical attractions include Colonial Williamsburg, Historic Jamestown, Jamestown Settlement, Yorktown Battlefield, and the Yorktown Victory Center (Virginia Tourism Corporation, 2013). In addition, the region is home to the world's largest military presence and Naval base and offers a variety of military themed museums including the Nauticus, the Mariner's Museum, the Naval Shipyard Museum, Military Aviation Museum, and the Virginia War Museum amongst many others (Virginia Tourism Corporation, 2013).

The region has over 1.6 million residents with the most populous cities being Virginia Beach, Norfolk, and Chesapeake. The City of Virginia Beach is the most populated city in the Commonwealth of Virginia.

The City has approximately 29 miles of beaches and hundreds of hotels, motels, restaurants, golf courses, and a convention center. The City hosts a variety of recreational events including the Shamrock Marathon, North American Sand Soccer Championships, Boardwalk Art Show, East Coast Surfing Championships, Rock 'n' Roll Half Marathon, Neptune Festival, Naval Air Station Oceana Air Show, and Craft Beer Festival among many others. The City is also home to First Landing State Park, the state of Virginia's most popular park. The park borders JEB Fort Story along JEB Fort Story's southern and western boundaries and provides a variety of recreational activities including hiking and camping. First Landing State Park serves day visitors and campers. Park use by both user groups is greatest in the summer months with peak use in the month of July, when 200,000 day visitors and more than 25,000 campers may use the park (Ballard, 2013). Over 1 million people visit First Landing State Park every year. Facilities include a swimming beach on the Chesapeake Bay shoreline, boat ramp and canoe/kayak rentals, hiking and biking trails, 20 rental cabins, and campsites for tents and recreational vehicles (VADCR, 2015). Most of the camping and facilities are located at the west end of the park, along the Chesapeake Bay shoreline and immediately south of Route 60. Trails extend east throughout most of the parcel all the way to 64th Street and Atlantic Avenue, near the Atlantic ocean shoreline.

Other recreational areas in the Hampton Roads region include the Virginia Beach Oceanfront Resort Strip, Sandbridge Beach, soccer fields, baseball fields, golf courses, camps, and farms with festival events. In addition there are many state parks and natural areas including False Cape State Park, Paradise Creek Nature Park, Lake Tecumseh, Back Bay National Wildlife Refuge, and the North Landing River Ecological Reserve. False Cape State Park, south of Dam Neck Annex, is located in Virginia Beach. As one of Virginia's most remote state parks, it is only accessible by foot, bicycle, boat or seasonal tram from Back Bay National Wildlife Refuge. Recreational activities in the park include trail hiking and biking and boating. Paradise Creek Nature Park abuts the northeastern edge of the installation boundary of St. Juliens Creek Annex between the railroad tracks along the north site boundary and Paradise Creek, a tributary to the Southern Branch of the Elizabeth River. Lake Tecumseh, located along the southwestern boundary of Dam Neck Annex, provides recreational opportunities for boating, fishing, and wildlife viewing. Waterfowl hunting on the lake is managed by the Virginia Department of Game and Inland Fisheries, and the Hampton Roads Sanitation District, which owns the lake. The Back Bay National Wildlife Refuge, located near the southern end of Dam Neck Annex, provides public access to beach and Back Bay habitats for waterfront use, fishing, hunting, bicycling, hiking, educational programs, and wildlife viewing. The North Landing River Ecological Reserve is identified as a Special Interest Area in the NALF Fentress installation INRMP (Navy, 2017e). It is located at the northern-most limit of the NALF Fentress and abuts the North Landing River Preserve, which is composed of lands off the installation (Navy, 2017e). However, this portion of NALF Fentress is not currently managed for recreational use.

With the exception of the Cape Henry lighthouses on JEB Fort Story, which are open to visitors through JEB Fort Story security gates, recreational activities on Navy installations in the region are restricted to active and retired military personnel, DoD civilian employees, and families and guests of these authorized user groups. Recreational activities on Navy installations in the region typically consist of hunting (deer management program and small game), picnicking, wildlife watching, hiking, jogging, and camping. At Jones Pond on Cheatham Annex, recreational activities consist of fishing and primitive camping along the shorelines; the Navy hosts a bass fishing tournament at Jones Pond that is open to active duty, reservists, retirees, DoD civilians, and eligible family members. Some installations have additional restrictions on recreational opportunities such as at NALF Fentress in which recreation is limited due to mission constraints (Navy, 2017e). Recreational use of NALF Fentress is limited to hunting,

which is managed through a regulated hunting program for white-tailed deer, open to installation personnel, active-duty and retired military personnel and their families, current civilian employees of the installation, and escorted guests of these authorized user groups (Navy, 2017e). Recreational opportunities at NWS Yorktown are also limited to hunting for deer due to extensive restricted areas (Navy, 2010a). At Dam Neck Annex, hunting occurs on the installation but is limited to active duty and retired military personnel and their dependents, civilian employees of the Navy and their dependents, and reservists. Waterfowl hunting was formerly allowed on Redwing Lake but is no longer allowed due to military mission/safety requirements (Navy, 2017d).

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4 ENVIRONMENTAL CONSEQUENCES

This chapter presents an analysis of the potential direct and indirect effects of each alternative on the affected environment. The following discussion elaborates on the nature of the characteristics that might relate to resources. "Significance," as used in National Environmental Policy Act (NEPA) assessments, requires considerations of both context and intensity. Considering context means that the significance of an action must be analyzed in several contexts, such as society as a whole, the affected region, the affected interests, and the locality. Significance varies with the setting of a proposed action. Both short- and long-term effects are relevant (40 Code of Federal Regulations [CFR] section 1508.27). Intensity refers to the severity or extent of the potential environmental impact, which can be thought of in terms of the potential amount of the likely change. In general, the more sensitive the context, the less intense a potential impact needs to be in order to be considered significant. Likewise, the less sensitive the context, the more intense a potential impact would need to be in order to be considered significant.

The potential effects to each resource area were determined by reviewing the primary training event activities (PTEAs) and corresponding stressors at each training location for each alternative. As noted in Section 2.1 (Organization of Training Events for Analysis), the PTEAs may create one or more stimuli that cause stress on one or multiple resources. Not all stressors affect every resource area, and not all PTEAs produce every stressor. As a result, each resource area is only analyzed for stressors with potential impacts on that resource (Table 4-1).

Table 4-1. Stressor Potential to Impact Resource Areas

Resource Areas	*Potential Stressors*					
	Physical Disturbance	*Strike*	*Public Interaction*	*Noise*	*Ingestion*	*Pollutants*
Air quality						X
Water quality	X					X
Biological	X	X		X	X	
Cultural	X			X		
Ambient noise				X		
Public health and safety			X			
Hazardous materials/ hazardous waste						X
Socioeconomics			X	X		

For each applicable stressor, the summarized PTEAs for each alternative (Table 2-21) are included in tables at the beginning of the analysis discussion for each training location. As in Table 2-21, the No Action Alternative column on each stressor table includes the typical annual quantities of each PTEA at a training location. These values represent a continuation of the existing level and intensity of annual training. The potential impacts to each resource area are ongoing and reflected in the existing conditions within the study area. The Alternative 1 column on each stressor table in this chapter identifies the difference in annual quantity from the No Action Alternative. In a similar fashion, the Alternative 2 column on each stressor table in this chapter identifies the difference in annual quantity from Alternative 1. Alternative 1 and 2 impacts are compared to the No Action Alternative.

4.1 Air Quality

4.1.1 Overview

Effects on air quality are based on estimated direct and indirect emissions associated with the action alternatives. The region of influence for assessing air quality impacts is the air basin in which the project is located, the Hampton Roads Intrastate Air Quality Control Region.

Estimated emissions from a proposed federal action are typically compared with the relevant national and state standards to assess the potential for increases in pollutant concentrations. Training activities have the potential to release air pollutants into the environment. Emissions of criteria air pollutants may affect human health directly by degrading local or regional air quality or indirectly by their effects on the environment.

4.1.2 Methodology

The potential impacts of criteria air pollutants are evaluated by first estimating the emissions from training activities for each alternative (for details of emissions calculations see Appendix E, Air Quality Emissions Calculations). Emissions were estimated for beach landings, equipment use, explosives on land, vehicle movement, surface vessel movement, weapons-firing – blank-fire, and weapons-firing – non-lethal training ammunition.

Beach landings include the operation of amphibious assault craft on land. Operation of amphibious assault craft in the water is addressed in the Atlantic Fleet Training and Testing (AFTT) Environmental Impact Statement (EIS)/Overseas EIS. Amphibious assault craft on land includes the time on land during the training event as well as the time on land at JEB Little Creek for taxiing, fueling, and engine tests.

For purposes of this analysis, “equipment use” refers to the use of portable diesel generators to provide electricity in support of Navy training events at multiple locations within the region. Diesel generators are used in training events at multiple locations within the region.

Total emissions for each training area were then summed to arrive at the total emissions within the region. These estimates are then used to determine the potential impact of the emissions on the attainment status of the air quality control region. To accomplish this, the emissions associated with the Proposed Action training activities were compared with the total emissions on a pollutant-by-pollutant basis for the region of influence’s 2014 National Emissions Inventory data. Potential impacts to air quality were evaluated with respect to the extent, context, and intensity of the impact in relation to relevant regulations, guidelines, and scientific documentation.

Criteria and hazardous air pollutants are generated by the combustion of fuels in surface vessels, and by land and amphibious vehicles. They also are generated by the combustion of explosives and propellants in various types of munitions. Emissions of criteria hazardous air pollutants related to gasoline and diesel combustion are intermittent and dispersed over a relatively large training area. A quantitative evaluation of hazardous air pollutant emissions is not warranted as only small quantities of hazardous air pollutants are emitted into the lower atmosphere, which is well mixed. Additionally, mobile source air toxics are regulated under the Control of Hazardous Air Pollutants from Mobile Sources final rule (also known as the Mobile Source Air Toxics rule or MSAT2), which targets producers, refiners, and importers of fuel and manufacturers of engines and vehicles. There are currently no regulatory drivers for mobile source operation. The Hampton Roads region was classified in the second lowest tier for cancer and other health risks in the 2011 National Air Toxics Assessment (U.S. Environmental Protection

Agency [USEPA] (2015)). Since the potential for exposure is very low and the risk presented by the emissions is similarly very low, a quantitative evaluation was not performed. Appendix E (Air Quality Emissions Calculations), provides a more detailed discussion of emission factors used for each emissions source category and sample air emissions calculations.

Potential greenhouse gas (GHG) contributions to climate change were also included in the analysis. The primary source of carbon dioxide emissions would be fuel combustion from vessels and vehicle emissions during training activities. All climate change emissions were estimated and are presented as carbon dioxide equivalents.

4.1.3 Impacts Common to All Locations Under All Alternatives

Because air quality is evaluated on a regional basis, all impacts from air emissions would be common to all locations, as they are all within the Hampton Roads Intrastate Air Quality Control Region.

4.1.4 Regional Conditions

The PTEAs applicable to air quality in the region that contribute to the pollutant stressor include beach landings, equipment use, explosives on land, vehicle movements, vessel movements, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.1-1). All counties and cities within the Hampton Roads Intrastate Air Quality Control Region are classified as being in attainment; therefore, a General Conformity evaluation is not necessary.

4.1.4.1 No Action Alternative

Annual criteria pollutant emissions were calculated and compared to baseline levels in the region (Table 4.1-2). However, training events under the No Action Alternative have occurred in the region for several decades and are part of the existing baseline air quality in the region of influence.

Pollutants

Amphibious craft used for beach landings generate criteria air pollutants from fuel combustion of marine diesel fuel. The estimated hours of operation of multiple types of amphibious craft identified in Table 4.1-1 generate calculated annual emissions provided in Table 4.1-2. The highest criteria air pollutant generated from operation of amphibious craft during beach landings is nitrogen oxides at approximately 49 tons per year. Criteria air pollutants are generated from fuel combustion during diesel generator use. It is estimated that 200-horsepower generators run for a total of approximately 98,000 hours annually. One type of training (Unit Level Training [ULT] Surface/Air Cargo Handling) accounts for over 60 percent of these generator operation hours due to the use of 30 generators, operating 24 hours per day for 68 total training days each year at Cheatham Annex. These and other generators operate in multiple locations across the region of influence and at varying times, typically only for the needed duration during an exercise. Therefore, the pollutant emissions are temporary and spread across a relatively large geographical area and are not likely to contribute significantly to regional air quality.

Navy Explosive Ordnance Disposal (EOD) training includes approximately 2,020 detonations on land and occurs throughout the year. These detonations are typically small (approximately 1.25 pounds net explosive weight [NEW]) but would also include detonations up to 25 pounds NEW. EOD training primarily occurs at Joint Expeditionary Base (JEB) Little Creek, JEB Fort Story, and Naval Weapons Station (NWS) Yorktown. Criteria air pollutants are generated from detonated explosives. Emissions were calculated based on the number of annual detonations proposed in Table 4.1-1. Emission factors were obtained from the USEPA's AP-42, Fifth Edition, Volume I, Chapter 15: Ordnance Detonation.

Table 4.1-1. Regional Air Quality Stressors

Primary Training Event Activity	*Contributing platform, equipment, or weapon*	*Annual PTEA Quantity Associated with the Stressor*					
		No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
		No. of Events	*Pollutants*	*No. of Events*	*Pollutants*	*No. of Events*	*Pollutants*
Beach Landings	Amphibious Craft	12 (LCU/ LCM) 29 (LCAC)	24 hours (LCU/LCM); 835 hours (LCAC)	3 (LCAC)	8.6 hours (LCAC)		
Equipment Use (hours)	Mobile diesel generators	46	98,344 hours			4	6,300 hours
Explosives on Land (# of detonations/event and maximum NEW)	demolition materials and charge	212	• 80 events (average 8 detonations/event with maximum NEW of 1.25 pounds); • 28 events (1 detonation/event with maximum NEW of 1.25 pounds); • 104 events (average 13 detonations/ event with maximum NEW of 25 pounds)	558	• 240 events (average 9 detonations/event with maximum NEW of 0.2 pounds); • 240 events (average 13 detonations/event with maximum NEW of 1.25 pounds); • 76 events (1 detonation/event with maximum NEW of 1.25 pounds); • 2 events (2 detonations/event with a maximum NEW of 1.25 pounds)	56	• 56 events (1 detonation/event with maximum NEW of 1.25 pound)
Vehicle Movement (hours)	Tactical and non-tactical vehicles	2,171	74,011 hours	397	3,523 hours	61	6,602 hours

Table 4.1-1. Regional Air Quality Stressors [Continued]

Primary Training Event Activity	*Contributing platform, equipment, or weapon*	*Annual PTEA Quantity Associated with the Stressor*					
		No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
		No. of Events	*Pollutants*	*No. of Events*	*Pollutants*	*No. of Events*	*Pollutants*
Vessel Movement (hours)	Small vessels	30	1,980 hours				
Weapons Firing – Blank-Fire	small caliber	575	898,620 rounds	632	35,830 rounds	60	15,712 rounds
Weapons Firing – Non-Lethal Training Ammunition (# of rounds)	paintball gun	252	25,200 rounds	152	45,600 rounds	56	5,600 rounds

Key: NEW = net explosive weight; LCAC = Landing Craft, Air Cushion; LCU = Landing Craft, Utility; LCM = Landing Craft, Mechanized; PTEA = primary training event activity

Table 4.1-2. Virginia Capes Inland Training No Action Alternative Emissions

Primary Training Event Activity	*No Action Alternative*						
	Emissions (tons/year)						
	Criteria Pollutants						*GHGs*
	CO	*NO_x*	*PM_{10}*	*$PM_{2.5}$*	*SO_x*	*VOCs*	*CO_2e*
Beach Landings (amphibious craft)	7.87	49.20	1.85	1.85	16.47	1.50	8,889
Equipment Use	68.45	304.87	21.64	21.64	20.16	29.28	11,310
Explosives on Land	0.36	0.11	0.36	0.26	0.00	0.02	11
Vehicle Movement	4.76	2.91	0.12	0.08	0.02	0.67	1,859
Vessel Movement	2.78	27.13	0.65	0.65	4.04	1.11	1, 575
Weapons Firing – Blank-Fire	0.81	0.01	0.04	0.04	0.00	0.00	0.94
Weapons Firing – Non-Lethal training ammunition	NA	NA	NA	NA	NA	NA	0.01
TOTAL EMISSIONS	**85.04**	**384.23**	**24.67**	**24.52**	**40.69**	**32.58**	**23,645**
Region of influence total	*3,448*	*11,314*	*21,356*	*36,810*	*18,631*	*108,156*	*4,300,125*
Percentage of region of influence total	2.47%	3.40%	0.12%	0.07%	0.22%	0.03%	0.55%

Key: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NA = not applicable; NO_x = nitrogen oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; SO_x = sulfur oxides; VOC = volatile organic compound.

Vehicle movement includes operation of on-road and off-road tactical and non-tactical vehicles in support of training missions and troop transport throughout the region. In general, most of these vehicles use diesel fuel. Criteria air pollutants are generated from fuel consumption during vehicle operation. Emissions calculations assumed operations were split between 70 percent tactical and 30 percent non-tactical vehicles based on the training event descriptions (Appendix C, United States Fleet Forces Training Included in the Proposed Action and Alternatives), with the largest operating vehicle in each class used as the representative for each category. Light Service Support Vehicle, which is a large pickup truck, was assumed as the non-tactical vehicle and Mine-Resistant Ambush Protected vehicle was chosen as the tactical vehicle and represent the typical vehicles used in training events. Analysis assumed an average of 20 miles per hour speed and approximately 75,000 hours of operation (Table 4.1-1).

Vessel movement under the Proposed Action includes small vessel training operations. Annual hours of operation under the No Action Alternative are 1,980 hours and spread over 30 training events per year (Table 4.1-1). Vessel movement is limited to the Southern Branch of the Elizabeth River. Criteria air pollutants are generated from fuel consumption during vessel operation. To provide a conservative emissions estimate, calculations assumed the largest vessel in the small vessel class, the Riverine Command Boat, which is propelled by two 850-horsepower diesel motors.

Training operations at multiple locations across the region include small arms weapons firing with the use of blank ammunition. Because blank ammunition includes combustion of chemical material, and only lacks a projectile, there are still pollutant emissions associated with blank fire. Annual number of rounds used in all VITEA training is included in Table 4.1-1. Since actual ammunition types used may vary over time (from 5.56 millimeter [mm] up to .50 caliber), all weapons fire was assumed to be the largest (.50 caliber) in order to provide a conservative impact assessment.

Non-lethal weapons training under the No Action Alternative consist of training operations using non-lethal paintball guns and ammunition. These operations occur at multiple training locations within the region and occur throughout the year. Rather than a combustive propellant (as in traditional lethal weapons and ammunition), paintball guns use a pressurized gas in order to propel the projectile. Generally, either compressed air (which is primarily composed of nitrogen) or carbon dioxide is used as a propellant. While compressed air does not contain any pollutants of concern, carbon dioxide is evaluated as a GHG. Although carbon dioxide as a propellant has become less common in high-end paintball weaponry for a variety of reasons, it is possible that the Navy may use carbon dioxide as a propellant. Therefore, annual carbon dioxide emissions were calculated based on the number of rounds in Table 4.1-1 and assuming approximately 800 shots can be fired using 1 pound of compressed, liquid carbon dioxide. It should also be noted that actual emissions would be less if any/all of the weapons used in training use compressed air, which is likely.

No Action Alternative Air Quality Summary

A summary of the annual criteria pollutant and GHG emissions for Virginia Capes (VACAPES) inland training operations under the No Action Alternative are provided in Table 4.1-2. The highest criteria pollutant emissions are nitrogen oxides and carbon monoxide at 3.40 and 2.47 percent of the regional air emissions, respectively. As United States Fleet Forces (USFF) inland training has been ongoing for decades, regional emissions would remain consistent with existing conditions and no significant impacts are anticipated from the No Action Alternative. Any effects of the No Action Alternative on regional air quality are reflected in the current ambient criteria air pollutant concentrations in air quality control regions. The No Action Alternative is exempt from the federal General Conformity Rule, because all locations within the region of influence are currently in attainment for all criteria pollutants. However, annual emissions of criteria pollutants remain very low in comparison to the existing baseline conditions in the region.

GHG emissions represent approximately 0.55 percent of the regional GHG emissions, which is nominal. However, sea level rise and other climatological changes, such as increase in extreme weather events, may impact the Proposed Action over the long term.

4.1.4.2 Alternative 1

Alternative 1 includes the training events analyzed in the No Action Alternative plus the addition of six newly proposed events and a change in the annual frequency of one baseline event. The following analysis provides annual emissions calculations associated with the six newly proposed events and the change in the one baseline event. The resulting calculations represent the net change between Alternative 1 and the No Action Alternative.

Pollutants

Three additional beach landing training events that include amphibious craft would occur under Alternative 1 as compared to the No Action Alternative. Changes to the calculated annual emissions for the No Action Alternative due to Alternative 1 activities are provided in Table 4.1-3 and compared to the region of influence's baseline emissions. This represents a net change in emissions compared to the No Action Alternative, since the activities under the No Action Alternative have been ongoing for years and are included in the regional baseline emissions for comparison. While nitrogen oxides associated with these events would have the largest quantity of emissions, all emissions associated with these activities would be minimal at less than 1 ton annually for all criteria pollutants.

Table 4.1-3. Virginia Capes Inland Training Alternative 1 Emissions (Increase from No Action Alternative)

Primary Training Event Activity	*Alternative 1 (increase from No Action Alternative)*						
	Emissions (tons/year)						
	Criteria Pollutants						*GHGs*
	CO	*NO_x*	*PM_{10}*	*$PM_{2.5}$*	*SO_x*	*VOCs*	*CO_2e*
Beach Landings (amphibious craft)	0.08	0.49	0.02	0.02	0.16	0.02	89
Explosives on Land	0.05	0.01	0.05	0.03	0.00	0.00	1.45
Vehicle Movement	2.80	1.71	0.07	0.05	0.01	0.39	1,093
Weapons Firing – Blank-Fire	0.03	0.00	0.00	0.00	0.00	0.00	0.04
Weapons Firing – Non-Lethal Training Ammunition	NA	NA	NA	NA	NA	NA	0.03
TOTAL EMISSIONS	**2.96**	**2.22**	**0.14**	**0.10**	**0.18**	**0.41**	**1,184**
Region of influence total	*3,448*	*11,314*	*21,356*	*36,810*	*18,631*	*108,156*	*4,300,125*
Percentage of region of influence total	0.09%	0.02%	0.00%	0.00%	0.00%	0.00%	0.03%

Key: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NA = not applicable; NO_x = nitrogen oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; SO_x = sulfur oxides; VOC = volatile organic compound.

Equipment use and vessel movement under Alternative 1 would be the same as discussed under the No Action Alternative. No additional generator operations would be required.

Explosives operations under Alternative 1 would increase approximately 2.5 times over those discussed above for the No Action Alternative. These events would be distributed throughout the year and across several installations within the study area. Detonations annually, including NEW, are included in Table 4.1-1. Carbon monoxide and particulate matter less than or equal to 10 microns in diameter would be emitted in the greatest quantities, but annual emissions would be only approximately 0.05 tons per year greater than the No Action Alternative. Therefore, the less than 1 percent increase in emissions associated with these additional activities would be minimal.

Alternative 1 would include an increase of approximately 5,000 hours of vehicle operations as compared to the No Action Alternative. Vehicle movement would occur throughout the multiple training locations. Carbon monoxide and nitrogen oxides associated with the additional vehicle movement would be emitted in the highest quantities at 2.80 and 1.71 tons per year, respectively. All other criteria pollutants would emit less than 1 ton annually. Therefore, emissions associated with the additional vehicle movement would be minimal.

Under Alternative 1, weapon firing – blank-fire would include an additional 35,830 rounds expended annually (Table 4.1-1). However, since these rounds are small and only contain a very minute quantity of chemical material in each round, the overall impacts would be extremely minor. The only criteria pollutant with any noteworthy emission quantity is carbon monoxide, totaling only 0.03 ton per year. Therefore, emissions associated with increased blank fire would be nominal.

Implementation of Alternative 1 would nearly triple the total number of paintball rounds fired under the No Action Alternative. However, the number of training events would be distributed throughout the year and at multiple training locations. Despite, the increase in number of rounds, the total quantity of carbon dioxide emitted would remain extremely low.

Alternative 1 Air Quality Summary

To evaluate the potential environmental impacts, the net change in criteria air pollutant emissions in the region of influence under Alternative 1 were estimated, relative to their corresponding emissions under the No Action Alternative. A summary of the annual criteria pollutant and GHG emissions for VACAPES inland training operations under Alternative 1 are provided in Table 4.1-3. Emissions for all criteria pollutants represent minimal increases from the baseline levels. Emissions increases of the highest criteria pollutants are nitrogen oxides and carbon monoxide at 0.02 and 0.09 percent of the regional air emissions, respectively. Because the entire region of influence is in attainment, the General Conformity Rule does not apply under Alternative 1. However, it is noted that annual emissions of criteria pollutants would be well below the General Conformity *de minimis* thresholds (ranging from 50 to 100 tons per year for each criteria pollutant). The increases in emissions would not cause or contribute to a violation of any National Ambient Air Quality Standards, increase the frequency or severity of a violation of any ambient air quality standard, or expose populations to substantially increased pollutant concentrations. Therefore, under Alternative 1, there would be no significant impacts to air quality within the region.

GHG emissions would increase by approximately 0.03 percent, so climate change would be negligibly impacted by implementation of Alternative 1. A very minute change of this magnitude is not likely to have any impact on global climate change, sea level rise, or any potential impacts of climate change. However, sea level rise and other climatological changes, such as increase in extreme weather events, may impact the Proposed Action over the long term.

4.1.4.3 Alternative 2

Alternative 2 includes the same training that occurs in Alternative 1, plus the addition of three newly proposed training locations. The following analysis provides annual emissions calculations associated with training in these new locations. The resulting calculations represent the net change between Alternative 2 and the No Action Alternative.

Pollutants

Beach landings and on-land operation of amphibious vehicles under Alternative 2 would remain at the levels analyzed for Alternative 1. Similar to Alternative 1, three additional beach landing training events that include amphibious craft would occur under Alternative 2 as compared to the No Action Alternative. Annual emissions calculated for these additional beach landings are provided in Table 4.1-4 and compared to the region of influence's baseline emissions. This represents a net change in emissions compared to the No Action Alternative. The activities under the No Action Alternative have been ongoing for years and are included in the regional baseline emissions for comparison. While nitrogen oxides associated with these events would have the largest quantity of emissions, all emissions associated with these activities would be minimal at less than 1 ton annually for all criteria pollutants.

Under Alternative 2, equipment use in the form of diesel generator operations would increase by approximately 6,300 hours annually over the levels analyzed in the No Action Alternative. Operation of the diesel generators would occur throughout the region and be spread across any given year. Annual criteria pollutant emissions for equipment use were calculated and compared to baseline levels in the region (Table 4.1-4). For equipment use, nitrogen oxides and carbon monoxide would be emitted in the greatest quantities, totaling 19.53 and 4.21 tons annually, respectively. These levels are minimal, well below *de minimis* thresholds, and represent less than 1 percent of annual region of influence emissions.

Vessel movements under Alternative 2 would remain at the levels analyzed for the No Action Alternative.

Alternative 2 would add a small number of additional on-land detonations for EOD training over the amount under Alternative 1, resulting in 614 additional training events over the No Action Alternative (Table 4.1-1). The detonations would occur throughout the year. This level of training event increase would have a nominal impact on criteria pollutant emissions, with less than 0.05 ton of each criteria pollutant emitted annually.

Vehicle movement would increase by approximately 6,600 hours annually (Table 4.1-1) from the level analyzed in Alternative 1, or a total of 11,565 hours over the No Action Alternative. The additional vehicle movements would occur across multiple training locations. For vessel movement, nitrogen oxides and carbon monoxide would be emitted in the greatest quantities, totaling only 1.71 and 2.82 tons annually, respectively. Emissions associated with vehicle movement under Alternative 2 would therefore be minimal.

Under Alternative 2, non-lethal weapons training would increase over the level analyzed for Alternative 1 by approximately 5,600 rounds annually, or a total of 51,200 rounds over the No Action Alternative (Table 4.1-1). Because the propellant would likely be air or carbon dioxide, the assumption was made that all rounds would use carbon dioxide in order to provide the most conservative analysis. Actual emissions are likely to be lower than those shown in Table 4.1-4.

Table 4.1-4. Virginia Capes Inland Training Alternative 2 Emissions (Increase from No Action Alternative)

Primary Training Event Activity	***Alternative 2 (increase from No Action Alternative)***						
	Emissions (tons/year)						
	Criteria Pollutants						***GHGs***
	CO	***NO_x***	***PM_{10}***	***$PM_{2.5}$***	***SO_x***	***VOCs***	***CO_2e***
Beach Landings (amphibious craft)	0.08	0.49	0.02	0.02	0.16	0.02	89
Equipment Use	0.05	0.01	0.05	0.03	0.00	0.00	1.54
Explosives on Land	2.82	1.71	0.07	0.05	0.01	0.39	1,093
Vehicle Movement	0.45	0.26	0.01	0.01	0.00	0.06	166
Weapons Firing – Blank-Fire	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Weapons Firing – Non-Lethal Training Ammunition	**7.61**	**22.00**	**1.54**	**1.50**	**1.46**	**2.35**	**2,075**
TOTAL EMISSIONS	***0.05***	***0.01***	***0.05***	***0.03***	***0.00***	***0.00***	***1.54***
Region of influence total	*3,448*	*11,314*	*21,356*	*36,810*	*18,631*	*108,156*	*4,300,125*
Percentage of region of influence total	0.22%	0.19%	0.01%	0.00%	0.01%	0.00%	0.05%

Key: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gas; NO_x = nitrogen oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; SO_x = sulfur oxides; VOC = volatile organic compound.

Alternative 2 Air Quality Summary

To evaluate potential environmental impacts, the net change in criteria air pollutant emissions in the region of influence under Alternative 2 were estimated, relative to their corresponding emissions under the No Action Alternative. A summary of the annual criteria pollutant and GHG emissions for VACAPES

inland training operations under Alternative 2 are provided in Table 4.1-4. Emissions for all criteria pollutants represent minimal increases from the baseline levels. Emissions increases for nitrogen oxides and carbon monoxide would be the highest, at 0.19 and 0.22 percent, respectively. To evaluate potential environmental impacts, the net change in criteria air pollutant emissions in the region of influence under Alternative 2 were estimated, relative to their corresponding emissions under the No Action Alternative. Because the entire region of influence is in attainment, the General Conformity Rule does not apply under Alternative 2. However, it is noted that annual emissions of criteria pollutants would be well below the General Conformity *de minimis* thresholds (ranging from 50 to 100 tons per year for each criteria pollutant). The increases in emissions would not cause or contribute to a violation of any National Ambient Air Quality Standards, increase the frequency or severity of a violation of any ambient air quality standard, or expose populations to substantially increased pollutant concentrations. Therefore, under Alternative 2, there would be no significant impacts to air quality within the region.

GHG emissions would increase by 0.05 percent, so it is unlikely that climate change would be impacted to any appreciable extent by implementation of Alternative 2. A very minute change of this magnitude is not likely to have any impact on global climate change or any potential impacts of climate change.

4.2 Water Resources

4.2.1 Overview

The potential impacts to water resources from physical disturbance and pollutants are addressed for each of the 10 training locations within the study area.

The discussion in each training installation begins with identification of the specific training activities and the stressors with the potential to impact water resources. The No Action Alternative represents the existing training activities, and the training activities under Alternative 1 and Alternative 2 are either the same as, or an increase from the No Action Alternative.

As noted in Chapter 3 (Affected Environment), climate change may impact water resources in addition to the Proposed Action. Climate effects on water and sediment quality will depend on the complex interactions of fresh water and saltwater that drive bay circulation and stratification. Climate change may alter existing circulation and stratification patterns due to altered tidal forcing, freshwater outflow, and water density (a function of temperature and salinity). There is uncertainty in climate change effects on freshwater outflow in tributaries to the bay, which are likely to decrease in summer and increase in the winter and spring (Najjar et al., 2010). Decreased summer precipitation and warmer air and water temperatures would tend to enhance stratified conditions and worsen dissolved oxygen depletion that occurs seasonally in the Chesapeake Bay. Other water quality changes include increased variability in salinity and changes to current nutrient cycling processes (Najjar et al., 2010). Changes in water quality would affect biological conditions, including algae blooms and sea grass health, which in turn affect the success of higher aquatic biological species.

Physical effects on water resources and sediment from climate change include the likelihood of increased frequency and intensity of coastal storms, and higher sea level resulting in increased water depths. These factors will cause changes to storm-related circulation and sediment transport processes, with the potential for increased shoreline erosion and resuspension and distribution of bottom sediments (Wren & Leonard, 2005). Storm effects will be exacerbated by sea level rise, with future shoreline locations further upslope than current conditions.

Global or absolute sea level is rising in most locations due to an increase in the volume and water mass of the world's oceans, due to thermal expansion of warming sea water and contributions of water from melting ice masses. The National Research Council equations used by the U.S. Army Corps of Engineers (USACE) to address possible future sea level rise rates in civil works projects (USACE Circular 1165-2-212) describe a range of future scenarios: sea level rise continuing at current rates in a linear fashion (1.8 mm per year), the rate of sea level rise increasing over time in an exponential manner due to contributions of rapidly melting ice sheets, and the rate of sea level rise increasing even more dramatically due to different GHG emissions scenarios (USACE, 2011). Differences in the increase in global sea level from these three scenarios range from an increase of 0.5 to 1.5 meters by the year 2100. There is much uncertainty in these predictions but it is generally accepted that future conditions will reflect somewhere within this range of values (USACE, 2011).

Subsidence, or sinking, of land masses causes an increase in the relative sea level that will dramatically increase the overall effect of sea level rise in the Chesapeake Bay region. The mid-Atlantic region is experiencing subsidence as part of post-glacial tectonics, with potential localized effects due to sediment compaction (Boon et al., 2010). Implications are that regional subsidence will contribute to much more dramatic increases in sea level for southern bay shorelines, on the order of two to four times the global average sea level rise. This means normal tidal fluctuations will affect higher elevations along bay shorelines, and storm surge and storm wave effects will be superimposed on tidal data that are at higher shoreline elevations. This will dramatically increase existing shoreline erosion problems for both armored and unarmored bay shorelines.

4.2.2 Methodology

PTEAs and the associated stressors that could potentially affect water resources include pollutants and physical disturbance. Pollutants include contributions to stormwater runoff from vehicle, vessel, and equipment (i.e., diesel generators) fueling and maintenance operations, explosives training, and weapons firing. Physical disturbance includes soil disturbance from personnel and vehicle movement and vessels on seafloor/river bottoms. The potential impacts to water resources were determined by analyzing the relevant PTEAs and associated stressors at each training location.

Potential sources of pollutants and physical disturbance from the PTEAs are generally characterized for all locations in Section 4.2.3 (Impacts Common to All Locations Under All Alternatives). Site-specific factors relevant for the assessment of impacts on water and sediment quality are provided in Section 4.2.4 (JEB Little Creek) through Section 4.2.13 (Southern Branch of the Elizabeth River), which address each installation or training area.

4.2.3 Impacts Common to All Locations Under All Alternatives

Navy training (No Action Alternative) has been occurring in the region for decades and, as a result, any impact of that training to water resources is reflected in the affected environment. The continuation of that training as well as the potential additional training events would have some common impacts associated with the pollutants and physical disturbance stressors (Table 4.2-1) as discussed below.

4.2.3.1 Surface Waters

Physical Disturbance

Explosives on land occur within designated, bermed areas, with expended materials removed after training events (Figure 4.2-1). As a result, physical disturbance of soils is confined to the bermed area and stormwater runoff is prevented from entering surface waters due to the presence of the berm.

Figure 4.2-1. Explosive Ordnance Disposal Range 1 at JEB Fort Story

Pollutants

Pollutant contributions to stormwater runoff from vehicle, vessel, and diesel generators pertain to fuel storage, fueling, and maintenance operations, which would occur in existing facilities within the installations, all of which have existing stormwater management controls. Installations where vehicle and/or vessel maintenance and fuel storage/refueling are conducted are required to manage stormwater in accordance with Virginia Pollutant Discharge Elimination System permits and Storm Water Pollution Prevention Plans (SWPPP). These permits and plans are intended to manage pollutants in surface runoff and discharges through outfalls to protect water quality in the receiving waters. Existing permits for training locations are included in Table 3.2-1, Virginia Pollutant Discharge Elimination System Permits for Proposed Action Training Locations.

The primary water quality concerns for the entirety of the Chesapeake Bay and its tributaries pertain to dissolved oxygen, nutrients, and suspended sediment. None of the training activities (beach landings, personnel movement, and vehicle movement) included in the Proposed Action would increase contributions of nutrients or substances that would affect dissolved oxygen conditions (e.g., contributions of organic material) to stormwater or water resources located at/near the training sites. There are also tributaries and discrete embayments or beaches with localized impairments due to bacterial contamination. The Proposed Action would not include any increase or additions of sewage; all septic wastes will be handled by existing installation facilities, which are managed and/or regulated by applicable permits.

Table 4.2-1. Joint Expeditionary Base Little Creek Water Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Pollutants*	*No. of Events*	*Physical Disturbance*	*Pollutants*	*No. of Events*	*Physical Disturbance*	*Pollutants*
Land – Beaches/ Dunes	Beach Landings	amphibious and small vessels	50	348 landings							
	Explosives on Land	demolition materials and charge				2	2 events (2 detonations with a maximum NEW of 1.25 pounds)	2 events (2 detonations with a maximum NEW of 1.25 pounds)			
	Personnel Movement	NA	815	6,978 people		2	48 people				
	Vehicle Movement	tactical and non-tactical vehicles	815	3,560 hours		2	1 hour				
Land– Non-Beaches/ Dunes	Personnel Movement	NA	24	1,800 people							

Key: NA = not applicable; NEW = net explosive weight. Note: Additional training event details are in Appendix C.

Impacts to water resources from explosives and small arms training activities consist of the potential for unconsumed explosives and explosion byproducts, small arms munitions spent shells, and non-lethal training ammunition (paintballs) to land in surface waters. As discussed in Section 3.7 (Hazardous Materials and Waste), hazardous constituents are commonly found in the explosive, propellant, and pyrotechnic elements of munitions and may leach from solid components of munitions, such as small arms ammunition; these constituents are also referred to as munitions constituents. Expended brass casings and non-lethal training ammunition are removed from the training areas following each training event. The Proposed Action in this Environmental Assessment (EA) includes land detonation of explosives, only; underwater detonations in the VACAPES training area were evaluated in the AFTT EIS/Overseas EIS and are not addressed in this EA (AFTT EIS/Overseas EIS activities are included in the cumulative impact analysis.).

As noted in Section 3.7.1 (Hazardous Materials and Waste, Definition of the Resource), during detonations, most of the munitions constituents are consumed, resulting in the generation of small quantities of gaseous products (i.e., carbon monoxide, carbon dioxide, steam, and nitrogen). In addition, as detailed in Section 4.7 (Hazardous Materials and Waste), only a small percentage of munitions fail to detonate as designed. Navy safety policies in place require the documentation and notification of non-functioning munitions (duds); if multiple duds occur in one exercise, the exercise is halted (Jenkins & Vogel, 2014). As part of routine range clearance activities, unexploded ordnance items (or duds) present on the surface are destroyed. Additionally, Department of Defense (DoD) Directive 4715.11, Environmental and Explosives Safety Management on Operational Ranges Within the United States, requires all military ranges to be operated in ways that ensure their long-term viability to meet the national defense mission while protecting the environment. As such, Navy ordnance training activities are conducted under controlled conditions within bermed areas; these bermed areas contain the majority of the debris and eliminate the potential for materials to be carried off-site by rain events (Figure 4.2-1). In addition, range maintenance procedures remove and dispose of debris within these explosive training areas, further reducing the likelihood of transmission into nearby surface waters. Water and sediment quality effects from accumulations in surface waters located near the land-based explosives training areas would be undetectable based on the low number of explosives involved in the proposed training activities near water resources, the containment of detonation debris within bermed areas, and low incidence of incomplete detonations.

4.2.3.2 Shorelines

Physical Disturbance

The beach/dune training areas at JEB Little Creek, JEB Fort Story, and Dam Neck Annex and Camp Pendleton are within a coastal flood zone with velocity hazard. These shorelines are primarily impacted by wind and waves as part of a coastal environment. As a result, the physical disturbance associated with the PTEAs of beach landings, personnel movement, explosives on land, and vehicle movement do not impact the status of beach/dune training area shorelines as coastal flood zones; therefore physical disturbance of shorelines is only discussed for the Southern Branch of the Elizabeth River, which is not a coastal flood zone with velocity hazard.

Pollutants

All expended brass casings from weapons firing – blank-fire training are collected from shoreline/beach/dune areas as standard practice for each training event. As a result, there are no

potential pollutants that would impact shorelines and therefore, shoreline impacts are not discussed under the pollutants stressor.

4.2.3.3 Soils

Pollutants

As noted above in Section 4.2.3.1 (Surface Waters), unconsumed explosives and explosion byproducts, small arms munitions spent shells, and non-lethal training ammunition (paintballs) potentially impact land/soils; however, expended brass casings and non-lethal training ammunition are removed from the training areas following each training event. Explosions that occur are assumed to distribute nearly all explosion byproducts into the air (refer to Section 3.7, Hazardous Materials and Waste), with very small quantities of explosion byproducts subject to settling on nearby land and water surfaces. The detonation of explosives primarily produces water vapor, carbon dioxide, and nitrogen. In addition, carbon monoxide and nitrogen oxides may be formed. The quantities produced of these two toxic chemicals would be very small. For example, using USEPA's Toxic Release Inventory (TRI) program for estimation of emissions, the detonation of 1 pound of TNT (2,4,6-trinitrotoluene) would produce approximately 0.01 pound of carbon monoxide and nitrogen oxides. As a result, the potential for pollutants in soils is not carried forward for discussion.

4.2.3.4 Sediments

Physical Disturbance

Contributions to sediment disturbance resulting from physical disturbance associated with the proposed vessel traffic training activities are temporary. Based on the predominance of sandy substrates in the Southern Branch of the Elizabeth River, any sediments resuspended by vessels would quickly resettle in the water. In addition, training on beaches could result in sedimentation in the adjacent waterways; however, since the adjacent waterways already experience wave action and tidal changes, the addition of sand from physical disturbance of beaches would be expected in the daily disturbance of these areas from waves and tidal changes.

4.2.4 Joint Expeditionary Base Little Creek

The PTEAs applicable to water resources at JEB Little Creek that contribute to the physical disturbance stressor include beach landings, explosives on land, personnel movement, vehicle movement and that contribute to the pollutants stressor include explosives on land (Table 4.2-1). Figure 4.2-2 depicts the training areas and water resources.

4.2.4.1 No Action Alternative

4.2.4.1.1 Surface Waters

Physical Disturbance

Physical disturbance from beach landings, personnel movement and vehicle movement within training areas has been occurring for decades and do not significantly contribute to stormwater runoff. The beach/dune training areas are dominated by wind and wave action; most of the non-beach/dune training areas have a low to negligible potential for runoff. In addition, the non-beach/dune training areas are typically grass covered, which further minimizes soil disturbance.

Current water quality remains unchanged as a result of the No Action Alternative since the ongoing training activities have been influencing the existing condition of water resources. As noted in Section 3.2 (Water Resources), estuarine waters off of the Chesapeake Bay that include JEB Little Creek Harbor are impaired for fish consumption but have no impairment of aquatic life and no impairment of the 30-day dissolved oxygen standard occurs.

4.2.4.1.2 Wetlands

Physical Disturbance

Wetlands are present along the beach/dune training areas and adjacent to some non-beach/dune training areas. Beach landings and personnel movement, do not destroy or modify wetlands. Amphibious craft movement on land during beach landing activities occurs on the beaches and not within the dune areas. Vehicle movement occurs along existing pathways within these areas and therefore avoids wetlands.

4.2.4.1.3 Soils

Physical Disturbance

The beach/dune training areas are not mapped for soil type; however, they are sandy areas, highly impacted by wind and wave action. As a result, erosion does occur along the shoreline. The Navy manages this shoreline by identifying and implementing shoreline stabilization, as needed. Physical disturbance from beach landings, personnel movement, and vehicle movement may contribute to the erosion potential along the shoreline; however, this activity has been ongoing for decades and the Navy actively manages the shoreline. In addition, the beach/dune training areas are dominated by wind and wave action that restores these areas. Most of the non-beach/dune training areas are typically grass covered, which further minimizes soil disturbance. While some of the soils adjacent to the beaches/dunes and within non-beaches/dunes are rated “very limited” for military operations with heavy foot traffic (i.e., not remain firm), Navy training is designed to incorporate real world conditions, which may not be ideal and therefore, the soils do not present an inability for USFF training to occur.

4.2.4.2 Alternative 1

Under Alternative 1, beach landings would be the same as under the No Action Alternative at this location and, as a result, there would be no significant impacts on water resources from beach landings and is not discussed further in this section.

4.2.4.2.1 Surface Waters

Physical Disturbance

As noted in Section 2.3.1 (JEB Little Creek: Alternative 1 Training), EOD events currently occur at the beach/dune training area; however, USFF explosives used in land training events on beach/dune training areas would increase by two events per year with a maximum NEW of 1.25 pounds over the No Action Alternative. Explosive on land training events have been occurring for decades at this location and do not significantly contribute to stormwater runoff. The increase in explosive training events over the No Action Alternative would have no additional impact to surface waters. The potential impacts from physical disturbance are addressed in Section 4.2.3.1 (Impacts Common to All Locations Under All Alternatives, Surface Waters) and would apply to the increase in training events.

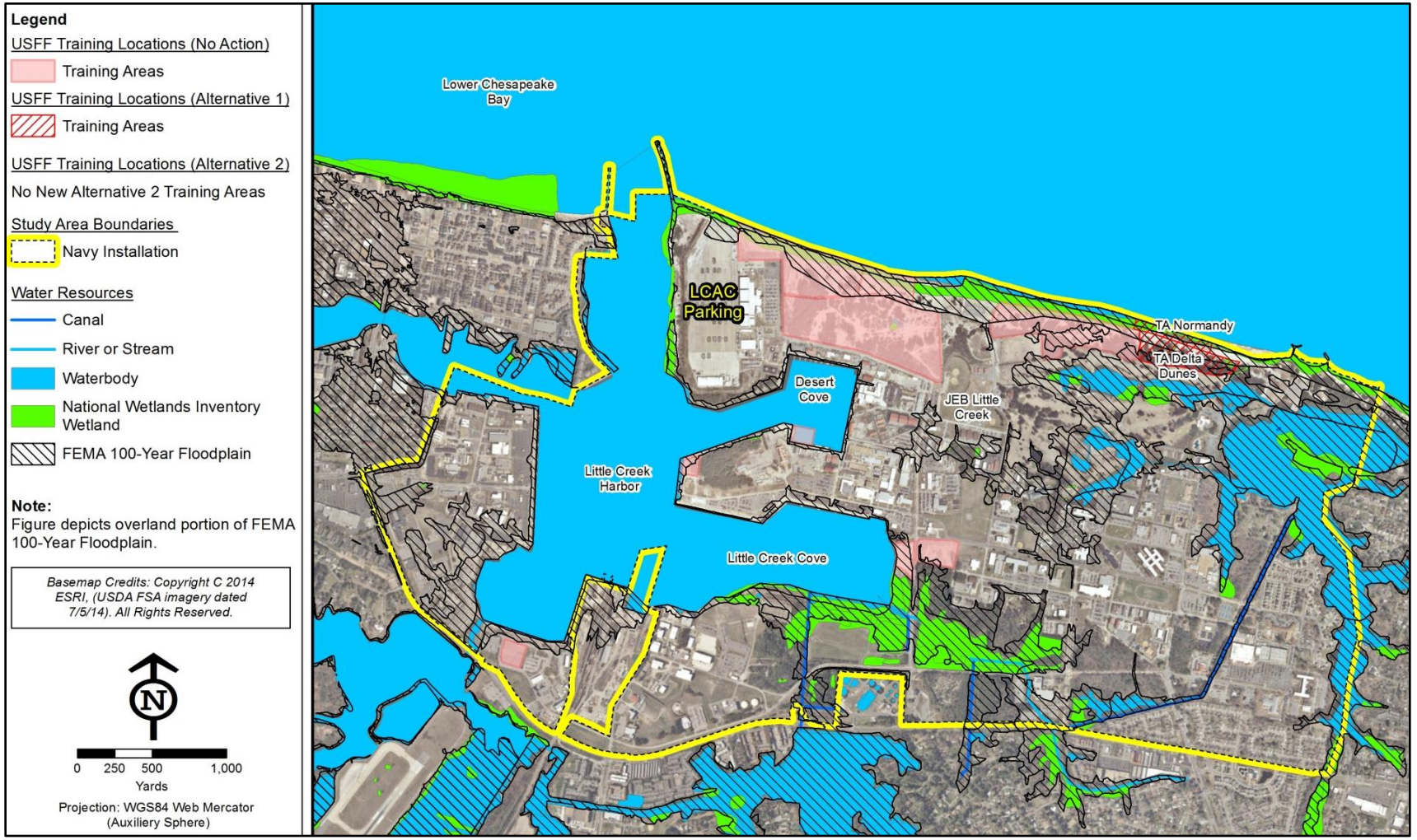

Figure 4.2-2. Joint Expeditionary Base Little Creek Water Resources

Approximately 48 additional people would move within the beaches/dune training areas and a minor increase in vehicle movement would occur on beach/dune training areas along the northern shoreline of JEB Little Creek under Alternative 1. This activity would occur throughout the year in support of training events. Physical disturbance from personnel movement and vehicle movement within training areas has been occurring for decades and does not significantly contribute to stormwater runoff. The beach/dune training areas are dominated by wind and wave action; area disturbance from personnel and vehicle movement within the beach/dune training areas is typically restored by wind and wave movement of sands.

Pollutants

The potential impacts from pollutants are addressed in Section 4.2.3.1 (Impacts Common to All Locations Under All Alternatives, Surface Waters).

4.2.4.2.2 Wetlands

Physical Disturbance

Wetlands are present along the beach/dune training areas and are in the vicinity of explosive training areas; however, the additional explosives detonations would occur within bermed areas, not within the wetlands, and therefore would not destroy or modify wetlands. In addition, wetlands are adjacent to some non-beach/dune training areas; however, personnel movement and vehicle movement would not destroy or modify wetlands.

Pollutants

The explosives detonations would occur within bermed areas with expended materials removed after training events and therefore would not release pollutants into a wetland.

4.2.4.2.3 Soils

Physical Disturbance

The beach/dune training areas are not mapped for soil type; however, they are sandy areas, highly impacted by wind and wave action. As a result, erosion does occur along the shoreline. The Navy manages this shoreline by identifying and implementing shoreline stabilization, as needed. Physical disturbance from additional explosives on land, personnel movement, and vehicle movement are not anticipated to increase erosion potential because explosives detonations would occur within a bermed area and the beach/dune training areas are dominated by wind and wave action that restores these areas.

4.2.4.3 Alternative 2

Alternative 2 training events are the same as those under Alternative 1 at this location; as noted in Table 4.2-1, no additional training would occur. Impacts under Alternative 2 would be the same as under Alternative 1 at this location and are discussed below (previous analysis for Alternative 1 is repeated for the reader's convenience).

Under Alternative 2, beach landings would be the same as under the No Action Alternative at this location and, as a result, there would be no significant impacts on water resources from beach landings.

4.2.4.3.1 Surface Waters

Physical Disturbance

Explosives on beach/dune training areas would increase by two events per year with a maximum NEW of 1.25 pounds over the No Action Alternative. The increase in explosive training events over the No Action Alternative would have no additional impact to surface waters. The potential impacts from physical disturbance are addressed in Section 4.2.3.1 (Impacts Common to All Locations Under All Alternatives, Surface Waters) and would apply to the increase in training events.

Approximately 48 additional people would move within the beaches/dune training areas and a minor increase in vehicle movement would occur on beach/dune training areas along the northern shoreline of JEB Little Creek under Alternative 2 as compared to the No Action Alternative. This activity would occur throughout the year in support of training events. Physical disturbance from personnel movement and vehicle movement within training areas has been occurring for decades and does not significantly contribute to stormwater runoff. The beach/dune training areas are dominated by wind and wave action; area disturbance from personnel and vehicle movement within the beach/dune training areas is typically restored by wind and wave movement of sands.

Pollutants

The potential impacts from pollutants are addressed in Section 4.2.3.1 (Impacts Common to All Locations Under All Alternatives, Surface Waters).

4.2.4.3.2 Wetlands

Physical Disturbance

Wetlands are present along the beach/dune training areas and are in the vicinity of explosive training areas; however, the additional explosives detonations would occur within bermed areas, not within wetlands, and therefore would not destroy or modify wetlands. In addition, wetlands are present adjacent to some non-beach/dune training areas; however, personnel movement and vehicle movement would not destroy or modify wetlands.

Pollutants

The explosives detonations would occur within bermed areas with expended materials removed after training events and therefore would not release pollutants into a wetland.

4.2.4.3.3 Soils

Physical Disturbance

The beach/dune training areas are not mapped for soil type; however, they are sandy areas, highly impacted by wind and wave action. As a result, erosion does occur along the shoreline. The Navy manages this shoreline by identifying and implementing shoreline stabilization, as needed. Physical disturbance from additional explosives on land, personnel movement, and vehicle movement are not anticipated to increase erosion potential because explosives detonations would occur within a bermed area and beach/dune training areas are dominated by wind and wave action that restores these areas.

4.2.4.4 Summary

The No Action Alternative represents baseline conditions. Under Alternative 1, two training events with explosives on land would occur within beach/dune training areas, nearly 50 additional personnel would

move throughout beach/dune training areas, and vehicle movement operations would increase by approximately one hour over the No Action Alternative. Alternative 2 training events would be the same as under Alternative 1.

Surface water impacts from ground disturbance would not be significant under any alternative since training activities would release negligible amounts of pollutants or increase turbidity to stormwater runoff at JEB Little Creek. As described in Section 4.2.3.1 (Impacts Common to All Locations Under All Alternatives, Surface Waters), explosive detonations are conducted within bermed areas, and quantities of explosives-related byproducts are expected to be very low, resulting in no detectable changes to water and sediment quality in the receiving waters. Wetland areas are present within and adjacent to training areas; however, destruction or modification of wetlands would not occur. Shorelines are within a coastal flood zone with velocity hazard but training events would not impact that status. Soils present within the training areas experience erosion potential; however, the Navy manages these areas to maintain appropriate conditions for continued training. As a result, there would be no significant impacts on water resources.

4.2.5 Joint Expeditionary Base Fort Story

The PTEAs applicable to water resources at JEB Fort Story that contribute to the physical disturbance stressor include beach landings, personnel movement, vehicle movement, and explosives on land and that contribute to the pollutants stressor include weapons firing – non-lethal training ammunition and explosives on land (Table 4.2-2). Figure 4.2-3 depicts the training areas and water resources.

4.2.5.1 No Action Alternative

4.2.5.1.1 Surface Waters

Physical Disturbance

The potential impacts from physical disturbance associated with explosives on land are addressed in Section 4.2.3.1 (Impacts Common to All Locations Under All Alternatives, Surface Waters), have been occurring for decades at this location, and do not significantly contribute to stormwater runoff.

Physical disturbance from beach landings, personnel movement, and vehicle movement within training areas has been occurring for decades and do not significantly contribute to stormwater runoff. The beach/dune training areas are dominated by wind and wave action; most of the non-beach/dune training areas have a low to negligible potential for runoff. In addition, the non-beach/dune training areas are typically grass covered, which further minimizes soil disturbance.

Current water and sediment quality remain unchanged as a result of the No Action Alternative. As noted in Section 3.2.4 (JEB Fort Story), waters off of JEB Fort Story are impaired for fish consumption but have no impairment of aquatic life and no impairment of the 30-day dissolved oxygen standard occurs.

Pollutants

Weapons firing – non-lethal training ammunition occur with the use of biodegradable paintball gun cartridges. As a result, no munitions constituents are present. Explosives training occurs within existing bermed areas as discussed in Section 4.2.3.1 (Impacts Common to All Locations Under All Alternatives, Surface Waters).

4.2.5.1.2 Wetlands

Physical Disturbance

Wetlands are present along the beach/dune training areas and are adjacent to and within some non-beach/dune training areas. Beach landings and personnel movement do not destroy or modify wetlands. Amphibious craft movement on land during beach landing activities occurs on the beaches and not within the dune areas. Vehicle movement occurs along existing pathways within these areas and therefore avoids wetlands.

Wetlands are present in the vicinity of explosives training areas; however, the explosives detonations occur within bermed areas, not within wetlands, and therefore do not destroy or modify wetlands.

Pollutants

The explosives detonations occur within bermed areas with expended materials removed after training events and therefore do not release pollutants into a wetland.

4.2.5.1.3 Soils

Physical Disturbance

The beach/dune training areas are not mapped for soil type; however, in general, the shoreline is accretional due to a net northward migration of sand in this area. These training areas are sandy and highly impacted by wind and wave action. The Navy manages this shoreline by identifying and implementing shoreline stabilization, as needed. Physical disturbance from beach landings, personnel movement, and vehicle movement may contribute to the erosion potential along the shoreline; however, this activity has been ongoing for decades and the Navy actively manages the shoreline. In addition, the beach/dune training areas are dominated by wind and wave action that restores these areas. Most of the non-beach/dune training areas are typically grass covered, which further minimizes soil disturbance.

While some of the soils adjacent to the beaches/dunes and within non-beaches/dunes are rated “very limited” for military operations with heavy foot traffic (i.e., not remain firm), Navy training is designed to incorporate real world conditions, which may not be ideal and therefore, the soils do not present an inability for USFF training to occur.

Physical disturbance from explosives on land are not anticipated to increase erosion potential because explosives detonations occur within a bermed area and therefore do not increase soil erosion potential.

4.2.5.2 Alternative 1

4.2.5.2.1 Surface Waters

Physical Disturbance

An additional 165 beach landings and 79 additional personnel movement and vehicle movement events would occur on beach/dune training areas at JEB Fort Story under Alternative 1 as compared to the No Action Alternative.

Physical disturbance from beach landings, personnel movement, and vehicle movement within training areas has been occurring for decades. The incremental increase in these training activities under Alternative 1 would not significantly contribute to stormwater runoff. The beach/dune training areas are dominated by wind and wave action; most of the non-beach/dune training areas have a low to negligible potential for runoff. In addition, the non-beach/dune training areas are typically grass covered, which further minimizes soil disturbance.

Table 4.2-2. Joint Expeditionary Base Fort Story Water Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Pollutants*	*No. of Events*	*Physical Disturbance*	*Pollutants*	*No. of Events*	*Physical Disturbance*	*Pollutants*
Land – Beaches/ Dunes	Beach Landings	amphibious and small vessels	85	379 landings		3	165 landings				
	Personnel Movement	NA	468	6,262 people		79	2,268 people				
	Vehicle Movement	tactical and non-tactical vehicles	412	5,245 hours		79	4,611 hours				
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	28		2,800 rounds	76		15,200 rounds			
Land – Non-Beaches/ Dunes	Personnel Movement	NA	346	5,150 people		480	10,560 people		56	784 people	
	Explosives on Land	demolition materials and charge	108	• 80 events (average 8 detonations/event with maximum NEW of 1.25 pounds) • 28 events (1 detonation/event with maximum NEW of 1.25 pounds)	• 80 events (average 8 detonations/event with maximum NEW of 1.25 pounds) • 28 events (1 detonation/event with maximum NEW of 1.25 pounds)	556	• 240 events (average 9 detonations/event with maximum NEW of 0.2 pounds) • 240 events (average 13 detonations/event with maximum NEW of 1.25 pounds) • 76 events (1 detonation/event with maximum NEW of 1.25 pounds)	• 240 events (average 9 detonations/event with maximum NEW of 0.2 pounds) • 240 events (average 13 detonations/event with maximum NEW of 1.25 pounds) • 76 events (1 detonation/event with maximum NEW of 1.25 pounds)	56	• 56 events (1 detonation/event maximum NEW 1.25 pounds)	• 56 events (1 detonation/event maximum NEW 1.25 pounds)
	Vehicle Movement	tactical and non-tactical vehicles	362	9,587 hours		240	60 hours		56	3,640 hours	
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	84		8,400 rounds				56		5,600 rounds

Key: NA = not applicable; NEW = net explosive weight. Note: Additional training event details are in Appendix C.

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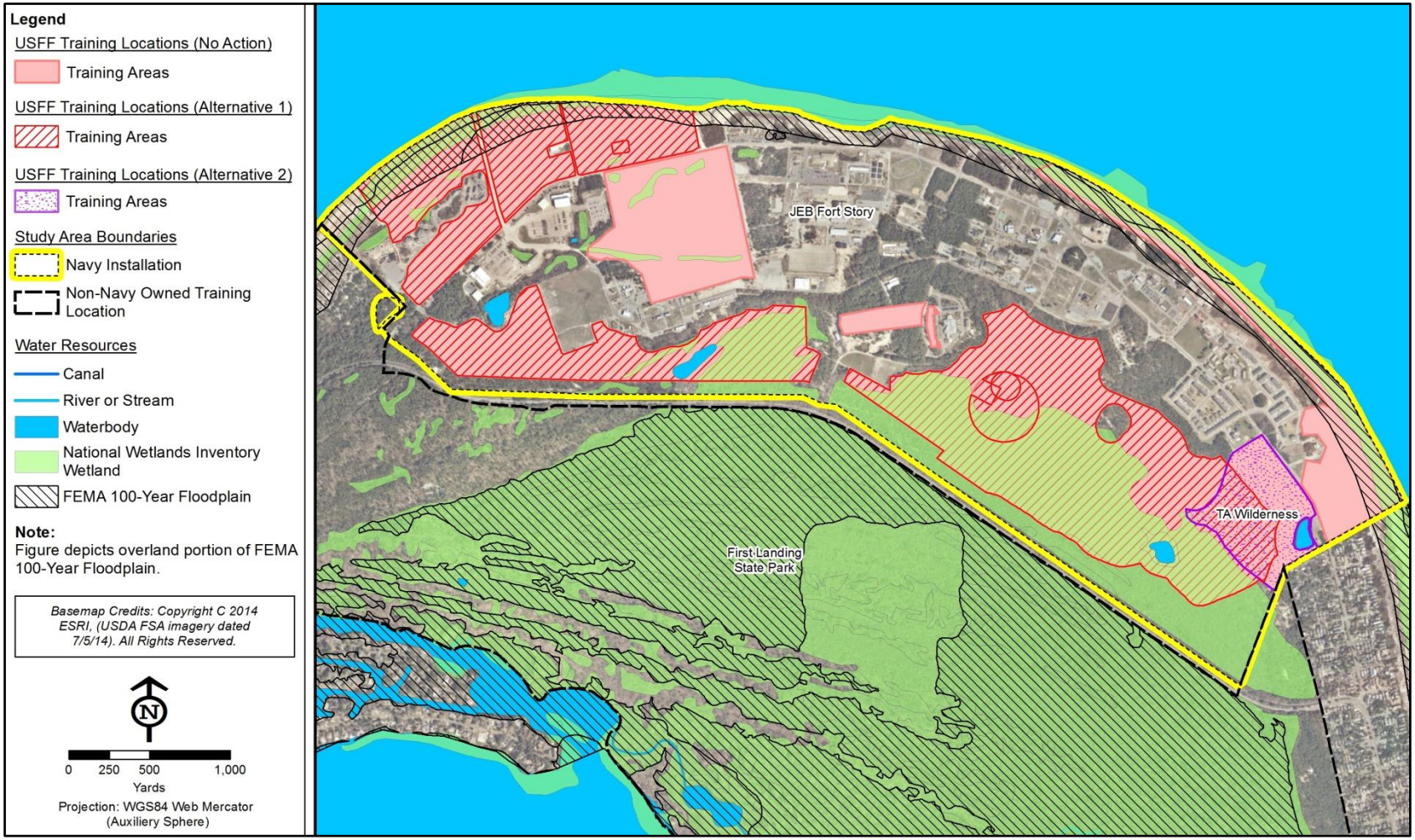

Figure 4.2-3. Joint Expeditionary Base Fort Story Water Resources

The increase in explosive training events over the No Action Alternative would have no additional impact to surface waters. The potential impacts from physical disturbance associated with explosives on land are addressed in Section 4.2.3.1 (Impacts Common to All Locations Under All Alternatives, Surface Waters) and would apply to the increase in training events.

Pollutants

Implementation of Alternative 1 would more than double the total number of paintball rounds fired under the No Action Alternative. However, the number of training events would be distributed throughout the year. All of the additional non-lethal training ammunition would be expended in beach/dune training areas. Weapons firing – non-lethal training ammunition occur with the use of biodegradable paintball gun cartridges. As a result, no munitions constituents are present. Explosives training occurs within existing bermed areas as discussed in Section 4.2.3.1 (Impacts Common to All Locations Under All Alternatives, Surface Waters).

4.2.5.2.2 Wetlands

Physical Disturbance

Wetlands are present along the beach/dune training areas. The additional beach landings and personnel movement under Alternative 1 would not destroy or modify wetlands. Amphibious craft movement on land during beach landing activities occurs on the beaches and not within the dune areas. All vehicle movement would occur along existing pathways within these areas and would avoid wetlands.

Wetlands are present in the vicinity of explosive training areas; however, the additional explosives detonations would occur within bermed areas, not within wetlands, and therefore would not destroy or modify wetlands.

Pollutants

The additional explosives detonations would occur within bermed areas with expended materials removed after training events and therefore would not release pollutants into a wetland.

4.2.5.2.3 Soils

Physical Disturbance

The beach/dune training areas are not mapped for soil type; however, in general, the shoreline is accretional due to a net northward migration of sand in this area. These training areas are sandy and highly impacted by wind and wave action. The Navy manages this shoreline by identifying and implementing shoreline stabilization, as needed. Physical disturbance from additional beach landings, personnel movement, and vehicle movement under Alternative 1 may contribute to the erosion potential along the shoreline; however, this activity has been ongoing for decades and the Navy actively manages the shoreline. In addition, the beach/dune training areas are dominated by wind and wave action that restores these areas. Most of the non-beach/dune training areas are typically grass covered, which further minimizes soil disturbance.

While some of the soils adjacent to the beaches/dunes and within non-beaches/dunes are rated “very limited” for military operations with heavy foot traffic (i.e., not remain firm), Navy training is designed to incorporate real world conditions, which may not be ideal and, therefore, the soils do not present an inability for USFF training to occur.

Physical disturbance from explosives on land are not anticipated to increase erosion potential because explosives detonations would occur within a bermed area and, therefore, would not increase soil erosion potential.

4.2.5.3 Alternative 2

4.2.5.3.1 Surface Waters

Physical Disturbance

Beach landings would be the same at this location as under Alternative 1; no additional beach landings would occur under Alternative 2. Physical disturbance from beach landings, personnel movement, and vehicle movement within training areas has been occurring for decades and the incremental increase in these activities under Alternative 2 would not significantly contribute to stormwater runoff. The beach/dune training areas are dominated by wind and wave action; most of the non-beach/dune training areas have a low to negligible potential for runoff. In addition, the non-beach/dune training areas are typically grass covered, which further minimizes soil disturbance and the additional personnel movement and vehicle movement in these areas would not significantly contribute to stormwater runoff.

The increase in explosive training events over the No Action Alternative would have no additional impact to surface waters. The potential impacts from physical disturbance associated with additional explosives on land are addressed in Section 4.2.3.1 (Impacts Common to All Locations Under All Alternatives, Surface Waters) and would apply to the increase in training events.

Pollutants

Under Alternative 2, non-lethal weapons training would increase over the level analyzed for Alternative 1 by approximately 5,600 rounds annually or a total of 51,200 rounds over the No Action Alternative. However, the number of training events would be distributed throughout the year. All of the additional non-lethal training ammunition would be expended in non-beach/dune training areas. Weapons firing – non-lethal training ammunition occur with the use of biodegradable paintball gun cartridges. As a result, no munitions constituents are present. Explosives training occurs within existing bermed areas as discussed in Section 4.2.3 (Impacts Common to All Locations Under All Alternatives).

4.2.5.3.2 Wetlands

Physical Disturbance

Wetlands are present along the beach/dune training areas. The additional beach landings and personnel movement under Alternative 2 would not destroy or modify wetlands. Amphibious craft movement on land during beach landing activities occurs on the beaches and not within the dune areas. Vehicle movement would occur along existing pathways within these areas and therefore would avoid wetlands.

The explosives detonations would occur within bermed areas, not within wetlands, and therefore would not destroy or modify wetlands.

Pollutants

Wetlands are present in the vicinity of explosive training areas; however, the additional explosives detonations would occur within bermed areas with expended materials removed after training events and therefore would not release pollutants into a wetland.

4.2.5.3.3 Soils

Physical Disturbance

The beach/dune training areas are not mapped for soil type; however, in general, the shoreline is accretional due to a net northward migration of sand in this area. These training areas are sandy and highly impacted by wind and wave action. The Navy manages this shoreline by identifying and implementing shoreline stabilization, as needed. Physical disturbance from beach landings, personnel movement, and vehicle movement may contribute to the erosion potential along the shoreline; however, this activity has been ongoing for decades and the Navy actively manages the shoreline. In addition, the beach/dune training areas are dominated by wind and wave action that restores these areas. Most of the non-beach/dune training areas are typically grass covered, which further minimizes soil disturbance.

While some of the soils adjacent to the beaches/dunes and within non-beaches/dunes are rated "very limited" for military operations with heavy foot traffic (i.e., not remain firm), Navy training is designed to incorporate real world conditions, which may not be ideal and therefore, the soils do not present an inability for USFF training to occur.

Physical disturbance from explosives on land are not anticipated to increase erosion potential because explosives detonations would occur within a bermed area and therefore would not increase soil erosion potential.

4.2.5.4 Summary

The No Action Alternative represents baseline conditions. Under Alternative 1,165 additional beach landings would occur, nearly 2,700 additional personnel would move throughout non-beach/dune training areas and approximately 10,560 additional personnel would move throughout beach/dune training areas, vehicle movement operations would increase in the beach/dune training areas by approximately 4,600 hours and would increase in the non-beach/dune training areas by approximately 60 hours, approximately 15,200 additional rounds of non-lethal training ammunition would be fired within the beach/dune training areas, and approximately 556 additional explosive on land training events would occur within non-beach/dune training areas over the No Action Alternative. Under Alternative 2, the same training events would occur as under Alternative 1; however, nearly 800 additional personnel would move throughout non-beach/dune training areas, approximately 56 additional explosive on land training events would occur within non-beach/dune training areas, vehicle movement operations would increase in the non-beach/dune training areas by approximately 3,640 hours, and approximately 5,600 additional rounds of non-lethal training ammunition would be fired within the non-beach/dune training areas over Alternative 1.

Surface water impacts from ground disturbance would not be significant under any alternative since training activities would release negligible amounts of pollutants or increase turbidity to stormwater runoff at JEB Fort Story. As described in Section 4.2.3 (Impacts Common to All Locations Under All Alternatives), explosive detonations are conducted within bermed areas and quantities of explosives-related byproducts are expected to be very low, resulting in no detectable changes to water and sediment quality in the receiving waters. Wetland areas are present within and adjacent to training areas; however, destruction or modification of wetlands would not occur under any alternative. Shorelines are within a coastal flood zone with velocity hazard but training events would impact that status. Soils present within the training areas experience low erosion potential; however, the Navy manages and would continue to manage these areas to maintain appropriate conditions for continued training under all alternatives. As a result, there would be no significant impacts on water resources.

4.2.6 Dam Neck Annex and Camp Pendleton

The PTEAs applicable to water resources at Dam Neck Annex and Camp Pendleton that contribute to the physical disturbance stressor include beach landings, personnel movement, and vehicle movement and that contribute to the pollutants stressor include weapons firing – non-lethal training ammunition (Table 4.2-3). Figure 4.2-4 depicts the training areas and water resources.

4.2.6.1 No Action Alternative

4.2.6.1.1 Surface Waters

Physical Disturbance

Physical disturbance from beach landings, personnel movement and vehicle movement within training areas has been occurring for decades and do not significantly contribute to stormwater runoff. The beach/dune training areas are dominated by wind and wave action; most of the non-beach/dune training areas have a low to negligible potential for runoff. In addition, the non-beach/dune training areas are typically grass covered, which further minimizes soil disturbance.

4.2.6.1.2 Wetlands

Physical Disturbance

Wetlands are present along the beach/dune training areas and are adjacent to some non-beach/dune training areas. Personnel movement does not destroy or modify wetlands. Multiple types of amphibious craft operate on land during beach landing activities; however, amphibious craft movement during these activities is limited to the beaches and does not occur within the vegetated dune areas where wetlands are present. Vehicle movement occurs along existing pathways within these areas and therefore avoids wetlands.

The Landing Craft, Air Cushion (LCAC) overland training track is a training area within an interdune wetland adjacent to North Beach. While beach landing activities with LCACs are limited to movement on the beaches, LCACs also train within the overland training track. LCAC movement to and from, as well as on, the overland training track is within the interdunal swale area; however, LCACs do not go into vegetated dune areas, and movement is restricted to the designated training area to minimize erosion.

4.2.6.1.3 Soils

Physical Disturbance

The beach/dune training areas are not mapped for soil type; however, in general, soils adjacent to the beaches have a low susceptibility to erosion by water. These training areas are sandy and highly impacted by wind and wave action. The Navy manages this shoreline by identifying and implementing shoreline stabilization, as needed. Physical disturbance from beach landings, personnel movement, and vehicle movement may contribute to the erosion potential along the shoreline; however, this activity has been ongoing for decades and the Navy actively manages the shoreline. In addition, the beach/dune training areas are dominated by wind and wave action that restores these areas. Most of the non-beach/dune training areas are typically grass covered, which further minimizes soil disturbance.

Table 4.2-3. Dam Neck Annex and Camp Pendleton Water Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Pollutants*	*No. of Events*	*Physical Disturbance*	*Pollutants*	*No. of Events*	*Physical Disturbance*	*Pollutants*
Land – Beaches/ Dunes	Beach Landings	amphibious	22	380 landings							
	Personnel Movement	NA	103	1,454 people		76	1,368 people				
	Vehicle Movement	tactical and non-tactical vehicles	64	3,781 hours		76	291 hours				
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun				76		30,400 rounds			
Land – Non-Beaches/ Dunes	Personnel Movement	NA	28	560 people							

Key: NA = not applicable. Note: Additional training event details are in Appendix C.

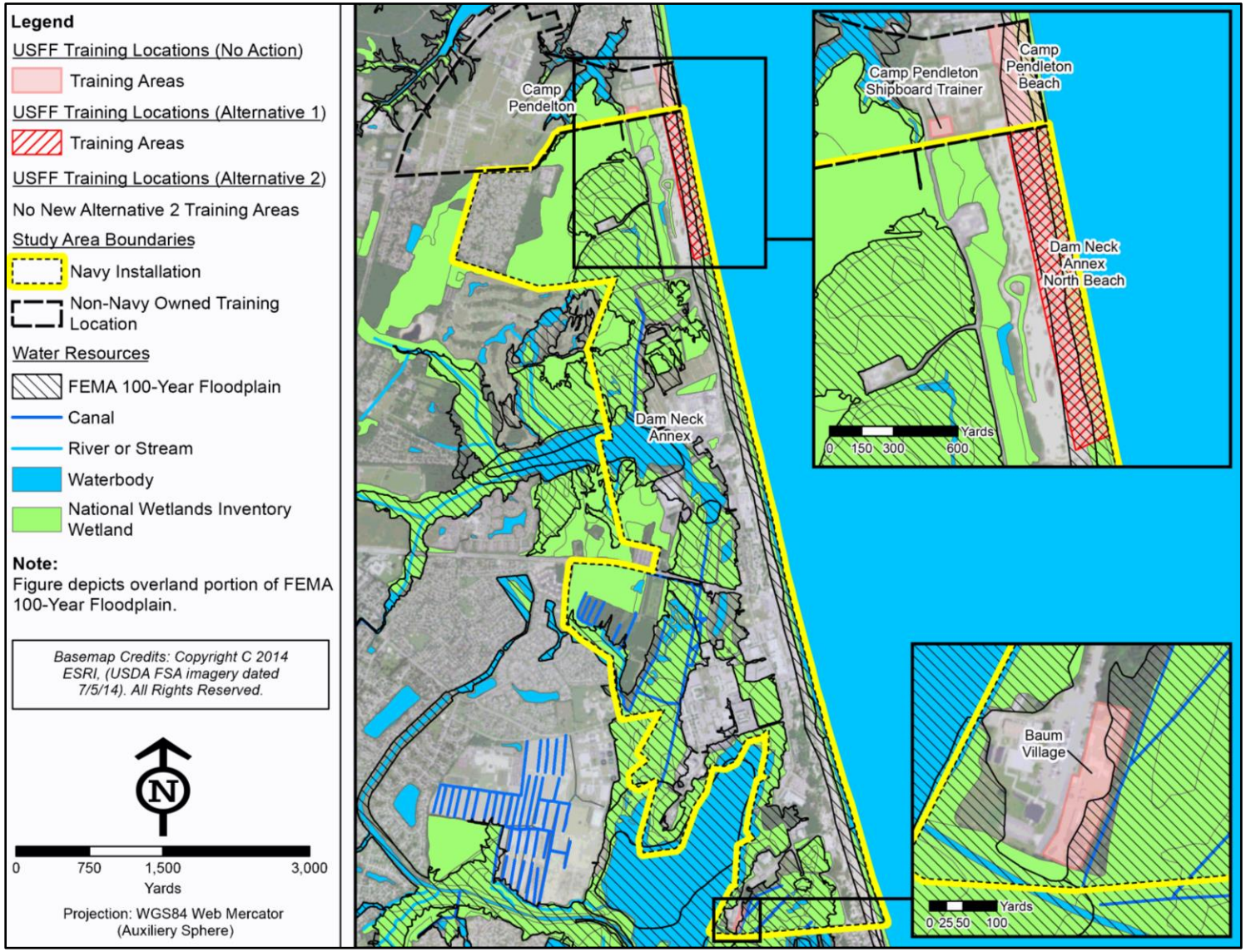

Figure 4.2-4. Dam Neck Annex and Camp Pendleton Water Resources

While some of the soils adjacent to the beaches/dunes and within non-beaches/dunes are rated "very limited" for military operations with heavy foot traffic (i.e., not remain firm), Navy training is designed to incorporate real world conditions, which may not be ideal and therefore, the soils do not present an inability for USFF training to occur.

4.2.6.2 Alternative 1

Under Alternative 1, beach landings would be the same as under the No Action Alternative at this location and, as a result, there would be no significant impacts on water resources from beach landings and impacts from beach landings is not discussed further in this section.

4.2.6.2.1 Surface Waters

Physical Disturbance

Over 1,300 additional people would move within the beaches/dune training areas and over 10,000 additional people would move within the non-beach/dune training areas under Alternative 1. Additional vehicle movement would occur on beach/dune training areas within Dam Neck Annex and Camp Pendleton. This activity would occur throughout the year in support of training events. Physical disturbance from personnel movement and vehicle movement within training areas has been occurring for decades and does not significantly contribute to stormwater runoff. The beach/dune training areas are dominated by wind and wave action; area disturbance from personnel and vehicle movement within the beach/dune training areas is typically restored by wind and wave movement of sands.

Pollutants

USFF weapons firing with non-lethal training ammunition does not currently occur at Dam Neck Annex and Camp Pendleton. Implementation of Alternative 1 would include the use of approximately 30,400 rounds of non-lethal training ammunition on the beach/dune training areas. Weapons firing – non-lethal training ammunition would occur with the use of biodegradable paintball gun cartridges. As a result, no munitions constituents would be present.

4.2.6.2.2 Wetlands

Physical Disturbance

Wetlands are present along the beach/dune training areas and are adjacent to some non-beach/dune training areas. Additional personnel movement would not destroy or modify wetlands as movement occurs on the beach areas and not within the wetlands. Vehicle movement occurs along existing pathways within these areas and therefore would avoid wetlands.

4.2.6.2.3 Soils

Physical Disturbance

The beach/dune training areas are not mapped for soil type; however, these training areas are sandy and highly impacted by wind and wave action. In general, areas adjacent to the beaches have a low susceptibility to erosion by water. The Navy manages this shoreline by identifying and implementing shoreline stabilization, as needed. Physical disturbance from beach landings and additional personnel movement and vehicle movement may contribute to the erosion potential along the shoreline; however, this activity has been ongoing for decades and the Navy actively manages the shoreline. In

addition, the beach/dune training areas are dominated by wind and wave action that restores these areas. Most of the non-beach/dune training area is grass covered, which further minimizes soil disturbance.

While some of the soils adjacent to the beaches/dunes and within non-beaches/dunes are rated "very limited" for military operations with heavy foot traffic (i.e., not remain firm), Navy training is designed to incorporate real world conditions, which may not be ideal and therefore, the soils do not present an inability for USFF training to occur.

4.2.6.3 Alternative 2

Alternative 2 training events are the same as those under Alternative 1 at this location; as noted in Table 4.2-3, no additional training would occur. Impacts under Alternative 2 would be the same as under Alternative 1 at this location and are discussed below (previous analysis for Alternative 1 is repeated for the reader's convenience).

Under Alternative 2, beach landings would be the same as under the No Action Alternative at this location and, as a result, there would be no significant impacts on water resources from beach landings.

4.2.6.3.1 Surface Waters

Physical Disturbance

Additional vehicle movement would occur on beach/dune training areas within Dam Neck Annex and Camp Pendleton. This activity would occur throughout the year in support of training events. Physical disturbance from personnel movement and vehicle movement within training areas has been occurring for decades and does not significantly contribute to stormwater runoff. The beach/dune training areas are dominated by wind and wave action; area disturbance from personnel and vehicle movement within the beach/dune training areas is typically restored by wind and wave movement of sands.

Pollutants

USFF weapons firing with non-lethal training ammunition does not currently occur at Dam Neck Annex and Camp Pendleton. Weapons firing – non-lethal training ammunition would occur with the use of biodegradable paintball gun cartridges. As a result, no munitions constituents are present.

4.2.6.3.2 Wetlands

Physical Disturbance

LCACs do not go into vegetated dune areas; LCACs conduct land training on the LCAC overland training track, an interdune wetland adjacent to North Beach. Beach landings do not destroy or modify wetlands.

Wetlands are present along the beach/dune training areas and are adjacent to some non-beach/dune training areas. Additional personnel movement would not destroy or modify wetlands as movement occurs on the beach areas and not within the wetlands. Vehicle movement occurs along existing pathways within these areas and therefore would avoid wetlands.

4.2.6.3.3 Soils

Physical Disturbance

The beach/dune training areas are not mapped for soil type; however, in general, adjacent to the beaches have a low susceptibility to erosion by water. These training areas are sandy and highly impacted by wind and wave action. The Navy manages this shoreline by identifying and implementing shoreline stabilization, as needed. Physical disturbance from beach landings and additional personnel movement and vehicle movement may contribute to the erosion potential along the shoreline; however, this activity has been ongoing for decades and the Navy actively manages the shoreline. In addition, the beach/dune training areas are dominated by wind and wave action that restores these areas. Most of the non-beach/dune training area is grass covered, which further minimizes soil disturbance.

While some of the soils adjacent to the beaches/dunes and within non-beaches/dunes are rated "very limited" for military operations with heavy foot traffic (i.e., not remain firm), Navy training is designed to incorporate real world conditions, which may not be ideal and therefore, the soils do not present an inability for USFF training to occur.

4.2.6.4 Summary

The No Action Alternative represents baseline conditions. Under Alternative 1, nearly 1,370 additional personnel would move throughout beach/dune training areas, vehicle movement operations would increase by approximately 290 hours, and approximately 30,400 additional rounds of non-lethal training ammunitions would be fired in beach/dune training areas over the No Action Alternative. Alternative 2 training events would be the same as under Alternative 1.

Surface water impacts from ground disturbance would not be significant under any alternative since training activities would not release pollutants or increase turbidity to stormwater runoff at Dam Neck Annex and Camp Pendleton. Wetland areas are present within and adjacent to training areas; however, destruction or modification of wetlands would not occur under Alternative 1 and 2 and the No Action Alternative. Shorelines are within a coastal flood zone with velocity hazard but training events would not impact that status. Soils present within the training areas experience erosion potential; however, the Navy manages these areas to maintain appropriate conditions for continued training. As a result, there would be no significant impacts on water resources.

4.2.7 Naval Auxiliary Landing Field Fentress

The PTEAs applicable to water resources at Naval Auxiliary Landing Field (NALF) Fentress that contribute to the physical disturbance stressor include personnel movement and vehicle movement and that contribute to the pollutants stressor include weapons firing – non-lethal training ammunition (Table 4.2-4). Figure 4.2-5 depicts the training areas and water resources.

4.2.7.1 No Action Alternative

4.2.7.1.1 Surface Waters

Physical Disturbance

Physical disturbance from personnel movement and vehicle movement within training areas has been occurring for decades and does not significantly contribute to stormwater runoff. Most of the non-beach/dune training areas are typically grass covered, which minimizes soil disturbance from personnel movement and vehicle movement is along compacted pathways.

Table 4.2-4. NALF Fentress Water Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Pollutants*	*No. of Events*	*Physical Disturbance*	*Pollutants*	*No. of Events*	*Physical Disturbance*	*Pollutants*
Land – Non-Beaches/ Dunes	Personnel Movement	NA	90	1,800 people					4	1,493 people	
	Vehicle Movement	tactical and non-tactical vehicles	90	4,500 hours					4	1,072 hours	
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	90		9,000 rounds						

Key: NA = not applicable. Note: Additional training event details are in Appendix C.

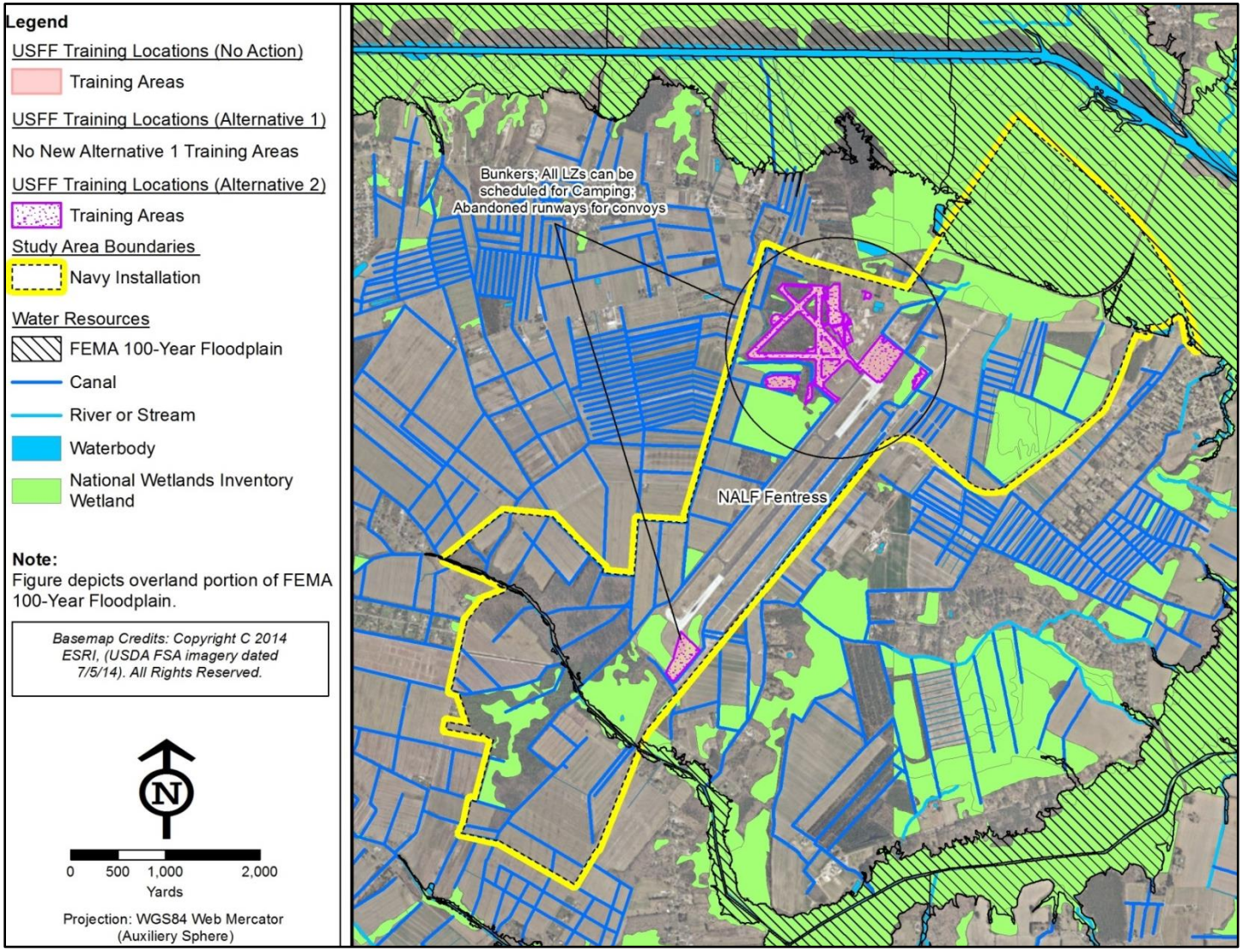

Figure 4.2-5. NALF Fentress Water Resources

While some of the soils within non-beaches/dunes are rated "very limited" for military operations with heavy foot traffic, Navy training is designed to incorporate real world conditions (i.e., not remain firm), which may not be ideal and therefore, the soils do not present an inability for USFF training to occur.

PTEAs that result in physical disturbance of soils within training areas do not occur adjacent to surface waters. Specific water quality concerns at NALF Fentress are related to agricultural leases on the installation and surrounding agricultural lands, with monitoring required for total suspended solids, Biological Oxygen Demand, total organic carbon, and nutrients in compliance with the Virginia Pollution Abatement Permit. There is also a bacteriological monitoring plan that pertains to use of treated wastewater for irrigation. Training activities at NALF Fentress do not result in contributions of organic matter, nutrients, increased sedimentation, or bacterial contaminants that affect these particular water quality parameters.

Pollutants

Weapons firing – non-lethal training ammunition occur with the use of biodegradable paintball gun cartridges. As a result, no munitions constituents are present. Explosives training occurs within existing bermed areas as discussed in Section 4.2.3 (Impacts Common to All Locations Under All Alternatives).

4.2.7.1.2 Wetlands

Physical Disturbance

Wetlands are present adjacent to and within some non-beach/dune training areas. Personnel movement does not destroy or modify wetlands as movement occurs on the beach areas and not within the wetlands. Vehicle movement occurs along existing pathways within these areas and therefore avoids wetlands.

4.2.7.1.3 Soils

Physical Disturbance

The soils at NALF Fentress are identified as medium to negligible potential for runoff. Most of the non-beach/dune training area is grass covered, which further minimizes soil disturbance. The majority of NALF Fentress soils are rated "very limited" or "somewhat limited" for field operations; however, the Navy has been conducting operations in these areas for decades. In addition, the rating reflects ideal conditions for heavy foot traffic and vehicle movement and Navy training is designed to incorporate real world conditions (i.e., not remain firm), Navy training is designed to incorporate real world conditions, which may not be ideal and therefore, the soils do not present an inability for USFF training to occur.

4.2.7.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no significant impacts on water resources.

4.2.7.3 Alternative 2

4.2.7.3.1 Surface Waters

Physical Disturbance

Under Alternative 2, nearly 1,500 additional people would move throughout non-beach/dune training areas within NALF Fentress and vehicle movement would increase by approximately 1,070 hours annually over the No Action Alternative.

Physical disturbance from personnel movement and vehicle movement within training areas has been occurring for decades. The incremental increase of personnel movement and vehicle moment under Alternative 2 would not be expected to significantly contribute to stormwater runoff. In addition, most of the non-beach/dune training areas are typically grass covered, which minimizes soil disturbance from personnel movement and vehicle movement is along compacted pathways.

While some of the soils within non-beaches/dunes are rated "very limited" for military operations with heavy foot traffic (i.e., not remain firm), Navy training is designed to incorporate real world conditions, which may not be ideal and therefore, the soils do not present an inability for USFF training to occur.

Pollutants

Under Alternative 2, weapons firing – non-lethal training ammunition would be the same as under the No Action Alternative at this location.

4.2.7.3.2 Wetlands

Physical Disturbance

Wetlands are present adjacent to and within some non-beach/dune training areas. Additional personnel movement would not destroy or modify wetlands as movement occurs on the beach areas and not within the wetlands. Vehicle movement would occur along existing pathways within these areas and therefore would avoid wetlands.

4.2.7.3.3 Soils

Physical Disturbance

The soils at NALF Fentress are identified as medium to negligible potential for runoff. Most of the non-beach/dune training area is grass covered, which further minimizes soil disturbance. The majority of NALF Fentress soils are rated "very limited" or "somewhat limited" for field operations; however, the Navy has been conducting operations in these areas for decades. In addition, the rating reflects ideal conditions for heavy foot traffic and vehicle movement and Navy training is designed to incorporate real world conditions (i.e., not remain firm), Navy training is designed to incorporate real world conditions (i.e., not remain firm), which may not be ideal and therefore, the soils do not present an inability for USFF training to occur.

4.2.7.4 Summary

The No Action Alternative represents baseline conditions. Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location. Under Alternative 2, nearly 1,500 additional personnel would move throughout non-beach/dune training areas, and vehicle movement operations would increase by approximately 1,070 hours over the No Action Alternative.

Surface water impacts from ground disturbance associated with Alternatives 1 and 2 and the No Action Alternative would not be significant since training activities would not release pollutants or increase turbidity to stormwater runoff at NALF Fentress. Wetland areas are present within and adjacent to training areas; however, destruction or modification of wetlands would not occur. As a result, there would be no significant impacts on water resources.

4.2.8 Northwest Annex

The PTEAs applicable to water resources at Northwest Annex that contribute to the physical disturbance stressor include personnel and vehicle movement (Table 4.2-5). Figure 4.2-6 depicts the training areas and water resources.

Table 4.2-5. Northwest Annex Water Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Physical Disturbance*	*No. of Events*	*Physical Disturbance*	*No. of Events*	*Physical Disturbance*
Land – Non-Beaches/ Dunes	Personnel Movement	NA	170	1,190 people				
	Vehicle Movement	tactical and non-tactical vehicles	170	510 hours				

Key: NA = not applicable. Note: Additional training event details are in Appendix C.

4.2.8.1 No Action Alternative

4.2.8.1.1 Surface Waters

Physical Disturbance

Physical disturbance from personnel movement and vehicle movement within training areas has been occurring for decades and does not significantly contribute to stormwater runoff. Most of the non-beach/dune training areas are typically grass covered, which minimizes soil disturbance from personnel movement and vehicle movement is along compacted pathways. Current water and sediment quality remain unchanged as a result of the No Action Alternative.

While some of the soils within non-beaches/dunes are rated “very limited” for military operations with heavy foot traffic (i.e., not remain firm), Navy training is designed to incorporate real world conditions, which may not be ideal and therefore, the soils do not present an inability for USFF training to occur.

4.2.8.1.2 Wetlands

Physical Disturbance

Wetlands are present adjacent to non-beach/dune training areas; personnel movement. Vehicle movement occurs along existing pathways within these areas and therefore does not destroy or modify wetlands.

4.2.8.1.3 Soils

Physical Disturbance

The soils at Northwest Annex within the training area have a low potential for runoff. Most of the non-beach/dune training area is grass covered, which further minimizes soil disturbance. The majority of Northwest Annex soils, including those at the training area, are rated “very limited” for field operations. The Navy has been conducting operations in these areas for decades and the soil rating reflects non-ideal, yet realistic, conditions for heavy foot traffic and vehicle movement. USFF training under the No Action Alternative is not expected to introduce physical disturbance to soils such that it would change soil runoff potential and affect water resources.

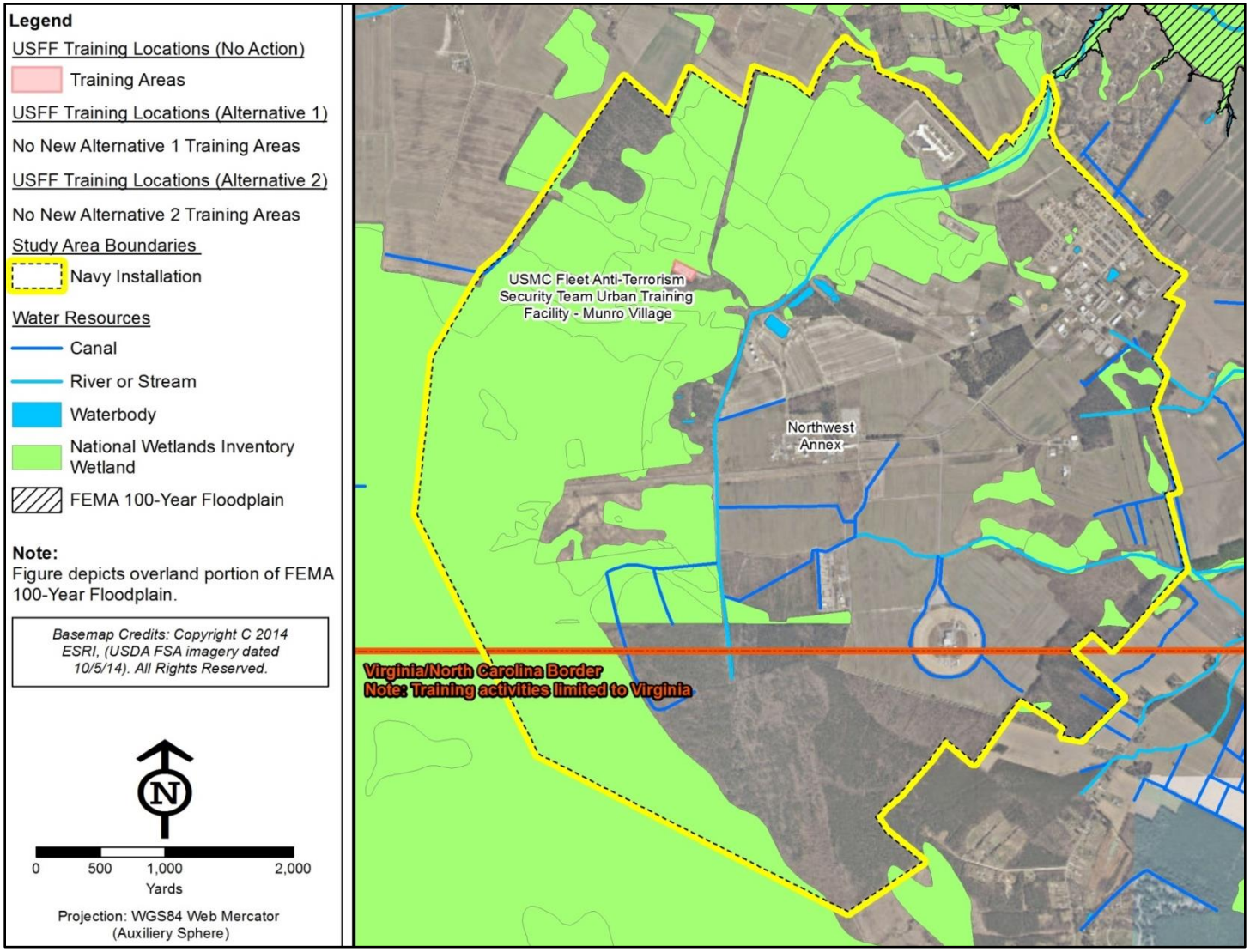

Figure 4.2-6. Northwest Annex Water Resources

4.2.8.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no significant impacts on water resources.

4.2.8.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no significant impacts on water resources.

4.2.8.4 Summary

The No Action Alternative represents baseline conditions. Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative at this location. Surface water impacts from ground disturbance for all alternatives would not occur since training activities would not release pollutants or increase turbidity to stormwater runoff at Northwest Annex. Wetland areas are present adjacent to training areas; however, destruction or modification of wetlands would not occur. As a result, there would be no significant impacts on water resources.

4.2.9 St. Juliens Creek Annex

The PTEAs applicable to water resources at St. Juliens Creek Annex that contribute to the physical disturbance stressor include personnel movement and vehicle movement (Table 4.2-6). Figure 4.2-7 depicts the training areas and water resources.

Table 4.2-6. St. Juliens Creek Annex Water Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Physical Disturbance*	*No. of Events*	*Physical Disturbance*	*No. of Events*	*Physical Disturbance*
Land – Non-Beaches/ Dunes	Personnel Movement	NA	17	4,893 people			28	392 people
	Vehicle Movement	tactical and non-tactical vehicles	16	4,527 hours			28	1,890 hours

Key: NA = not applicable. Note: Additional training event details are in Appendix C.

4.2.9.1 No Action Alternative

4.2.9.1.1 Surface Waters

Physical Disturbance

Physical disturbance from personnel movement and vehicle movement within training areas has been occurring for decades and does not significantly contribute to stormwater runoff. Most of the non-beach/dune training areas are typically grass covered and vehicle movement occurs along compacted pathways, which minimizes soil disturbance from personnel movement. Current water and sediment quality remain unchanged as a result of the No Action Alternative.

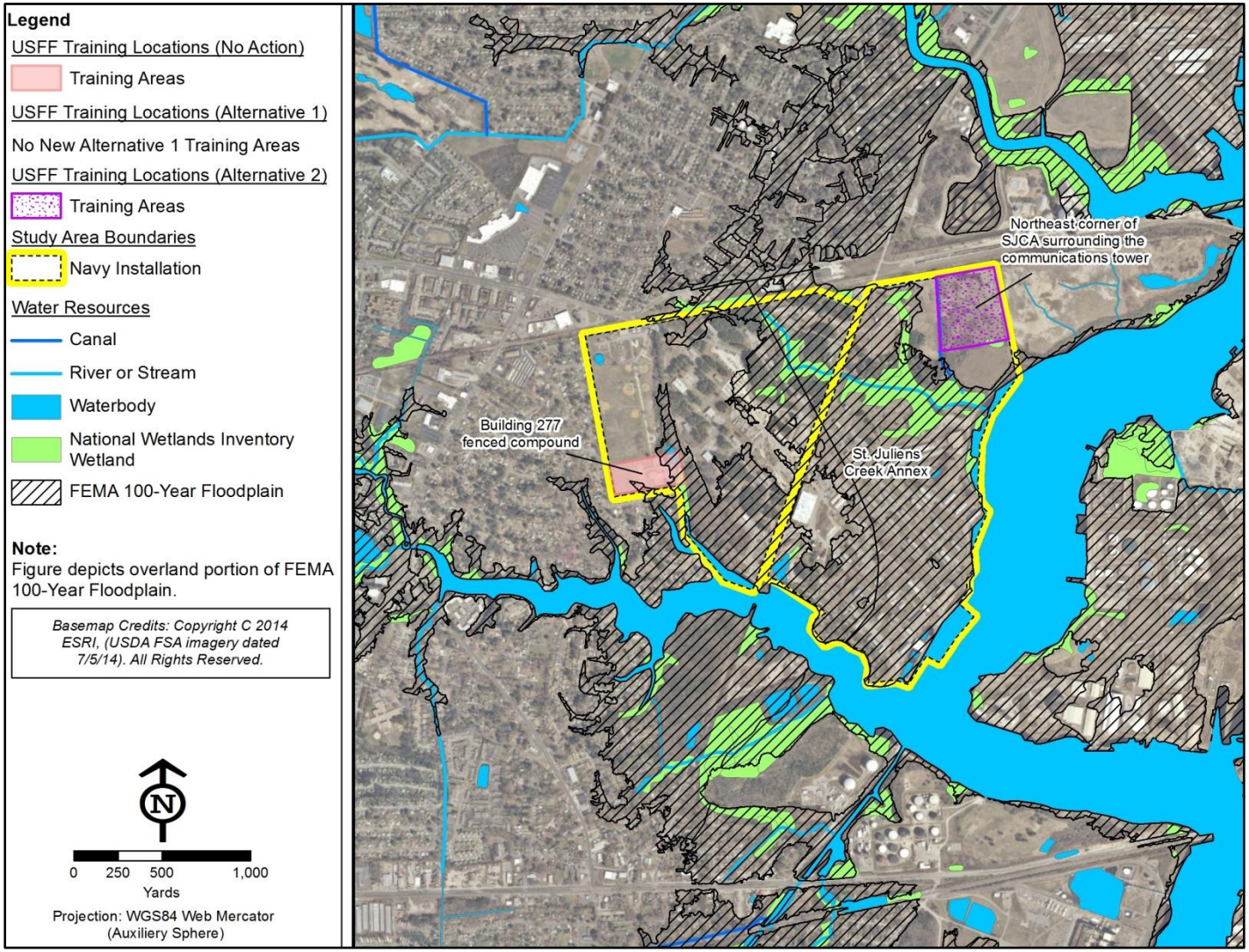

Figure 4.2-7. St. Juliens Creek Annex Water Resources

Current water and sediment quality remain unchanged as a result of the No Action Alternative. As noted in Section 3.2 (Water Resources), the Elizabeth River is considered impaired in various segments for the use designations of aquatic life, fish consumption, and recreation because of contaminants and other water quality issues and the Elizabeth River watershed has an approved TMDL for enterococci.

4.2.9.1.2 Wetlands

Physical Disturbance

Wetlands are present adjacent to and within non-beach/dune training areas; personnel movement and vehicle movement do not destroy or modify wetlands. Vehicle movement would occur along existing pathways within these areas.

4.2.9.1.3 Soils

Physical Disturbance

The soils at St. Juliens Creek Annex within the training areas have a low to negligible potential for runoff. Most of the non-beach/dune training area is grass covered, which further minimizes soil disturbance. While a large portion of St. Juliens Creek Annex is not rated for military field operation suitability, the areas that are rated are identified as “very limited” or “somewhat limited;” however, the Navy has been conducting operations in these areas for decades. In addition, the rating reflects ideal conditions for heavy foot traffic and vehicle movement and Navy training is designed to incorporate real world conditions (i.e., not remain firm), Navy training is designed to incorporate real world conditions, which may not be ideal and therefore, the soils do not present an inability for USFF training to occur.

PTEAs that result in physical disturbance of soils within training areas may contribute to stormwater captured in the existing outfalls at St. Juliens Creek Annex. Per the existing Virginia Pollutant Discharge Elimination System permit and SWPPP, discharge is monitored from four outfalls that discharge to the Elizabeth River.

4.2.9.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no significant impacts on water resources.

4.2.9.3 Alternative 2

4.2.9.3.1 Surface Waters

Physical Disturbance

Under Alternative 2, nearly 400 additional people would move throughout non-beach/dune training areas within St. Juliens Creek Annex and vehicle movement operations would increase by approximately 1,890 hours annually over the No Action Alternative.

Physical disturbance from personnel movement and vehicle movement within training areas has been occurring for decades and the incremental increase in these activities would not significantly contribute to storm water runoff. Most of the non-beach/dune training areas are typically grass covered, which minimizes soil disturbance from personnel movement and vehicle movement is along compacted pathways.

Current water and sediment quality would remain unchanged as a result of Alternative 2. As noted in Section 3.2 (Water Resources), the Elizabeth River is considered impaired in various segments for the use designations of aquatic life, fish consumption, and recreation because of contaminants and other water quality issues and the Elizabeth River watershed has an approved TMDL for enterococci.

4.2.9.3.2 Wetlands

Physical Disturbance

Wetlands are present adjacent to and within non-beach/dune training areas; additional personnel movement and vehicle movement would not destroy or modify wetlands. Vehicle movement would occur along existing pathways within these areas and therefore avoid wetlands.

4.2.9.3.3 Soils

The soils at St. Juliens Creek Annex within the training areas have a low to negligible potential for runoff. In addition, while a large portion of St. Juliens Creek Annex is not rated for military field operation suitability, the areas that are rated are identified as “very limited” or “somewhat limited;” however, the Navy has been conducting operations in these areas for decades. In addition, the rating reflects ideal conditions for heavy foot traffic and vehicle movement and Navy training is designed to incorporate real world conditions (i.e., not remain firm), Navy training is designed to incorporate real world conditions, which may not be ideal and therefore, the soils do not present an inability for USFF training to occur.

PTEAs that result in physical disturbance of soils within training areas may contribute to stormwater captured in the existing outfalls at St. Juliens Creek Annex. Per the existing Virginia Pollutant Discharge Elimination System permit and SWPPP, discharge is monitored from four outfalls that discharge to the Elizabeth River.

4.2.9.4 Summary

The No Action Alternative represents baseline conditions. Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location. Under Alternative 2, nearly 400 additional personnel would move throughout non-beach/dune training areas within St. Juliens Creek Annex and vehicle movement operations would increase by approximately 1,890 hours annually over the No Action Alternative and Alternative 1.

Surface water impacts from ground disturbance would not be significant since training activities would not release pollutants or increase turbidity to storm water runoff under any alternative. Wetland areas are present adjacent to and within training areas; however, destruction or modification of wetlands would not occur. As a result, there would be no significant impacts on water resources.

4.2.10 Naval Weapons Station Yorktown

The PTEAs applicable to water resources at NWS Yorktown that contribute to the physical disturbance stressor include explosives on land, personnel and vehicle movement and that contribute to the pollutants stressor include explosives on land and weapons firing – non-lethal training ammunition (Table 4.2-7). Figure 4.2-8 depicts the training areas and water resources.

Table 4.2-7. Naval Weapons Station Yorktown Water Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Pollutants*	*No. of Events*	*Physical Disturbance*	*Pollutants*	*No. of Events*	*Physical Disturbance*	*Pollutants*
Land – Non-Beaches/ Dunes	Explosives on Land	demolition materials and charge	104	104 events (average 13 detonations/event with maximum NEW of 25 pounds)	104 events (average 13 detonations/event with maximum NEW of 25 pounds)						
	Personnel Movement	NA	104	1,560 people							
	Vehicle Movement	tactical and non-tactical vehicles	228	27,192 hours							
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	50		5,000 rounds						

Key: NA = not applicable; NEW = net explosive weight. Note: Additional training event details are in Appendix C.

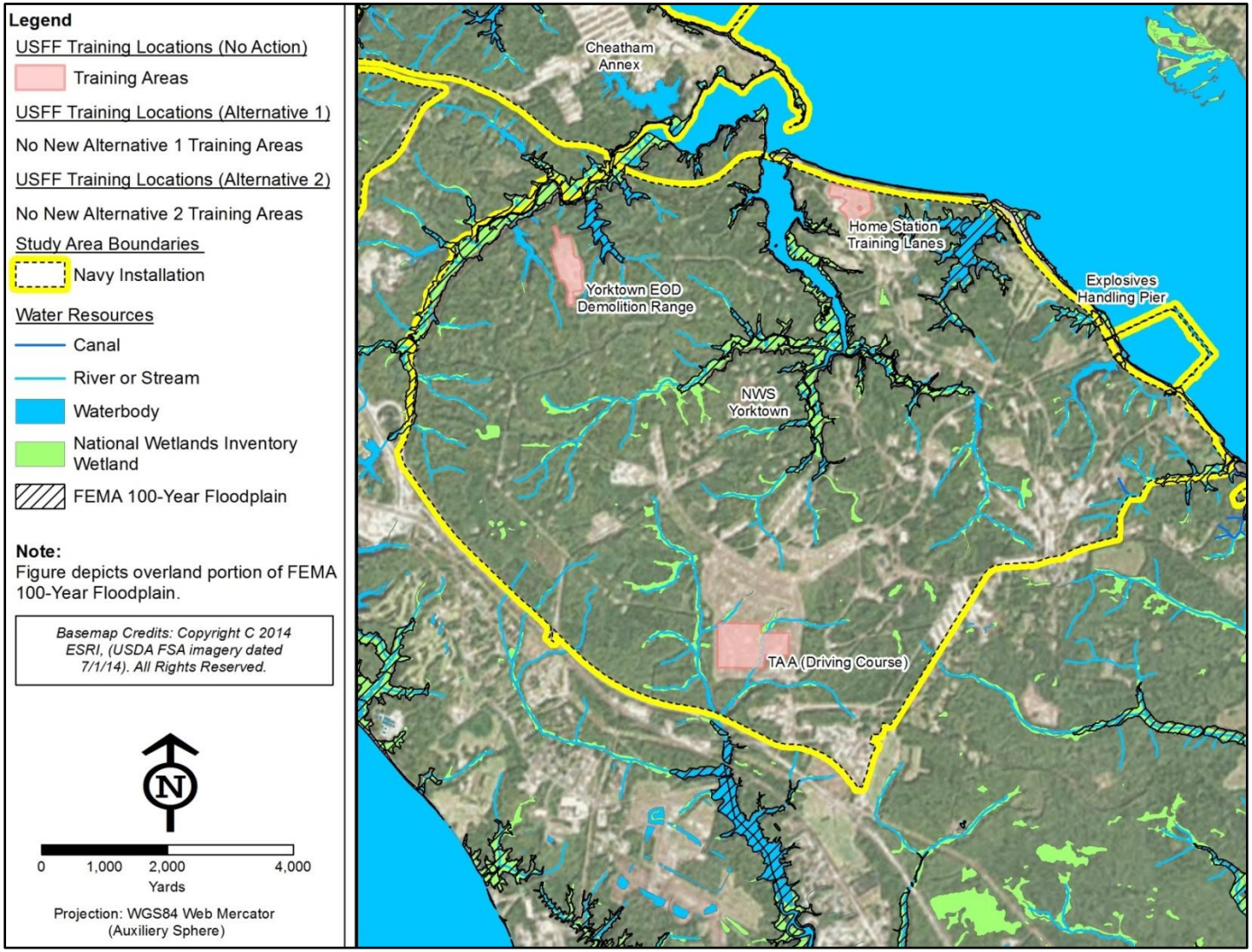

Figure 4.2-8. Naval Weapons Station Yorktown Water Resources

4.2.10.1 No Action Alternative

4.2.10.1.1 Surface Waters

Physical Disturbance

The potential impacts from physical disturbance associated with explosives on land are addressed in Section 4.2.3 (Impacts Common to All Locations Under All Alternatives), have been occurring for decades at this location, and do not significantly contribute to stormwater runoff.

Physical disturbance from personnel movement and vehicle movement within training areas has been occurring for decades and does not significantly contribute to stormwater runoff. Most of the non-beach/dune training areas are typically grass covered, which minimizes soil disturbance from personnel movement and vehicle movement is along compacted pathways. Current water and sediment quality remain unchanged as a result of the No Action Alternative.

PTEAs that result in physical disturbance of soils within training areas may contribute to stormwater captured in the existing outfalls at NWS Yorktown. Per the existing Virginia Pollutant Discharge Elimination System permit and SWPPP, discharge is monitored for total recoverable zinc, iron and aluminum at two outfalls, with specified effluent limitations.

Pollutants

The potential impacts from pollutants associated with explosives on land are addressed in Section 4.2.3 (Impacts Common to All Locations Under All Alternatives). Weapons firing – non-lethal training ammunition occur with the use of biodegradable paintball gun cartridges. As a result, negligible munitions constituents are present.

Current water and sediment quality remain unchanged as a result of the No Action Alternative. As noted in Section 3.2 (Water Resources), the York River watershed has numerous water quality impairments. The York River main stem has a TMDL for fecal coliform in shellfish waters, and King's Creek and Felgates Creek are included in a TMDL for fecal coliform. Training activities do not contribute any sources of bacterial contaminants that affect these water quality parameters and the TMDLs.

4.2.10.1.2 Wetlands

Physical Disturbance

Wetlands are not present in the vicinity of explosives training areas or near where personnel movement occurs. Wetlands are present adjacent to and within vehicle training areas; however, vehicle movement is not destroying or modifying wetlands and does not occur within the wetland area.

Pollutants

Wetlands are not present in the vicinity of explosives training areas.

4.2.10.1.3 Soils

Physical Disturbance

Over 90 percent of NWS Yorktown does not have soil data available; however, personnel movement and vehicle movement are not anticipated to significantly contribute to soil erosion because most of the non-beach/dune training areas are typically grass covered, which minimizes soil disturbance from

personnel movement. In addition, vehicle movement is along compacted pathways. Physical disturbance from explosives on land are not anticipated to increase erosion potential because explosives detonations occur within a bermed area and therefore do not increase soil erosion potential.

4.2.10.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.2.10.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.2.10.4 Summary

The No Action Alternative represents baseline conditions. Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative at this location. Surface water impacts from ground disturbance would not be significant since training activities would not release pollutants or increase turbidity to stormwater runoff at NWS Yorktown. As described in Section 4.2.3 (Impacts Common to All Locations Under All Alternatives), explosive detonations are conducted within bermed areas and quantities of explosives-related byproducts are expected to be very low, resulting in no detectable changes to water and sediment quality in the receiving waters. Wetland areas are present adjacent to and within training areas; however, destruction or modification of wetlands would not occur. As a result, there would be no significant impacts on water resources.

4.2.11 Cheatham Annex

The PTEAs applicable to water resources at Cheatham Annex that contribute to the physical disturbance stressor include personnel and vehicle movement (Table 4.2-8). Figure 4.2-9 depicts the training areas and water resources.

Table 4.2-8. Cheatham Annex Water Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Physical Disturbance*	*No. of Events*	*Physical Disturbance*	*No. of Events*	*Physical Disturbance*
Land – Non-Beaches/ Dunes	Personnel Movement	NA	32	11,585 people				
	Vehicle Movement	tactical and non-tactical vehicles	62	8,683 hours				
Water and Adjacent Shoreline	Personnel Movement	NA	1	24 people				

Key: NA = not applicable. Note: Additional training event details are in Appendix C.

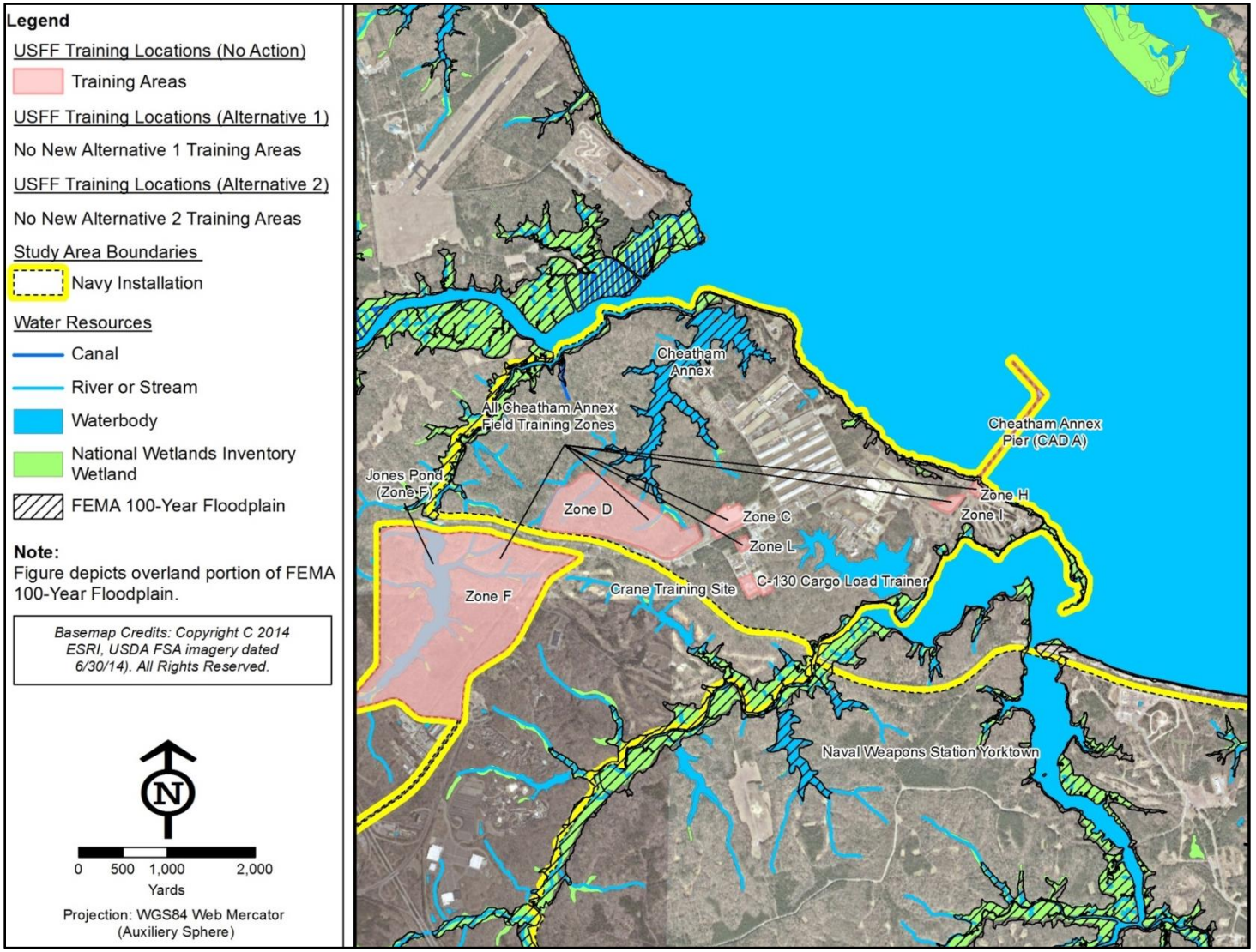

Figure 4.2-9. Cheatham Annex Water Resources

4.2.11.1 No Action Alternative

4.2.11.1.1 Surface Waters

Physical Disturbance

Physical disturbance from personnel movement and vehicle movement within training areas has been occurring for decades and does not significantly contribute to stormwater runoff. Most of the non-beach/dune training areas are typically grass covered, which minimizes soil disturbance from personnel movement and vehicle movement is along compacted pathways.

Current water and sediment quality remain unchanged as a result of the No Action Alternative. As noted in Section 3.2 (Water Resources), the York River watershed has numerous water quality impairments. The York River main stem has a TMDL for fecal coliform in shellfish waters and Queen Creek and King Creek, both of which border Cheatham Annex, are included in a TMDL for fecal coliform. Training activities do not contribute any sources of bacterial contaminants that affect these water quality parameters and the TMDLs.

PTEAs that result in physical disturbance of soils within training areas may contribute to stormwater captured in the existing outfalls at Cheatham Annex. Per the existing Virginia Pollutant Discharge Elimination System permit and SWPPP, discharge is monitored for total suspended solids, total petroleum hydrocarbons, and dissolved copper and zinc. The permit requires quarterly visual monitoring at outfalls in addition to the analytical monitoring.

4.2.11.1.2 Wetlands

Physical Disturbance

Wetlands are not present near where personnel movement and vehicle movement occurs.

4.2.11.1.3 Soils

Physical Disturbance

Over 90 percent of Cheatham Annex does not have soil data available; however, personnel movement and vehicle movement are not anticipated to significantly contribute to soil erosion because most of the non-beach/dune training areas are typically grass covered, which minimizes soil disturbance from personnel movement. In addition, vehicle movement is along compacted pathways.

4.2.11.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.2.11.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.2.11.4 Summary

The No Action Alternative represents baseline conditions. Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative at this location. Surface water impacts from

ground disturbance would not be significant since training activities would not release pollutants or increase turbidity to stormwater runoff at Cheatham Annex. Wetland areas are not present where training events occur. As a result, there would be no significant impacts on water resources.

4.2.12 First Landing State Park

The PTEA applicable to water resources at First Landing State Park that contributes to the physical disturbance stressor includes personnel movement (Table 4.2-9). Figure 4.2-10 depicts the training areas and water resources.

Table 4.2-9. First Landing State Park Water Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Physical Disturbance*	*No. of Events*	*Physical Disturbance*	*No. of Events*	*Physical Disturbance*
Land – Non-Beaches/ Dunes	Personnel Movement	NA	12	592 people				

Key: NA = not applicable. Note: Additional training event details are in Appendix C.

4.2.12.1 No Action Alternative

4.2.12.1.1 Surface Waters

Physical Disturbance

Personnel movement is along designated trails within the park. Physical disturbance from Navy personnel movement within First Landing State Park has been occurring for decades and does not significantly contribute to stormwater runoff. Current water and sediment quality remain unchanged as a result of the No Action Alternative. There is an approved TMDL for fecal coliform for the Lynnhaven River, Broad Bay, and Linkhorn Bay, which border the shoreline of First Landing State Park to the south and west. Training activities do not contribute any sources of bacterial contaminants that affect this water quality parameter or the TMDL.

4.2.12.1.2 Wetlands

Pollutants

Wetlands are present throughout the park; however, personnel movement does not destroy or modify wetlands.

4.2.12.1.3 Soils

Pollutants

The majority of First Landing State Park is identified as having soils with a low to negligible potential for runoff. While nearly all of First Landing State Park is rated “very limited” for military field operations, the Navy’s training events do not include activities similar to field operations.

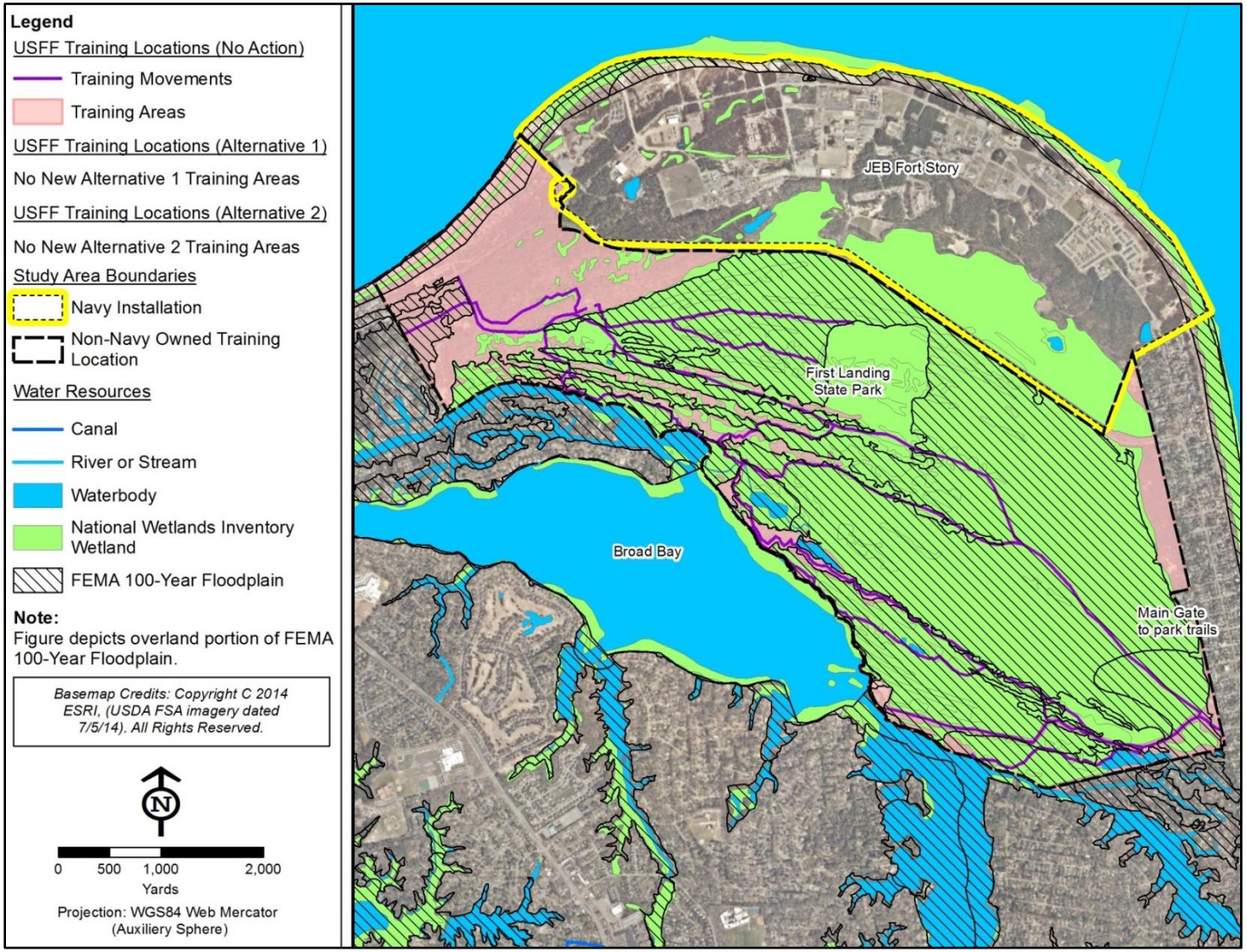

Figure 4.2-10. First Landing State Park Water Resources

4.2.12.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.2.12.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.2.12.4 Summary

The No Action Alternative represents baseline conditions. Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative at this location. Surface water impacts from ground disturbance would not be significant since training activities would not release pollutants or increase turbidity to stormwater runoff at First Landing State Park. Wetland areas would not be destroyed or modified. As a result, there would be no significant impacts on water resources.

4.2.13 Southern Branch of the Elizabeth River

The PTEAs applicable to water resources at the Southern Branch of the Elizabeth River that contribute to the physical disturbance stressor include personnel movement and vessel movement and that contribute to the pollutants stressor include weapons firing – blank-fire (Table 4.2-10). Figure 4.2-11 depicts the training areas and water resources.

4.2.13.1 No Action Alternative

4.2.13.1.1 Surface Waters

Physical Disturbance

Small groups of personnel potentially move within the shallow waters of the shoreline along the Southern Branch of the Elizabeth River during up to 30 annual events. Movement is limited to ingress and egress from small vessels when they are in nearshore areas. The ingress and egress activity does not involve movement onto land.

Physical disturbance along the shorelines due to personnel movement potentially occurs; however, these activities occur on sandy substrates and any sediments resuspended quickly resettle in the water and do not impair water quality.

Vessel movement occurs over a broad area in the Southern Branch of the Elizabeth River and training activities are primarily conducted along the deepest portions of the water channels at appropriate speeds for the site conditions. Vessels do not transit waterways without sufficient water depth to safely accommodate the vessel. Therefore, impacts to water column turbidity from vessel prop wash and wakes are negligible.

Table 4.2-10. Southern Branch of the Elizabeth River Water Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Pollutants*	*No. of Events*	*Physical Disturbance*	*Pollutants*	*No. of Events*	*Physical Disturbance*	*Pollutants*
Water and Adjacent Shoreline	Personnel Movement	NA	30	2,160 people							
	Vessel Movement	small vessels	30	30 nearshore activities/ 1,980 hours							
	Weapons Firing – Blank-Fire	small caliber	30		21,600 uncaptured rounds						

Key: NA = not applicable. Note: Additional training event details are in Appendix C.

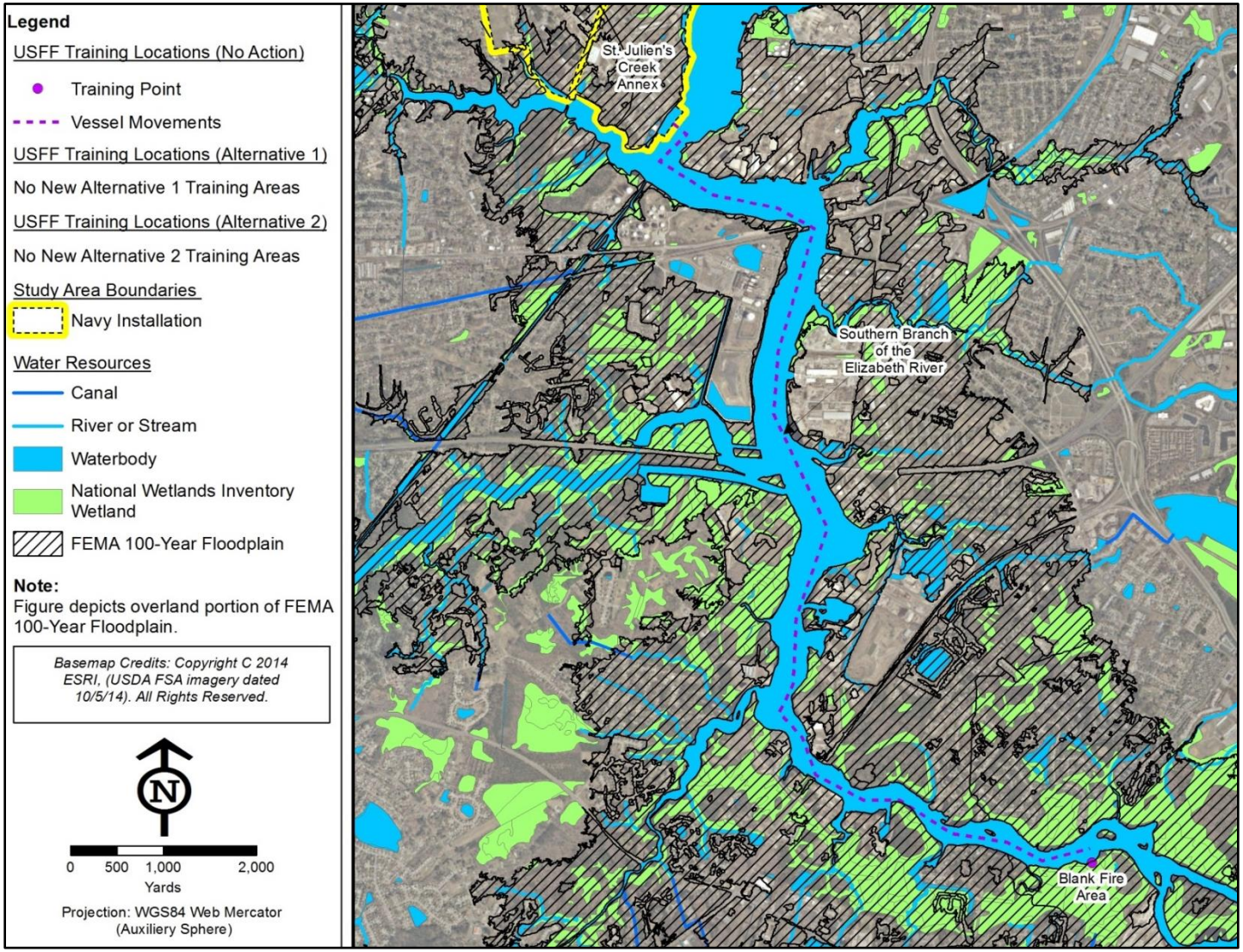

Figure 4.2-11. Southern Branch of the Elizabeth River Water Resources

Pollutants

With vessel-based, small arms training not all expended brass from blank-fire is captured within the vessel. Approximately 21,600 rounds of expended brass casing from blank-fire are not captured during Navy training events. The uncaptured expended brass casings represent approximately 15 percent of all blank-fire rounds expended during training activities in the Southern Branch of the Elizabeth River. The expended brass casings are dispersed within a designated area and expected to deteriorate/corrode over long-term timeframes; burial and encrustation slow the deterioration/corrosion process and tidal flow could cause even further dispersal of the material.

A variety of factors have been identified that directly influence metal corrosion of submerged objects; these include water composition (e.g., dissolved oxygen, pH, salinity), temperature, water movement, and the presence of microbiological organisms in the water (North & MacLeod, 1987). Wang et al. (2011) and George et al. (2015) conducted a study to evaluate corroded underwater military munitions and develop a scientific basis for informing predictive modeling of specific corrosion behaviors of shell casings associated with various classes of underwater military munitions in the marine environment. This study noted that the corrosion rate increases as the rate of water flow increases, the corrosion rate is generally higher in seawater than in fresh water, and corrosion of brass is generally less than 1 mil (0.001 inches) per year in seawater (Navy, 2018). As noted in Section 3.2 (Water Resources), the portion of the Southern Branch of the Elizabeth River that includes the study area is estuarine (in the transition zone between river and marine environments). As a result, the corrosion of brass casings would be expected to be less than 0.001 inches per year.

The burial process is related to the scour induced by the presence of the brass casings (scouring is a specific type of erosion that involves the removal of underwater material by waves and currents) (Navy, 2018). Burial rates due to scour by wave action are faster in shallow water (3 to 12 meters) (Navy, 2018). In addition, dispersal of brass casings along the river bottom increases with increasing wave velocity. Greater water motion also increases mechanical erosion of the metal surface of the brass casings and increases the corrosion rate. The corrosion rate combined with burial/dispersion of the casings is not expected to result in detectable changes in sediment quality from the casings that may be deposited on the river bottom. In addition, dredging within the Southern Branch of the Elizabeth River may periodically remove expended brass casings from the sediment.

Current water and sediment quality remain unchanged as a result of the No Action Alternative. Existing water quality impairments pertain to dissolved oxygen and fecal bacteria. Training activities do not result in any discharges of pollutants to the waterways that contribute to these water quality parameters.

4.2.13.1.2 Wetlands

Physical Disturbance

The Southern Branch of the Elizabeth River is bordered by wetlands for portions of the length within the study area; however, personnel movement and vessel movement do not destroy or modify wetlands.

4.2.13.1.3 Shorelines

Physical Disturbance

The shorelines along the Southern Branch of the Elizabeth River within the study area vary from undeveloped to developed areas. Personnel movement within the shallow water shorelines generally occur in undeveloped areas. This activity is intermittent and brief in duration; as a result, personnel movement adjacent to shorelines does not alter their existing status.

Physical disturbance along the shorelines could occur from vessel use in shallow water and boat wakes along shorelines. Navy vessel operators practice safe navigation and travel at a safe speed. In general, vessel movement that generates wakes is conducted in designated channels away from shorelines; vessel movement near shorelines occurs at low speeds. Therefore, impacts to water column turbidity and shoreline stability from vessel prop wash and wakes are negligible.

4.2.13.1.4 Sediments

Physical Disturbance

Physical disturbance along the shorelines due to personnel movement potentially occurs; however, these activities occur on sandy substrates and any sediments resuspended quickly resettle in the water. Sediments disturbed from vessel movement consist of sands that quickly resettle and do not contribute to turbidity in the water column.

4.2.13.1.5 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.2.13.1.6 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.2.13.1.7 Summary

The No Action Alternative represents baseline conditions. Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative at this location. Surface water impacts from physical disturbance would not be significant since training activities would not increase turbidity along the Southern Branch of the Elizabeth River. Wetlands are present along the Southern Branch of the Elizabeth River; however, destruction or modification of wetlands would not occur. Shorelines along the Southern Branch of the Elizabeth River would not be impacted by training events. Sediments are primarily sandy substrate and physical disturbance of those sediments would be temporary with sands quickly resettling. While uncaptured brass casings are dispersed within a designated area during training activities in the Southern Branch of the Elizabeth River, current water and sediment quality remain unchanged due to brass casing deterioration, tidal flow dispersion of casings, and periodic dredging of the area. As a result, there would be no significant impacts on water resources.

4.2.14 Water Resources Summary

4.2.14.1 No Action Alternative Water Resources Summary

The No Action Alternative represents a continuation of the existing level and intensity of annual training. The impacts on water resources are ongoing and reflected in existing conditions within the study area. Current water and sediment quality remain unchanged as a result of the No Action Alternative.

There are no significant impacts on water resources. Surface water impacts from physical disturbance are not significant since training activities do not increase contributions of nutrients or substances that affect dissolved oxygen conditions to stormwater or water resources located at or near the training sites. Stormwater outfalls would continue to be monitored in accordance with existing permits and plans. Weapons firing – non-lethal training ammunition activities occur with the use of biodegradable paintball gun cartridges. As a result, no munitions constituents are present and no impacts to water resources occur. As described in Section 4.2.3 (Impacts Common to All Locations Under All Alternatives), explosive detonations are conducted within bermed areas and quantities of explosives related byproducts are expected to be very low, resulting in no detectable changes to water and sediment quality in the receiving waters. Wetland areas are present within and adjacent to training areas; however, destruction or modification of wetlands would not occur. Some shorelines are within a coastal flood zone with velocity hazard, but training events would not impact that status. In addition, shorelines along the Southern Branch of the Elizabeth River would not be altered by training events because the activities primarily occur within the water and do not result in degradation of the shoreline. Soils present within the training areas have varying potential for runoff; beach/dune areas have the greatest potential for erosion. The Navy manages beach/dune areas to minimize erosion and maintain shorelines for training events. Sediments within the Southern Branch of the Elizabeth River may temporarily experience physical disturbance but the sandy substrate resettles quickly. To the maximum extent practicable, brass casings are recovered on land or captured in vessels. In addition, uncaptured brass casings are expected to deteriorate and may disperse with tidal flow; periodic dredging may further remove casings from the sediment. As a result, there would be no significant impacts on water resources.

4.2.14.2 Alternative 1 Water Resources Summary

Alternative 1 includes the same activities as the No Action Alternative with an increase in annual frequency for most training activities. There would be no significant impacts on water resources. The additional training events would not increase contributions of nutrients or substances that affect dissolved oxygen conditions to stormwater or water resources located at or near the training areas. Stormwater outfalls would continue to be monitored in accordance with existing permits and plans. Wetland areas are present within and adjacent to training areas; however, destruction or modification of wetlands would not occur. Some shorelines are within a coastal flood zone with velocity hazard but training events would not impact that status. In addition, shorelines along the Southern Branch of the Elizabeth River are not altered by training events because the activities primarily occur within the water and would not result in degradation of the shoreline. Soils present within the training areas have varying potential for runoff; beach/dune areas have the greatest potential for erosion. The Navy manages beach/dune areas to minimize erosion and maintain shorelines for training events. Sediments within the Southern Branch of the Elizabeth River may temporarily experience physical disturbance but the sandy substrate resettles quickly. To the maximum extent practicable, brass casings are recovered on land or

captured in vessels. In addition, uncaptured brass casings are expected to deteriorate and may disperse with river currents; periodic dredging may further remove casings from the sediment. The increases in explosives training would not be located near open waters and would not have any effect on water or sediment quality. As under the No Action Alternative, weapons firing with non-lethal training ammunition would use biodegradable paintball gun cartridges and therefore, no munitions constituents would be present. Therefore, Alternative 1 would have no significant impacts on water resources.

4.2.14.3 Alternative 2 Water Resources Summary

Alternative 2 includes the same activities as the No Action Alternative with an increase in annual frequency for most training activities. There would be no significant impacts on water resources. The additional training events would not increase contributions of nutrients or substances that affect dissolved oxygen conditions to stormwater or water resources located at or near the training areas. Stormwater outfalls would continue to be monitored in accordance with existing permits and plans. Wetland areas are present within and adjacent to training areas; however, destruction or modification of wetlands would not occur. Some shorelines are within a coastal flood zone with velocity hazard but training events would not impact that status. In addition, shorelines along the Southern Branch of the Elizabeth River are not altered by training events because the activities primarily occur within the water and would not result in degradation of the shoreline. Soils present within the training areas have varying potential for runoff; beach/dune areas have the greatest potential for erosion. The Navy manages beach/dune areas to minimize erosion and maintain shorelines for training events. Sediments within the Southern Branch of the Elizabeth River may temporarily experience physical disturbance but the sandy substrate resettles quickly. To the maximum extent practicable, brass casings are recovered on land or captured in vessels. In addition, uncaptured brass casings are expected to deteriorate and may disperse with river currents; periodic dredging may further remove casings from the sediment. The increases in explosives training would not be located near open waters and would not have any effect on water or sediment quality. As under the No Action Alternative, weapons firing with non-lethal training ammunition would use biodegradable paintball gun cartridges and therefore, no munitions constituents would be present. Therefore, Alternative 2 would have no significant impacts on water resources.

4.3 Biological Resources

4.3.1 Overview

All PTEAs occurring within the study area (see Table 2-1, Primary Training Event Activities) take place within an approximately 40-mile radius of Naval Station Norfolk, located in Norfolk, Virginia. This relative proximity of training areas means that many abiotic factors (e.g., temperature, precipitation, sunlight, prevailing winds, and geology) that influence flora and fauna distribution are similar and, as a consequence, species composition is generally the same across the study area. Many of the training events covered in this section have similar potential impacts. As such, the potential impacts associated with PTEAs are primarily included in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). For those instances where a potential impact would be limited to one or two of the PTEAs, the potential impact is covered under the specific training area.

4.3.2 Methodology

Evaluation of potential impacts was completed using existing natural resource survey data, literature reviews, and analysis of current training activities. Training activities were analyzed to determine the

manner in which they would potentially act as stressors to the biological resources present at each location as described in Chapter 3 (Affected Environment). Biological resources stressors include physical disturbance, physical strike, noise, and ingestion. The physical disturbance stressor applies to habitats and vegetation whereas the physical strike, noise, and ingestion stressors apply to species.

Determination of potential impacts considers interaction of mechanisms for impact as identified by stressor category with the likelihood of occurrence of a species, and the susceptibility of a particular species to the stressor.

Endangered Species Act (ESA) protected species were evaluated for determinations of (i) no effect, (ii) may affect, not likely to adversely affect, or (iii) likely to adversely affect. Marine Mammal Protection Act (MMPA) protected species were evaluated for "take" or "no take" determinations.

Evaluation of potential impacts also takes into consideration natural resources management measures pursuant to Integrated Natural Resources Management Plans (INRMPs). Pursuant to the Sikes Act, the Navy must implement and maintain a balanced and integrated program for the management of natural resources. This is done in large part through the development of INRMPs, which are long-term planning documents that guide the implementation of the Natural Resources Program. The INRMP supports installation missions, while protecting and enhancing natural habitats. An INRMP integrates all aspects of natural resources management, including the various components of the Environmental Compliance Program, Environmental Restoration Program (ERP), and Cultural Resources programs, as well as the management of sensitive species, wetlands, watershed and floodplain protection, wildlife, grounds maintenance, pest management, and outdoor recreation with the current military mission. INRMPs exist for all of the locations covered in this study with the exception of St. Juliens Creek Annex, First Landing State Park, and the Southern Branch of the Elizabeth River.

4.3.3 Impacts Common to All Locations Under All Alternatives

This section covers potential impacts to biological resources that are common to all locations. In addition, this section identifies the natural resource management standard operating procedures (SOPs) (e.g., SOPs for sea turtles), and natural resources management measures implemented in large part pursuant to the Sikes Act Improvement Act of 1997. Additionally, it should be noted that training SOPs (those military procedures carried out when conducting specific training activities) often have secondary benefits to the environment. For those instances where a potential impact is unique to a specific training area, the discussion for that potential impact is covered under the corresponding training area.

JEB Fort Story, JEB Little Creek, and Dam Neck Annex and Camp Pendleton entail PTEAs that take place in both beach/dune habitat and inland habitats. NALF Fentress, Northwest Annex, St. Juliens Creek Annex, First Landing State Park, NWS Yorktown, and Cheatham Annex occur in inland habitats. Cheatham Annex and the Southern Branch of the Elizabeth River entail PTEAs that take place on water and adjacent shorelines.

4.3.3.1 Habitats and Vegetation

For the purposes of this document a detailed characterization of habitat and vegetation type is not necessary to assess potential impacts of the various training activities. Within the study area, undeveloped terrestrial habitats are generally composed of beaches, primary and secondary dunes, open fields, and forests. Vegetation within each of the habitats can be broadly described as follows: beaches, consisting of largely unvegetated sandy shores; primary dunes close to the shoreline

dominated by herbaceous species and secondary dunes located further inland dominated by coastal forested species; open fields located further inland dominated by herbaceous species; and forested areas dominated by a combination of deciduous and non-deciduous tree species. Where available, a more in-depth description of habitats and vegetation types can be obtained from installation INRMPs. Natural resource management practices employed to protect habitats and vegetation include use of signage and physical barriers to limit access when appropriate, restricting vehicles to existing trails and roadways, and including any restrictions in installation planning documents and maps (e.g., INRMPs, Range Management Plans, and Installation Master Plans). In addition, installation natural resource managers monitor conditions on installations to identify potential issues before they become a problem.

Physical Disturbance

Physical disturbance associated with beach landings, personnel movement, vehicle movement, and explosives on land have the potential to disturb individual plants and soils which could degrade habitats over time. Training that utilizes beach habitats would be restricted to unvegetated portions of the beach. Training activities that require traversing primary dunes would be completed using existing access points. Vehicles training at inland areas would typically use existing roads and trails. Signs and fencing to limit access to sensitive areas would be utilized. In addition, natural resource managers may use INRMPs and annual INRMP reviews to assess the management of established special interest areas. For example, in accordance with INRMP responsibilities, natural resource managers may periodically monitor dune stabilization and restoration efforts to evaluate the success of dune protection.

4.3.3.2 Mammals

The terrestrial mammals within the study area training locations are primarily common species that are adapted to an urban and suburban environment and therefore, have habituated to the disturbances of a human altered environment, including the stressors associated with PTEAs. Most mammals in the study area are highly mobile and agile, and most individuals would move away from an area of a training activity or, in the case of small mammals, move into a protected location, such as a burrow or vegetation, for cover. Many installations implement projects to enhance or restore native habitats as part of the INRMP.

Physical Strike

Physical strike associated with beach landings, vehicle movement, explosives on land, and weapons firing – non-lethal training ammunition has the potential to impact mammals. Some individual mammals may not be able to move out of the way of potential strikes; however, most mammals are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, move into a protected location, such as a burrow or vegetation, for cover. Certain management measures are undertaken at installations in accordance with the INRMP that reduce the potential for physical strike. These measures may include managing species and habitats within the constraints of the military mission and balancing population levels with habitat carrying capacity.

Noise

Noise associated with vehicle movement, equipment use (operation of generators), explosives on land, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition all have the potential to disturb mammals to varying degrees. A multitude of studies evaluating a wide range of noise sources and analyzing a number of different stress responses in wildlife have been completed. The level of response depends on a number of factors, including the life-history characteristics of the species,

characteristics of the training activities, habitat type, and the species' previous exposure to the noise source. Several studies indicate a strong tendency for many species to acclimate or habituate to noise disturbances (Grubb & King, 1991; Ellis et al., 1991; Black et al., 1984; Conomy et al., 1998). Most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain management measures set forth in INRMPs has the effect of minimizing noise impacts to mammals. These measures are tailored to the specific conditions of the installation but may generally include respect for fenced or posted wildlife protection areas and spatial separation of established training areas from installation boundaries by establishing interior forested or bermed noise buffer zones.

4.3.3.3 Invertebrates

Due to their diminutive nature most terrestrial invertebrates, with a few exceptions (e.g., flying insects), have limited spatial mobility when compared to other species. When disturbed, most invertebrates would be protected by their use of cover or burrowing habitats. INRMPs contain provisions to benefit invertebrates. For example, installation INRMPs emphasize the implementation of Executive Order (EO) 13148, *Greening the Government Through Leadership in Environmental Management*. This EO requires federal agencies to incorporate the principles and practices of beneficial landscaping. This effort includes the reduction in pesticide use which benefits invertebrates on the installation. Habitat enhancement and restoration projects, including the use of native plant species in landscaping, also benefit invertebrates.

Physical Strike

Physical strike associated with beach landings, vehicle movement, explosives on land, and weapons firing – non-lethal training ammunition have the potential to impact invertebrates; however, most invertebrates would be protected by use of cover or burrowing habitats. Flying invertebrates are highly mobile and agile and would likely move away from a training activity. Weapons firing – blank-fire results in expended brass casings; however, the casings are picked up by the Navy and do not pose a strike risk as they are expended in close proximity to the weapon, where invertebrates would not be expected to occur.

Noise

Noise associated with vehicle movement, equipment use (operation of generators), explosives on land, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition all have the potential to disturb invertebrates. Many invertebrates have proven ability to hear and use sound for a variety of reasons (Morley et al., 2014). Invertebrates rely on communication at frequencies within the main frequency spectrum of many anthropogenic noise sources (Morley et al., 2014). As a result, it is realistic to conclude that noise has the potential to temporarily interfere with invertebrate communication within the training area. Most noise events would be localized and occur for a relatively short period of time (minutes to hours).

4.3.3.4 Reptiles and Amphibians

When disturbed, most reptiles and amphibians would move into a protected location, such as a burrow or vegetation for cover; however, depending on the situation, reptiles and amphibians are also known to exhibit a passive response to disturbance (e.g., freezing/playing dead) until perceived to be threatened (Bowles, 1995). Projects implemented as part of the INRMP that enhance and restore habitat would also

benefit reptiles and amphibians, including but not limited to those that limit access to sensitive breeding sites and those projects that monitor populations of threatened and endangered species.

Physical Strike

Physical strike associated with beach landings, vehicle movement, explosives on land, and weapons firing – non-lethal training ammunition have the potential to impact reptiles and amphibians; however, many reptiles and amphibians, such as larger snakes, frogs, and lizards are mobile and agile and would move from the training area when disturbed. Based on the terrain and safety requirements, vehicles are not expected to attain speeds that would be likely to result in collisions with reptiles and amphibians. Other less spatially mobile species, such as salamanders, skinks, and small snakes, are secretive and most individuals would be protected by their use of cover or burrowing habits. Weapons firing – blank-fire results in expended brass casings; however, the casings are picked up by the Navy and do not pose a strike risk as they are expended in close proximity to the weapon, where reptiles and amphibians would not be expected to occur.

Noise

Noise associated with vehicle movement, equipment use (operation of generators), explosives on land, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition all have the potential to disturb frogs and toads during spring breeding periods when vocal communication is used to identify breeding locations and individuals. Natural and artificial sounds can disrupt behavior by auditory masking or interfering with an animal's ability to detect and interpret other relevant sounds, such as communication signals (Wartzok et al, 2003). However, the higher normal ambient sound caused by ocean surf and/or the urban and suburban setting of the base may lessen disturbance by habituating frogs and toads to noise (Brown et al., 2012). In addition, most noise events would be localized and occur for a relatively short period of time (minutes to hours).

4.3.3.5 Birds

Most birds within the study area are species adapted to an urban and suburban environment and therefore, habituated to the disturbances of a human altered environment. Research suggests that bird populations in urban environments can rebound very shortly, even after large-scale, extremely noisy events (Payne et al., 2012). All PTEAs but one (i.e., personnel movement) associated with the Proposed Action generate noise. The PTEA of explosives on land generates noise and also generates a relatively small degree of air blast and associated overpressure. The range from the explosion point at which dangerous pressure occurs is dependent on the size of the explosion. Nearly all bird species occurring on the study area installations are protected by the MBTA. Noise alone generated by the Proposed Action is not expected to result in incidental takes, but some incidental takes of migratory birds could occur should a bird be in close proximity to the air blast and overpressure generated by explosives on land (i.e., those occurring at NWS Yorktown, JEB Little Creek, and JEB Fort Story). Given the human presence during the events, short duration of explosive events, and lack of habitat around EOD detonation ranges, there is little likelihood that an individual bird would be present in close proximity to a detonation event. Nonetheless, there is a remote possibility for incidental takes of migratory birds.

Therefore, the Navy has determined that the Proposed Action may result in the "take" of migratory birds. The term "take," as defined by the U.S. Fish and Wildlife Service (USFWS) for purposes of the MBTA, means to "pursue, hunt, shoot, wound, kill, trap, capture, or collect" (50 CFR part 10.12). The Proposed Action, however, is a military readiness activity; therefore, "take" is in compliance with the

MBTA. Under the MBTA regulations applicable to military readiness activities (50 CFR Part 21), the USFWS has promulgated a rule that authorizes the incidental take of migratory birds, provided it does not result in a significant adverse effect on a population of a migratory bird species. The proposed PTEAs would not result in a significant adverse impact on a population of a migratory bird species (including those categorized as Birds of Conservation Concern). INRMP management measures that benefit bird species include habitat enhancement and restoration projects, implementing nesting programs (e.g., osprey platforms, blue bird boxes, etc.), shorebird nesting surveys, limiting access to nesting sites, and limiting tree clearing and tree maintenance during breeding seasons.

The USFWS established National Bald Eagle Management Guidelines in 2007 that include protective measures outlined in the Bald and Golden Eagle Protection Act (16 United States Code [U.S.C.] sections 668–668c) and the MBTA (16 U.S.C. sections 703–712). Both the Bald and Golden Eagle Protection Act and MBTA protect bald eagles by prohibiting killing, selling, or otherwise harming eagles, their nests, or eggs. The Bald and Golden Eagle Protection Act also protects eagles from disturbance. The tolerance level of bald eagles to noise continues to be an ongoing question that lacks sufficient research. Tolerance to noise is subject to spatial and temporal variations in the landscape and the source of the noise. As bald eagle nests are identified on study area installations, a 500-foot buffer around the nest should be established as recommended by the Virginia Department of Game and Inland Fisheries. Any project or activity requests within the established 500-foot buffer around bald eagle nests will require consultation with the USFWS and Virginia Department of Game and Inland Fisheries. The Proposed Action is unlikely to disturb nesting bald eagles. No Eagle Act permit is required.

Physical Strike

Physical strike associated with beach landings, vehicle movement, explosives on land and weapons firing – non-lethal training ammunition have the potential to impact birds; however, generally birds are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. Weapons firing – blank-fire results in expended brass casings and do not pose a strike risk as they are expended in close proximity to the weapon, where birds would not be expected to occur.

Noise

Noise associated with vehicle movement, equipment use (operation of generators), explosives on land, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition all have the potential to disrupt vocal communications and startle birds during daily activities. However, the higher normal ambient sound caused by ocean surf and/or the urban and suburban setting of the base may lessen disturbance by habituating birds to noise. In addition, most noise events would be localized and occur for a relatively short period of time (minutes to hours).

4.3.3.6 Federally Protected Species and Critical Habitats

4.3.3.6.1 Northern Long-Eared Bat (*Myotis septentrionalis*)

Large wooded tracts within the study area offer potential summer habitat for northern long-eared bats, which have been documented at most study area installations addressed in this EA. Under the ESA, the final 4(d) rule for the northern long-eared bat prohibits incidental take for activities that occur within 0.25 mile of any known hibernacula at any time of year or activities that involve cutting or destroying known maternity roost trees or any other trees within a 150-foot radius during the pup season (June 1 through July 31). All other incidental take is allowed. This project does not propose any tree removal, is

not located within a 150-foot radius of any documented maternity roost trees, and does not occur within 0.25 mile of any hibernacula. Based on the stressors of physical strike and noise associated with Proposed Action PTEAs (described below), the Proposed Action may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat. The Navy is relying on the findings of the Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions (January 5, 2016) to fulfill its project-specific ESA section 7 responsibilities.

Physical Strike

Physical strike associated with beach landings, vehicle movement, explosives on land, and weapons firing – non-lethal training ammunition have the potential to impact bats; however, generally bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements. Weapons firing – blank-fire results in expended brass casings; however, the casings are picked up by the Navy and do not pose a strike risk as they are expended in close proximity to the weapon, where species would not be expected to occur.

Noise

Noise associated with vehicle movement, equipment use (operation of generators), explosives on land, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition all have the potential to startle bats. However, the higher normal ambient sound caused by the urban and suburban setting of most of the installations may lessen disturbance by habituating bats to noise. In addition, most noise events would be localized and occur for a relatively short period of time (minutes to hours).

4.3.3.6.2 Piping Plover (*Charadrius melodus*)

JEB Little Creek, JEB Fort Story, and Dam Neck Annex include appropriate foraging habitats and are in the range of the piping plover. Based on survey data, it is likely that any individuals observed on-site would be rare occurrences and considered transient individuals (Navy, 2017d). No federally threatened or endangered bird species have been documented at JEB Little Creek, including the piping plover. A March and April 2013 survey at JEB Fort Story documented only one transient piping plover. Considering the survey results, there is a low likelihood that the piping plover would occur regularly at JEB Little Creek or JEB Fort Story. The piping plover has been observed along the beaches of Dam Neck Annex, most recently on April 8, 2013; however, there is no documentation of this species nesting at Dam Neck Annex as cited in the INRMP for NAS Oceana Dam Neck Annex. Based on the following discussion of physical strike and noise stressors, the Navy has determined that the Proposed Action may affect, but is not likely to adversely affect, the ESA-listed piping plover.

Physical Strike

Physical strike associated with beach landings, vehicle movement, explosives on land, and weapons firing – non-lethal training ammunition have the potential to impact birds; however, generally birds, including piping plovers, are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. The fact that piping plovers are rarely sighted in surveys and have not been observed nesting on these study area beaches makes physical strike unlikely.

Noise

Noise associated with vehicle movement, equipment use (operation of generators), explosives on land, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition all have the potential to disrupt vocal communications and startle birds during daily activities. However, the higher than

normal ambient sound caused by ocean surf and/or the urban and suburban setting may lessen disturbance by habituating birds to noise. Wildlife has been shown to habituate to blast noise (including that from cannon fire and bombing ranges) (Larkin et al., 1996). In addition, most noise events would be localized and occur for a relatively short period of time (minutes to hours).

4.3.3.6.3 Red Knot (*Calidris canutus*)

JEB Little Creek, JEB Fort Story, and Dam Neck Annex include appropriate foraging habitats and are in the range of the red knot. However, the red knot breeds in northern Canada and Alaska and winters in South America, only using the Atlantic coast during fall and spring migratory movements (Audubon, 2017). Red knots have been observed during a survey at Dam Neck Annex, but not at the other installations. Red knots have been reported during Christmas bird counts in the Tidewater area. It is likely that any individuals observed on-site would be rare occurrences and considered transient individuals. Thus, the Navy has determined that the Proposed Action would have no effect on the ESA-listed red knot at JEB Little Creek; and the Proposed Action may affect, but is not likely to adversely affect the ESA-listed red knot at JEB Fort Story and Dam Neck Annex.

4.3.3.6.4 Roseate Tern (*Sterna dougallii*)

JEB Little Creek, JEB Fort Story, and Dam Neck Annex include appropriate foraging habitats and are in the range of the species. Roseate terns nest on small barrier islands, often at ends or breaks. The North American subspecies is divided into two separate breeding populations; one in the northeastern United States and Nova Scotia and another in the southeastern United States and Caribbean. Roseate terns are most common in the central portion of this range, from Massachusetts to Long Island, New York (USFWS, 2011a). No roseate terns have been observed at any of the installations. Based on the foregoing, the Navy has determined that the Proposed Action would have no effect on the ESA-listed roseate tern.

4.3.3.6.5 Small Whorled Pogonia (*Isotria medeoloides*)

NWS Yorktown and Cheatham Annex are in the historical range of the small whorled pogonia, and both installations contain appropriate habitats for the species. Habitat preferences include older hardwood stands of beech, birch, maple, oak, and hickory with an open understory, acidic soils, and a leaf layer (USFWS, 2016a). Although within the historical range, the species has not been confirmed as present at NWS Yorktown or Cheatham Annex. And, though no formal critical habitat has been designated at NWS Yorktown or Cheatham Annex, a number of ecologically significant communities that support or have the potential to support rare or at risk species have been identified (Navy, 2010a). These communities, as well as existing information on rare species have formed the basis for the designation of eight ecological areas that merit conservation and protection at NWS Yorktown and Cheatham Annex. Six of the ecological areas are located at NWS Yorktown and three at Cheatham Annex. Delineating these areas and implementing the specific habitat management measures described in the INRMP ensures the continued protection of the natural heritage resources. Pursuant to the ESA, the Navy has determined that the Proposed Action would have no effect on the ESA-listed small whorled pogonia.

Physical Disturbance

Physical disturbance associated with personnel movement, vehicle movement, explosives on land and weapons firing – non-lethal training ammunition will occur in training areas that are primarily paved

surfaces, mowed lawn, and mowed old field outside of any potential habitats for this species. In addition, vehicles training at inland areas would be restricted to existing roads and trails. Signs and fencing to limit access to sensitive areas would be utilized. In addition, annual monitoring by installation Natural Resources staff would be employed to identify potential impacts before they become an issue.

4.3.3.6.6 Harbor Seals

Harbor seals have been seen hauling out on the beaches at Dam Neck Annex/Camp Pendleton, First Landing State Park, and possibly JEB Fort Story from late fall through early spring. There is a potential for harbor seals to haul out at other locations, including JEB Little Creek. As discussed below, physical strike and noise associated with personnel movement, vehicle movement, explosives on land, and weapons firing would not result in the unintentional taking of harbor seals incidental to those activities, as defined by the MMPA. As a result, the Navy has determined that the No Action Alternative would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

Physical Strike

There is a potential for amphibious vehicles to physically strike a hauled-out harbor seal. While strikes of in-water seals are documented, strikes of hauled out harbor seals have not been identified for the study area. Since the species is likely to return to the water when people, amphibious craft, or vehicles are present or approaching, strikes of hauled out seals are not likely to occur. The potential for in-water seal strikes in the study area is addressed in the updated AFTT EIS/Overseas EIS.

Noise

Hauled-out harbor seals may react to the presence of people, amphibious craft, and vehicles and temporarily return to the water. Such reactions would reduce the potential for hauled-out seals to incur injury from physical strike, discussed above. Hauled-out pinnipeds may be disturbed when approached at close distance, though research indicates such reactions are somewhat context dependent (Andersen et al., 2012; Curtin et al., 2009; Hoover-Miller et al., 2013; Jansen et al., 2010; Johnson & Acevedo-Gutiérrez, 2007; Suryan & Harvey, 1998; Weiss & Morrill, 2014; Young et al., 2014). For example, one study showed that harbor seals were disturbed by tourism-related vessels, small boats, and kayaks that stopped or lingered by haul-out sites but that the seals "do not pay attention to" passing vessels at closer distances (Johnson & Acevedo-Gutiérrez, 2007). Pinnipeds in the water generally appear less responsive (Richardson et al., 1995) than those at haul-out sites. Noise disturbance to hauled-out harbor seals is unlikely to result in more than short-term interference with resting activities of seals.

4.3.3.6.7 Sea Turtles

Sea turtles are known to occur in the waters off JEB Little Creek, JEB Fort Story, Dam Neck Annex/Camp Pendleton. There is no historical evidence of nesting sea turtles at JEB Little Creek. At JEB Fort Story and Dam Neck Annex/Camp Pendleton offshore occurrences of loggerhead and Kemp's ridley sea turtles have been documented and they may potentially nest at these locations. Green sea turtles were not detected during acoustic and satellite tagging studies conducted offshore of JEB Fort Story and, thus, they are not expected to nest on JEB Fort Story beaches. However, one green sea turtle nest was documented on Sandbridge Beach, a few miles south of Dam Neck Annex; based on this proximity, green sea turtles may potentially nest on Dam Neck Annex/Camp Pendleton.

SOPs have been developed at Dam Neck Annex/Camp Pendleton for implementing and conducting beach surveys for sea turtle nesting and strandings. These procedures are expected to minimize potential impacts to nesting activities and sea turtles. Nesting and stranded sea turtle management at JEB Fort Story is performed in accordance with the Navy's Biological Assessment for Sea Turtle Management at JEB Fort Story dated May 2016, as supplemented. The nesting sea turtle management plan at JEB Fort Story is a component of the INRMP (Navy, 2017c). JEB Little Creek does not have a sea turtle monitoring program because no nesting has occurred on those beaches since data collection efforts began in 1970. However, other protocols for beach landings have been developed and include lookout requirements during beach landings that would provide additional protection for nesting sea turtles and hatchlings. Sea turtle nest monitoring and management guidelines for Dam Neck Annex/Camp Pendleton are based on the Back Bay National Wildlife Refuge Sea Turtle Management Program (USFWS, 2011b) and the Navy's SOPs for Sea Turtles at Dam Neck Annex (Navy, 2015; USFWS, 2016c). Each of those SOPs is summarized below:

Dam Neck Annex/Camp Pendleton:

- Morning patrols are conducted from May 15 through August 31 by Naval Air Station (NAS) Oceana Natural Resources Staff on all-terrain vehicles or other four-wheel drive vehicle approved.
- Patrollers must attend training sessions for patrol procedures and all-terrain vehicle safety.
- If patrols start before daylight, headlights of vehicles will be covered with red filters. No white lights of any kind are permitted.
- If a turtle crawl is found, patrollers will determine if there is a nest and document the time and location of the nest. Nesting activities must be reported immediately to the Back Bay National Wildlife Refuge and the installation Natural Resources Manager. Together, the Back Bay National Wildlife Refuge biologist and installation Natural Resources Manager will determine whether the nest can be left in place (in situ) or should be relocated.
- Relocation may be necessary if the nest is at risk from several wash-overs during high tide events, high levels of public use around the nest, if it is in a location susceptible to erosion or near a sloughing escarpment and may potentially get buried, or any other reason determined by the Back Bay National Wildlife Refuge biologist and installation Natural Resources Manager.
- If a nest is left in situ, the perimeter of the nesting area is marked with wire flags, cordoned off with flagging, and surrounded by informational signs and reflectors to educate the public and deter human disturbance.
- Nests will be checked daily to ensure no unauthorized disturbance has occurred, determine if hatching has commenced, and document signs of predatory disturbance and plant or pest invasion.
- Two to three weeks after hatchlings have emerged and no more signs of hatching are present, the nest will be excavated and data will be collected.

Potential impacts to sea turtles from training activities on beach areas of JEB Little Creek, JEB Fort Story, and Dam Neck Annex are expected to only occur between the months of May through October, when female sea turtles approach the beach to lay their eggs, while eggs are incubating, and when hatchlings emerge from the nests and enter the water. Nesting activities primarily occur at night, aside from Kemp's ridley sea turtles that nest during the day. The majority of training activities may occur year round at all locations. Only some activities, such as beach landings, would occur at night. Due to the seasonal occurrence of sea turtles and nests on the beaches of the study area compared to year-round

occurrence of training activities, the potential for overlap between training activities proposed under each alternative and sea turtle presence and nesting activities would be limited. In addition, only small numbers of sea turtle nests have been documented on beaches within the study area. These considerations may reduce the potential level of exposure to the various stressors associated with each PTEA, compared to other biological resources that occur year-round within the study area. For each location in the study area where sea turtles may occur, additional location-specific analysis considers historical nesting data and information on nearshore occurrence along with the potential impacts of each stressor resulting from each PTEA.

Based on the below discussion of physical strike and noise stressors in conjunction with historical nesting locations, the Navy has determined that the Proposed Action would have no effect on loggerhead, green, and Kemp's ridley sea turtles at JEB Little Creek. The Navy has determined that the Proposed Action would have no effect on green sea turtles at JEB Fort Story, but may affect, but is not likely to adversely affect, green sea turtles at Dam Neck Annex. Additionally, the Navy has determined that the Proposed Action may affect, but is not likely to adversely affect, loggerhead and Kemp's ridley sea turtles at JEB Fort Story and Dam Neck Annex.

Physical Strike

Beach landings by amphibious vessels may result in direct impacts if vessels strike a nesting female or if they drive over nests, compacting the sand over the eggs, possibly crushing the eggs and killing pre-emergent hatchlings or striking hatchlings that are transiting from the nest to the water. Amphibious vessels that transit across land and water may temporarily modify the beach area, but are not expected to produce deep ruts in the sand that could preclude nesting in that area or entrap hatchlings attempting to reach the water. Small boats that land on the beach would not go much farther than the high mean water line and would not approach potential nesting habitat areas located further inland, between the high mean water line and the sand dune line. In addition, as stated in the SOPs, sea turtle nests found below the high mean water line would be relocated, as they would be considered at risk of washing out during a high tide event. Conducting training activities at night would make it more difficult to detect and avoid a female sea turtle or hatchlings on the beach. Specifically, nighttime beach landings that occur between May and August annually may potentially disrupt sea turtle nesting activities, causing a female to abandon nesting attempts or become disoriented after laying her nest. Nighttime beach landings occurring from August through the end of October annually also have the potential to disrupt emerging hatchlings from reaching the water. Displacement of sand from amphibious vehicles may create ruts in the sand, preventing hatchlings from reaching the water, or may obscure sea turtle nesting activity, preventing new nests from being found during daily sea turtle patrols at Dam Neck Annex. Lookouts used during beach landings would inform the installation of any sea turtle sightings, which would help prevent the possibility of missing a nest during daily patrols. In addition, since nests are monitored daily near the hatch window to determine if they will successfully hatch, the potential for hatchlings to be present on the beach would be known, and these areas would be avoided. Therefore, no impacts to individual sea turtles are anticipated, and population-level impacts would not occur as a result of beach landings.

Vehicle movements may also result in physical strikes to nesting females, nests, or hatchlings. Other potential impacts to nesting sea turtles and hatchlings would consist of alteration of potential nesting habitat, destruction of nests, disruption of nesting activities, and obstruction of hatchlings returning to the water. Vehicle movements may create deep ruts in the sand that could temporarily alter the beach,

making the area unsuitable for nesting immediately after training activities have been conducted. The implementation of sea turtle management measures at JEB Fort Story and Dam Neck Annex would reduce the potential for physical strike from vehicle movements because sea turtle nests would be visibly marked and avoided. Lookouts used during vehicle movements would inform the installation of any sea turtle sightings, which would help prevent the possibility of missing a nest. In addition, since nests are monitored daily near the hatch window to determine if they will successfully hatch, the potential for hatchlings to be present on the beach would be known and these areas would be avoided. Therefore, vehicle movements would not result in impacts to individual sea turtles, and population-level impacts would not occur.

Physical strike by personnel movements are not considered likely because a nesting female sea turtle on the beach is large enough to be seen and easily avoided. Human presence from personnel movements during training events occurring within sea turtle nesting season may disturb nesting activities and cause disorientation of adult females and hatchlings. The implementation of sea turtle management measures at JEB Fort Story and Dam Neck Annex would reduce the potential for direct impacts from personnel movements because sea turtle nests would be visibly marked and avoided, and the use of lookouts during beach activities would provide protection to nesting females and hatchlings because personnel would avoid nesting sea turtles and hatchlings during movements. In addition, given the infrequency of training activities that involve personnel and vehicle movements on the beach throughout the year, permanent impacts to potential nesting habitats are not anticipated. No impacts to individual sea turtles are anticipated from personnel movements, and no population impacts would occur.

Weapons firing – blank-fire results in expended brass casings; however, the casings do not pose a strike risk because they are expended in close proximity to the weapon, where sea turtles would not be expected to occur. The potential for direct strike of a sea turtle from non-lethal training ammunition that would lead to injury or mortality is negligible. In addition, personnel would not fire any weapons if a female sea turtle or hatchling is observed in close proximity. Therefore, no impacts to individual sea turtles are anticipated as a result of weapons firing activities and population-level impacts would not occur.

Noise

Primary beach landing activities that would produce noise levels with the potential to impact sea turtles include LCAC operations. These training activities would generate localized temporary increases in noise levels, up to a 92 dBA (A-weighted decibels) sound exposure level at a distance of 300 feet when operating at high power, which may potentially result in hearing loss for humans (Table 3.5-1, Noise Level Thresholds Summary) and could impact nesting sea turtles and hatchlings on the beach areas in close proximity to LCAC operations. In addition, amphibious vehicle operations would occur for a relatively short period of time (minutes to hours). These in-air noise sources may result in a behavioral response including a startle response by nesting females or hatchlings, disruption of nesting activities, or avoidance of a potential nesting area. Training activities that involve LCAC operations would have to be conducted at the same time that a sea turtle would approach or be present on the beach for a potential impact to occur. The likelihood of encountering a sea turtle during LCAC beach landings is considered low since these training activities would occur infrequently throughout the year. Furthermore, noise from LCAC operations would only result in a short-term response, such as a startle response or temporary avoidance of an area by the affected individual. Normal behaviors and nesting activities are expected to resume once the LCAC has left the area or has powered down. Therefore, impacts to

individuals would be temporary, minor, and recoverable once LCAC operations have ceased, and no long-term impacts to individual sea turtles would occur. The use of lookouts during LCAC operations would reduce the potential for noise impacts to nesting females and hatchlings because individuals would be avoided. In addition, given the infrequency of training activities that involve LCAC operations, permanent abandonment of the beach by sea turtles would not occur; therefore, long-term population-level impacts are not anticipated.

Noise generated by vehicle movements on or near the beach areas may harass sea turtles or disrupt nesting activities. As described in Section 3.5.1.1.2 (Ambient Noise, Ground Vehicles and Surface Vessels), noise from vehicles does not occur at levels that would result in injurious impacts. However, noise from vehicle movements could become a source of deterrence to sea turtles during sea turtle nesting season. Potential impacts from vehicle noise may consist of a startle response or avoidance of an area, which could preclude a female from laying a nest. Training activities involving vehicle movements would have to occur at the same time, within the vicinity of a sea turtle approaching the beach, and generate enough noise to elicit a response in order for a potential impact to occur. Impacts to sea turtles would primarily result in a short-term response, such as a startle response or temporary avoidance of an area. Normal behaviors and nesting activities are expected to resume once the vehicles have left the area or have powered down. Therefore, impacts to individuals would be temporary, minor, and recoverable, and no long-term impacts to individual sea turtles would occur. Furthermore, since training events involving vehicle movements on the beach would occur infrequently and for short durations of time (minutes to hours), these actions are not expected to have long-term population-level impacts to sea turtles.

Noise generated by blank firing and non-lethal training ammunition on or near the beach areas have the potential to impact sea turtles by causing startle responses or threat escape responses that could disrupt nesting activities. As described in Section 3.5.1.1.1 (Ambient Noise, Munitions and Equipment), in-air noise levels associated with blank firing and non-lethal training ammunition may result in hearing loss to humans and may similarly impact sea turtles on the beach in close proximity to these activities. However, as previously stated, personnel would not fire weapons if a sea turtle is observed during training activities, eliminating the possibility of sea turtles being exposed to noise levels that would result in physiological impacts. Behavioral impacts may potentially occur if a sea turtle is not observed in the immediate vicinity but is within hearing of range of blank-fire and non-lethal ammunition training activities. Sea turtles are assumed to exhibit no more than a brief startle response to any individual explosive or bursts of explosives. If an event has a longer duration of explosive use, such as firing events with multiple bursts of blank gunnery rounds, sea turtles may exhibit a response beyond an initial startle, such as actively avoiding the area or abandoning a nesting attempt. Furthermore, training events involving firing of blanks and non-lethal training ammunition on beach areas would occur infrequently and the likelihood of a sea turtle being in the same area where weapons firing activities is also considered low. Normal behaviors and nesting activities are expected to resume once the weapons firing activities have ceased. Therefore, impacts to individual sea turtles would be temporary, minor, and recoverable, limited to short-term responses from short bursts of noise, and no long-term impacts to individuals would occur. In addition, training activities involving weapons firing would not have population-level impacts to sea turtles.

4.3.4 Joint Expeditionary Base Little Creek

The PTEAs applicable to biological resources at JEB Little Creek that contribute to the physical disturbance stressor include beach landings, personnel movement, vehicle movement, and explosives on land; that contribute to the physical strike stressor include beach landings, vehicle movement, and explosives on land; and that contribute to the noise stressor include beach landings, vehicle movement, explosives on land, and weapons firing – blank-fire (Table 4.3-1).

4.3.4.1 No Action Alternative

No Action Alternative locations at JEB Little Creek are described in Chapter 2 (see Figure 2-2 and Table 2-3) and Table 4.3-1.

4.3.4.1.1 Habitats and Vegetation

Physical disturbance impacts are the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). No significant impacts to habitats and vegetation at JEB Little Creek occur as a result of the No Action Alternative.

4.3.4.1.2 Mammals

Physical strike and noise impacts are the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). No significant impacts to mammals at JEB Little Creek occur as a result of the No Action Alternative.

4.3.4.1.3 Invertebrates

Physical strike and noise impacts are the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). No significant impacts to invertebrates at JEB Little Creek occur as a result of the No Action Alternative.

4.3.4.1.4 Reptiles and Amphibians

Physical strike and noise impacts are the same as those described in Section 4.3.3.4, Reptiles and Amphibians. No significant impacts to reptiles and amphibians at JEB Little Creek occur as a result of the No Action Alternative.

4.3.4.1.5 Birds

Physical strike and noise impacts are the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). No significant impacts to birds at JEB Little Creek occur as a result of the No Action Alternative.

Table 4.3-1. Joint Expeditionary Base Little Creek Biological Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*											
			No Action Alternative				*Alternative 1 (difference from the No Action Alternative)*				*Alternative 2 (difference from Alternative 1)*			
			No. of Events	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*
Land – Beaches/ Dunes	Beach Landings	amphibious and small vessels	50	348 landings	348 landings	348 landings								
	Explosives on Land	Demolition materials and charge					2	2 events (2 detonations with a maximum NEW of 1.25 pounds)	2 events (2 detonations with a maximum NEW of 1.25 pounds)	2 events (2 detonations with a maximum NEW of 1.25 pounds)				
	Personnel Movement	NA	815	6,978 people			2	48 people						
	Vehicle Movement	tactical and non-tactical vehicles	815	3,560 hours	3,560 hours	3,560 hours	2	1 hour	1 hour	1 hour				
Land– Non-Beaches/ Dunes	Personnel Movement	NA	24	1,800 people										
	Weapons Firing – Blank	small caliber	6			595,400 rounds								

Key: NEW = net explosive weight; NA = not applicable; No. = number.

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4.3.4.1.6 Federally Protected Species and Habitats

Several federally protected species, including the northern long-eared bat (*Myotis septentrionalis*), piping plover (*Charadrius melodus*), red knot (*Calidris canutus*), roseate tern (*Sterna dougallii*), harbor seal (*Phoca vitulina*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and Kemp's ridley sea turtle (*Lepidochelys kempii*), have the potential to occur at JEB Little Creek. However, there is no historical evidence of nesting sea turtles at JEB Little Creek.

4.3.4.1.6.1 Northern Long-Eared Bat

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. No significant impacts to northern long-eared bat occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at JEB Little Creek may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.4.1.6.2 Piping Plover

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.2 (Impacts Common to All Locations Under All Alternatives, Piping Plover). No significant impacts to piping plover occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at JEB Little Creek would have no effect on the ESA-listed piping plover.

4.3.4.1.6.3 Red Knot

As described in Section 4.3.3.6.3 (Impacts Common to All Locations Under All Alternatives, Red Knot), no significant impacts to red knot occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at JEB Little Creek would have no effect on the ESA-listed red knot.

4.3.4.1.6.4 Roseate Tern

As described in Section 4.3.3.6.4 (Impacts Common to All Locations Under All Alternatives, Roseate Tern), no significant impacts to roseate tern occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at JEB Little Creek would have no effect on the ESA-listed roseate tern.

4.3.4.1.6.5 Harbor Seal

There is a potential for harbor seals to occur at JEB Little Creek, since they have been observed to haul out at other locations in the lower Chesapeake Bay. Sightings and numbers of this species within the study area have increased in recent years at rock islands in the lower Chesapeake Bay, possibly suggesting a preference for these areas (Rees et al., 2016), the closest of which is over 2 nautical miles from JEB Little Creek. The likelihood of the No Action Alternative affecting hauled-out seals at JEB Little Creek is low for several reasons. First, this species only occurs during certain times of the year, limiting the potential for interaction or overlap with Navy activities at JEB Little Creek. Also, harbor seals prefer to haul out at areas away from human activity, but if they are present on beaches of JEB Little Creek, the Navy would simply avoid hauled-out harbor seals. Therefore, the No Action Alternative has no significant impacts to harbor seals at JEB Little Creek, and, the Navy has determined that the No Action Alternative would not result in the reasonably foreseeable "take" of a marine mammal species by

harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.4.1.6.6 Loggerhead Sea Turtles

There is no historical evidence of loggerhead nesting or nesting attempts on JEB Little Creek beach areas since data collection efforts began in 1970 (VDGIF, 2016). Loggerhead sea turtles have been detected from acoustic and satellite tagging efforts conducted offshore of JEB Little Creek (Barco & Lockhart, 2016) and observed in rare occurrences near JEB Little Creek beach habitats (Navy, 2017c). Therefore, while loggerhead sea turtle occurrence at JEB Little Creek is possible, it is not considered likely because no loggerhead nests or nesting attempts have been documented at JEB Little Creek beaches (VDGIF, 2016). In addition, protocols for beach landings include lookout requirements that would reduce the potential for impacts on nesting loggerhead sea turtles and hatchlings, because sea turtles on the beach would be avoided. No significant impacts to loggerhead sea turtles at JEB Little Creek occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at JEB Little Creek would have no effect on loggerhead sea turtles.

4.3.4.1.6.7 Green Sea Turtles

There is no historical evidence of green sea turtle nesting or nesting attempts on JEB Little Creek beach areas since data collection efforts began in 1970 (VDGIF, 2016). Green sea turtles have been detected from acoustic and satellite tagging efforts conducted offshore of JEB Little Creek (Barco & Lockhart, 2016) and observed in rare occurrences near JEB Little Creek beach habitats (Navy, 2017c). While green sea turtle occurrence at JEB Little Creek is possible, it is not considered likely. Protocols for beach landings include lookout requirements that would further reduce the potential for impacts on nesting green sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided. No significant impacts to green sea turtles at JEB Little Creek occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at JEB Little Creek would have no effect on green sea turtles.

4.3.4.1.6.8 Kemp's Ridley Sea Turtles

There is no historical evidence of Kemp's ridley sea turtle nesting or nesting attempts on JEB Little Creek beach areas since data collection efforts began in 1970 (VDGIF, 2016). Kemp's ridley sea turtles have been detected from acoustic and satellite tagging efforts conducted offshore of JEB Little Creek (Barco & Lockhart, 2016) and observed in rare occurrences near JEB Little Creek beach habitats (Navy, 2017c). Therefore, Kemp's ridley sea turtle occurrence at JEB Little Creek is possible, but not considered likely. Protocols for beach landings include lookout requirements that would further reduce the potential for impacts on nesting Kemp's ridley sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided. No significant impacts to Kemp's ridley sea turtles at JEB Little Creek occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at JEB Little Creek would have no effect on Kemp's ridley sea turtles.

4.3.4.2 Alternative 1

Alternative 1 training events are described in Chapter 2 (see Table 2-14, Figure 2-16, and Figure 2-17) and Table 4.3-1. EOD events currently occur at Training Area (TA) Normandy/TA Delta Dunes and are limited to 1.4-pound NEW; however, USFF would use up to 2-pound NEW during training events as part of Alternative 1.

4.3.4.2.1 Habitats and Vegetation

Physical disturbance impacts are expected to be generally the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical disturbance of individual plants and soils would be expected to increase and degrade habitats over time, for the reasons discussed under Section 4.3.3.1, impacts would not be significant. Training that utilizes beach habitats would be restricted to unvegetated portions of the beach. Training activities that require traversing primary dunes would be completed using existing access points. Vehicles training at inland areas would typically use existing roads and trails. Signs and fencing to limit access to sensitive areas would be utilized. In addition, natural resource managers may use INRMPs and annual INRMP reviews to assess the management of habitats. No significant impacts would occur to habitats and vegetation at JEB Little Creek as a result of Alternative 1.

4.3.4.2.2 Mammals

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual mammals would be expected to increase, for the reasons discussed under Section 4.3.3.2, impacts would not be significant. Most mammals are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, move into a protected location, such as a burrow or vegetation, for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to mammals. No significant impacts would occur to mammals at JEB Little Creek as a result of Alternative 1.

4.3.4.2.3 Invertebrates

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual invertebrates would be expected to increase, for the reasons discussed under Section 4.3.3.3, impacts would not be significant. Most invertebrates are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to invertebrates. No significant impacts would occur to invertebrates at JEB Little Creek as a result of Alternative 1.

4.3.4.2.4 Reptiles and Amphibians

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual reptiles and

amphibians would be expected to increase, for the reasons discussed under Section 4.3.3.4, impacts would not be significant. Most reptiles and amphibians are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to reptiles and amphibians. No significant impacts would occur to reptiles and amphibians at JEB Little Creek as a result of Alternative 1.

4.3.4.2.5 Birds

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual birds would be expected to increase, for the reasons discussed under Section 4.3.3.5, impacts would not be significant. Most birds are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to birds. No significant impacts would occur to birds at JEB Little Creek as a result of Alternative 1.

4.3.4.2.6 Federally Protected Species and Habitats

Several federally protected species, including the northern long-eared bat (*Myotis septentrionalis*), piping plover (*Charadrius melodus*), red knot (*Calidris canutus*), roseate tern (*Sterna dougallii*), harbor seal (*Phoca vitulina*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and Kemp's ridley sea turtle (*Lepidochelys kempii*), have the potential to occur at JEB Little Creek. However, there is no historical evidence of nesting sea turtles at JEB Little Creek.

4.3.4.2.6.1 Northern Long-Eared Bat

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. Therefore, the additional training under Alternative 1 would have no significant impacts to northern long-eared bat at JEB Little Creek. Pursuant to the ESA, Alternative 1 at JEB Little Creek may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.4.2.6.2 Piping Plover

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.2 (Impacts Common to All Locations Under All Alternatives, Piping Plover). The additional training under Alternative 1 would have no significant impacts to piping plover. Pursuant to the ESA, Alternative 1 at JEB Little Creek would have no effect on the ESA-listed piping plover.

4.3.4.2.6.3 Red Knot

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.3 (Impacts Common to All Locations Under All Alternatives, Red Knot). The additional training

under Alternative 1 would have no significant impacts to red knot. Pursuant to the ESA, Alternative 1 at JEB Little Creek would have no effect on the ESA-listed red knot.

4.3.4.2.6.4 Roseate Tern

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.4 (Impacts Common to All Locations Under All Alternatives, Roseate Tern). The additional training under Alternative 1 would have no significant impacts to roseate tern. Pursuant to the ESA, Alternative 1 at JEB Little Creek would have no effect on the ESA-listed roseate tern.

4.3.4.2.6.5 Harbor Seal

Noise and physical strike impacts are the same as those described in Section 4.3.3.6.6 (Impacts Common to All Locations Under All Alternatives, Harbor Seals). There is a potential for harbor seals to occur at JEB Little Creek since they have been observed to haul out at other locations in the lower Chesapeake Bay. Sightings and numbers of this species within the study area have increased in recent years at rock islands in the lower Chesapeake Bay, possibly suggesting a preference for these areas (Rees et al., 2016), the closest of which is over 2 nautical miles from JEB Little Creek. The likelihood of Alternative 1 affecting hauled out seals at JEB Little Creek is low for several reasons: this species only occurs during certain times of the year, limiting the potential for interaction or overlap with Navy activities at JEB Little Creek; harbor seals prefer to haul out at areas away from human activity; and, if present on beaches of JEB Little Creek, the Navy would simply avoid hauled-out harbor seals. Therefore, the additional training under Alternative 1 would have no significant impacts to harbor seals at JEB Little Creek. Thus, physical strike or noise from Alternative 1 at JEB Little Creek would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.4.2.6.6 Loggerhead Sea Turtles

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.7. There is no historical evidence of loggerhead nesting or nesting attempts on JEB Little Creek beach areas since data collection efforts began in 1970 (VDGIF, 2016). Loggerhead sea turtles have been detected from acoustic and satellite tagging efforts conducted offshore of JEB Little Creek (Barco & Lockhart, 2016) and observed in rare occurrences near JEB Little Creek beach habitats. Therefore, while loggerhead sea turtle occurrence at JEB Little Creek is possible, it is not considered likely. Protocols for beach landings include lookout requirements that would further reduce the potential for impacts on nesting loggerhead sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided. Therefore, the addition of explosives on land and increased vehicle and personnel movements on the beach under Alternative 1 would have no significant impacts to loggerhead sea turtles at JEB Little Creek. Pursuant to the ESA, Alternative 1 at JEB Little Creek would have no effect on loggerhead sea turtles.

4.3.4.2.6.7 Green Sea Turtles

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.7. There is no historical evidence of green sea turtle nesting or nesting attempts on JEB Little Creek beach areas since data collection efforts began in 1970 (VDGIF, 2016). Green sea turtles have been detected from acoustic and satellite tagging efforts conducted offshore of JEB Little Creek (Barco & Lockhart, 2016) and observed in rare occurrences near JEB Little Creek beach habitats (Navy, 2017c). Therefore, while green sea turtle occurrence at JEB Little Creek is possible, it is not considered likely. Protocols for beach landings include lookout requirements that would further reduce the potential for impacts on nesting

green sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided. Therefore, the addition of explosives on land and increased vehicle and personnel movements on the beach under Alternative 1 would have no significant impacts to green sea turtles at JEB Little Creek. Pursuant to the ESA, Alternative 1 at JEB Little Creek would have no effect on green sea turtles.

4.3.4.2.6.8 Kemp's Ridley Sea Turtles

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.7. There is no historical evidence of Kemp's ridley sea turtle nesting or nesting attempts on JEB Little Creek beach areas since data collection efforts began in 1970 (VDGIF, 2016). Kemp's ridley sea turtles have been detected from acoustic and satellite tagging efforts conducted offshore of JEB Little Creek (Barco & Lockhart, 2016) and observed in rare occurrences near JEB Little Creek beach habitats (Navy, 2017c). Therefore, while Kemp's ridley sea turtle occurrence at JEB Little Creek is possible, it is not considered likely. Protocols for beach landings include lookout requirements that would further reduce the potential for impacts on nesting Kemp's ridley sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided. Therefore, the addition of explosives on land and increased vehicle and personnel movements on the beach under Alternative 1 would have no significant impacts to Kemp's ridley sea turtles at JEB Little Creek. Pursuant to the ESA, Alternative 1 at JEB Little Creek would have no effect on Kemp's ridley sea turtles.

4.3.4.3 Alternative 2

Alternative 2 training events are the same as those under Alternative 1 at this location; as noted in Table 4.3-1, no additional training would occur. Impacts under Alternative 2 would be the same as under Alternative 1 and are discussed below (previous analysis is repeated for the reader's convenience).

4.3.4.3.1 Habitats and Vegetation

Physical disturbance impacts are expected to be generally the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical disturbance of individual plants and soils would be expected to increase and degrade habitats over time, for the reasons discussed under Section 4.3.3.1, impacts would not be significant. Training that utilizes beach habitats would be restricted to unvegetated portions of the beach. Training activities that require traversing primary dunes would be completed using existing access points. Vehicles training at inland areas would typically use existing roads and trails. Signs and fencing to limit access to sensitive areas would be utilized. In addition, natural resource managers may use INRMPs and annual INRMP reviews to assess the management of habitats. No significant impacts would occur to habitats and vegetation at JEB Little Creek as a result of Alternative 2.

4.3.4.3.2 Mammals

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual mammals would be expected to increase, for the reasons discussed under Section 4.3.3.2, impacts would not be significant. Most mammals are highly mobile and agile and would likely move away from a training activity or, in the case

of small mammals, move into a protected location, such as a burrow or vegetation, for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to mammals. No significant impacts would occur to mammals at JEB Little Creek as a result of Alternative 2.

4.3.4.3.3 Invertebrates

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual invertebrates would be expected to increase, for the reasons discussed under Section 4.3.3.3, impacts would not be significant. Most invertebrates are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to invertebrates. No significant impacts would occur to invertebrates at JEB Little Creek as a result of Alternative 2.

4.3.4.3.4 Reptiles and Amphibians

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual reptiles and amphibians would be expected to increase, for the reasons discussed under Section 4.3.3.4, impacts would not be significant. Most reptiles and amphibians are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to reptiles and amphibians. No significant impacts would occur to reptiles and amphibians at JEB Little Creek as a result of Alternative 2.

4.3.4.3.5 Birds

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual birds would be expected to increase, for the reasons discussed under Section 4.3.3.5, impacts would not be significant. Most birds are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to birds. No significant impacts would occur to birds at JEB Little Creek as a result of Alternative 2.

4.3.4.3.6 Federally Protected Species and Habitats

Several federally protected species, including the northern long-eared bat (*Myotis septentrionalis*), piping plover (*Charadrius melodus*), red knot (*Calidris canutus*), roseate tern (*Sterna dougallii*), harbor seal (*Phoca vitulina*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and Kemp's ridley sea turtle (*Lepidochelys kempii*) occur or have the potential to occur at JEB Little Creek. While occurrence of nesting sea turtles on the beaches of JEB Little Creek is possible, it is not considered likely.

4.3.4.3.6.1 Northern Long-Eared Bat

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. Therefore, the additional training under Alternative 2 would have no significant impacts to northern long-eared bat at JEB Little Creek. Pursuant to the ESA, Alternative 2 at JEB Little Creek may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.4.3.6.2 Piping Plover

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.2 (Impacts Common to All Locations Under All Alternatives, Piping Plover). The additional training under Alternative 2 would have no significant impacts to piping plover. Pursuant to the ESA, Alternative 2 at JEB Little Creek would have no effect on the ESA-listed piping plover.

4.3.4.3.6.3 Red Knot

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.3 (Impacts Common to All Locations Under All Alternatives, Red Knot). The additional training under Alternative 2 would have no significant impacts to red knot. Pursuant to the ESA, Alternative 2 at JEB Little Creek would have no effect on the ESA-listed red knot.

4.3.4.3.6.4 Roseate Tern

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.4 (Impacts Common to All Locations Under All Alternatives, Roseate Tern). The additional training under Alternative 2 would have no significant impacts to roseate tern. Pursuant to the ESA, Alternative 2 at JEB Little Creek would have no effect on the ESA-listed roseate tern.

4.3.4.3.6.5 Harbor Seal

Noise and physical strike impacts are the same as those described in Section 4.3.3.6.6 (Impacts Common to All Locations Under All Alternatives, Harbor Seals). There is a potential for harbor seals to occur at JEB Little Creek since they have been observed to haul out at other locations in the lower Chesapeake Bay. Sightings and numbers of this species within the study area have increased in recent years at rock islands in the lower Chesapeake Bay, possibly suggesting a preference for these areas (Rees et al., 2016), the closest of which is over 2 nautical miles from JEB Little Creek. The likelihood of Alternative 2 affecting hauled out seals at JEB Little Creek is low for several reasons: this species only occurs during certain times of the year, limiting the potential for interaction or overlap with Navy activities at JEB Little Creek; harbor seals prefer to haul out at areas away from human activity; and, if present on beaches of JEB Little Creek, the Navy would simply avoid hauled-out harbor seals. Therefore, the additional training

under Alternative 2 would have no significant impacts to harbor seals at JEB Little Creek. Thus, physical strike or noise from Alternative 1 at JEB Little Creek would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.4.3.6.6 Loggerhead Sea Turtles

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.7 (Impacts Common to All Locations Under All Alternatives, Sea Turtles). There is no historical evidence of loggerhead nesting or nesting attempts on JEB Little Creek beach areas since data collection efforts began in 1970 (VDGIF, 2016). Loggerhead sea turtles have been detected from acoustic and satellite tagging efforts conducted offshore of JEB Little Creek (Barco & Lockhart, 2016) and observed in rare occurrences near JEB Little Creek beach habitats. Therefore, while loggerhead sea turtle occurrence at JEB Little Creek is possible, it is not considered likely. Protocols for beach landings include lookout requirements that would further reduce the potential for impacts on nesting loggerhead sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided. Therefore, the addition of explosives on land and increased vehicle and personnel movements on the beach under Alternative 2 would have no significant impacts to loggerhead sea turtles at JEB Little Creek. Pursuant to the ESA, Alternative 2 at JEB Little Creek would have no effect on loggerhead sea turtles.

4.3.4.3.6.7 Green Sea Turtles

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.7 (Impacts Common to All Locations Under All Alternatives, Sea Turtles). There is no historical evidence of green sea turtle nesting or nesting attempts on JEB Little Creek beach areas since data collection efforts began in 1970 (VDGIF, 2016). Green sea turtles have been detected from acoustic and satellite tagging efforts conducted offshore of JEB Little Creek (Barco & Lockhart, 2016) and observed in rare occurrences near JEB Little Creek beach habitats (Navy, 2017c). Therefore, while green sea turtle occurrence at JEB Little Creek is possible, it is not considered likely. Protocols for beach landings include lookout requirements that would further reduce the potential for impacts on nesting green sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided. Therefore, the addition of explosives on land and increased vehicle and personnel movements on the beach under Alternative 2 would have no significant impacts to green sea turtles at JEB Little Creek. Pursuant to the ESA, Alternative 2 at JEB Little Creek would have no effect on green sea turtles.

4.3.4.3.6.8 Kemp's Ridley Sea Turtles

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.7 (Impacts Common to All Locations Under All Alternatives, Sea Turtles). There is no historical evidence of Kemp's ridley sea turtle nesting or nesting attempts on JEB Little Creek beach areas since data collection efforts began in 1970 (VDGIF, 2016). Kemp's ridley sea turtles have been detected from acoustic and satellite tagging efforts conducted offshore of JEB Little Creek (Barco & Lockhart, 2016) and observed in rare occurrences near JEB Little Creek beach habitats (Navy, 2017c). Therefore, while Kemp's ridley sea turtle occurrence at JEB Little Creek is possible, it is not considered likely. Protocols for beach landings include lookout requirements that would further reduce the potential for impacts on nesting Kemp's ridley sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided. Therefore, the addition of explosives on land and increased vehicle and personnel movements on the beach under Alternative 2 would have no significant impacts to Kemp's ridley sea turtles at JEB Little Creek. Pursuant to the ESA, Alternative 2 at JEB Little Creek would have no effect on Kemp's ridley sea turtles.

4.3.4.4 Summary

The stressors applicable to biological resources at JEB Little Creek are physical disturbance associated with beach landings, personnel movement, vehicle movement, and explosives on land; physical strike associated with beach landings, vehicle movement, and explosives on land; and noise associated with beach landings, vehicle movement, explosives on land, and weapons firing – blank-fire (Table 4.3-1). JEB Little Creek has been used for a wide variety of military training activities since before World War II (Navy, 2017c) and as a result, many of the training areas have long been established. Implementation of the No Action Alternative would be consistent with the baseline conditions within existing training areas and is not expected to result in significant impacts. In addition, although new or additional activities are proposed, the activities conducted under Alternatives 1 and 2 would be similar in nature to those conducted under the No Action Alternative and would not be expected to result in significant impacts to biological resources at JEB Little Creek.

4.3.5 Joint Expeditionary Base Fort Story

The PTEAs applicable to biological resources at JEB Fort Story that contribute to the physical disturbance stressor include beach landings, personnel movement, vehicle movement, and explosives on land; that contribute to the physical strike stressor include beach landings, vehicle movement, weapons firing – non-lethal training ammunition, and explosives on land; and that contribute to the noise stressor include beach landings, vehicle movement, explosives on land, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.3-2).

4.3.5.1 No Action Alternative

No Action Alternative training is described in Chapter 2 (see Figure 2-5 and Table 2-4) and Table 4.3-2.

4.3.5.1.1 Habitats and Vegetation

Physical disturbance impacts are the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). No significant impacts to habitats and vegetation at JEB Fort Story occur as a result of the No Action Alternative.

4.3.5.1.2 Mammals

Physical strike and noise impacts are the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). No significant impacts to mammals at JEB Fort Story occur as a result of the No Action Alternative.

4.3.5.1.3 Invertebrates

Physical strike and noise impacts are the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). No significant impacts to invertebrates at JEB Fort Story occur as a result of the No Action Alternative.

4.3.5.1.4 Reptiles and Amphibians

Physical strike and noise impacts are the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). No significant impacts to reptiles and amphibians at JEB Fort Story occur as a result of the No Action Alternative.

Table 4.3-2. Joint Expeditionary Base Fort Story Biological Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*											
			No Action Alternative				*Alternative 1 (difference from the No Action Alternative)*				*Alternative 2 (difference from Alternative 1)*			
			No. of Events	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*
Land – Beaches/ Dunes	Beach Landings	amphibious and small vessels	85	379 landings	379 landings	379 landings	3	165 landings	165 landings	165 landings				
	Personnel Movement	NA	468	6,262 people			79	2,268 people						
	Vehicle Movement	tactical and non-tactical vehicles	412	4,735 hours	4,735 hours	4,735 hours	79	3,171 hours	3,171 hours	3,171 hours				
	Weapons Firing – Blank	small caliber	28			1,400 rounds	76			22,952 rounds				
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	28		2,800 rounds	2,800 rounds	76		15,200 rounds	15,200 rounds				
Land – Non-Beaches/ Dunes	Personnel Movement	NA	346	5,150 people			480	10,560 people			56	784 people		
	Explosives on Land	demolition materials and charge	108	• 80 events (average 8 detonations/ event with maximum NEW of 1.25 pounds) • 28 events (1 detonation/event with maximum NEW of 1.25 pounds)	• 80 events (average 8 detonations/event with maximum NEW of 1.25 pounds) • 28 events (1 detonation/event with maximum NEW of 1.25 pounds)	• 80 events (average 8 detonations/event with maximum NEW of 1.25 pounds) • 28 events (1 detonation/event with maximum NEW of 1.25 pounds)	556	• 240 events (average 9 detonations/event with maximum NEW of 0.2 pounds) • 240 events (average 13 detonations/event with maximum NEW of 1.25 pounds) • 76 events (1 detonation/event with maximum NEW of 1.25 pounds)	• 240 events (average 9 detonations/event with maximum NEW of 0.2 pounds) • 240 events (average 13 detonations/event with maximum NEW of 1.25 pounds) • 76 events (1 detonation/event with maximum NEW of 1.25 pounds)	• 240 events (average 9 detonations/event with maximum NEW of 0.2 pounds) • 240 events (average 13 detonations/event with maximum NEW of 1.25 pounds) • 76 events (1 detonation/event with maximum NEW of 1.25 pounds)	56	• 56 events (1 detonation/event maximum NEW 1.25 pounds)	• 56 events (1 detonation/event maximum NEW 1.25 pounds)	• 56 events (1 detonation/event maximum NEW 1.25 pounds)
	Vehicle Movement	tactical and non-tactical vehicles	362	9,587 hours	9,587 hours	9,587 hours	240	60 hours	60 hours	60 hours	56	3,640 hours	3,640 hours	3,640 hours
	Weapons Firing – Blank	small caliber	192			4,868 rounds	480			5,280 rounds	56			2,912 rounds
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	84		8,400 rounds	8,400 rounds					56		5,600 rounds	5,600 rounds

Key: NA = not applicable; NEW = net explosive weight; No. = number.

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4.3.5.1.5 Birds

Physical strike and noise impacts are the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). No significant impacts to birds at JEB Fort Story occur as a result of the No Action Alternative.

4.3.5.1.6 Federally Protected Species and Habitats

Several federally protected species, including the northern long-eared bat (*Myotis septentrionalis*), piping plover (*Charadrius melodus*), red knot (*Calidris canutus*), roseate tern (*Sterna dougallii*), harbor seal (*Phoca vitulina*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and Kemp's ridley sea turtle (*Lepidochelys kempii*), occur or have the potential to occur at JEB Fort Story.

4.3.5.1.6.1 Northern Long-Eared Bat

A July 2015 mist net survey for bats at the installation did not capture the northern long-eared bat (*Myotis septentrionalis*); however, the species was detected during an acoustic survey conducted from March 11 through November 16, 2015 (Navy, 2016a). Physical strike and noise impacts are the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. No significant impacts to northern long-eared bat occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.5.1.6.2 Piping Plover

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.2 (Impacts Common to All Locations Under All Alternatives, Piping Plover). No significant impacts to piping plover occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed piping plover.

4.3.5.1.6.3 Red Knot

As described in Section 4.3.3.6.3 (Impacts Common to All Locations Under All Alternatives, Red Knot), no significant impacts to red knot occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed red knot.

4.3.5.1.6.4 Roseate Tern

As described in Section 4.3.3.6.4 (Impacts Common to All Locations Under All Alternatives, Roseate Tern), no significant impacts occur to roseate tern as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at JEB Fort Story would have no effect on the ESA-listed roseate tern.

4.3.5.1.6.5 Harbor Seal

Physical Strike

Under the No Action Alternative, there is a potential for physical strike of a hauled-out harbor seal. While strikes of in-water seals are documented, strikes of hauled-out harbor seals have not been identified for the study area. Since the species is likely to return to the water when people, amphibious

craft, or vehicles are present or approaching, strikes of hauled-out seals are not likely to occur. These disturbances would not result in a significant impact to harbor seals. The potential for in-water seal strikes in the study area are addressed in the updated AFTT EIS/Overseas EIS.

Noise

Under the No Action Alternative, hauled-out harbor seals may react to the presence of people, amphibious craft, and vehicles and temporarily return to the water. In Alaska, harbor seals showed a higher probability of ending a haul-out (i.e., entering the water from land or ice) when vessels approached (Blundell & Pendleton, 2015). However, whether the response was related to noise or visual presence of the vessel was not studied. Such reactions would reduce the potential for hauled-out seals to incur injury from physical strike, as discussed above. Marine mammal responses to vessel presence and vessel noise are relatively well studied but can be difficult to distinguish from one another, particularly during field studies. Behavioral responses appear to depend on behavioral context in many species and on the characteristics of the vessel's movement in some situations (Richardson et al., 1995). Hauled-out pinnipeds may be disturbed when approached at close distance, though research indicates such reactions are somewhat context dependent (Andersen et al., 2012; Curtin et al., 2009; Hoover-Miller et al., 2013; Jansen et al., 2010; Johnson & Acevedo-Gutiérrez, 2007; Suryan & Harvey, 1998; Weiss & Morrill, 2014; Young et al., 2014). For example, one study showed that harbor seals were disturbed by tourism-related vessels, small boats, and kayaks that stopped or lingered by haul-out sites but that the seals "do not pay attention to" passing vessels at closer distances (Johnson & Acevedo-Gutiérrez, 2007). Pinnipeds in the water generally appear less responsive (Richardson et al., 1995) than those at haul-out sites. Based on existing studies, it is likely that harbor seals found in the study area would have relatively minor behavioral reactions to vessels that maintain a reasonable distance. The distance that will provoke a response varies based on many factors including, but not limited to, vessel size, geographic location, and individual animal tolerance levels (Jahoda et al., 2003; Baker et al., 1983; Watkins, 1981). Should the vessels approach close enough to evoke a reaction, animals may engage in avoidance behaviors and/or alter their breathing patterns.

Under the No Action Alternative, vessel noise would potentially have behavioral effects on the harbor seal in the winter, spring, and fall, when these animals are most likely to occur. Results from monitoring of harbor seals at rock islands in the lower Chesapeake Bay possibly suggest a preference for these areas (Rees et al., 2016), the closest of which is over 3 nautical miles from JEB Fort Story. Additionally, the majority of sightings occurred at the rock islands furthest away (over 6 nautical miles) from JEB Fort Story. Occurrence of this species is, therefore, expected to be occasional, and reactions exhibited by harbor seals would likely be temporary in nature. As a result, the Navy has determined that the No Action Alternative would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.5.1.6.6 Loggerhead Sea Turtles

Acoustic and satellite telemetry studies have documented loggerhead sea turtle occurrence in Chesapeake Bay areas offshore of JEB Fort Story (Barco & Lockhart, 2016). Loggerhead sea turtles have exhibited nesting activity at JEB Fort Story since 1996 and recent data includes two loggerhead nests in 2013 and one loggerhead nest in 2014 (VDGIF, 2016; Navy, 2017c).

Physical Strike

The potential for physical strike impacts to nesting sea turtles are discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). The likelihood of encountering a loggerhead sea turtle during training activities is considered low because there is a very low density of historical loggerhead sea turtle nesting. Furthermore, training activities involving beach landings, personnel movement, and vehicle movement are conducted throughout the year, whereas loggerhead sea turtles would only occur seasonally. Implementation of sea turtle management measures at JEB Fort Story, in accordance with its INRMP (Navy, 2017c) and USFWS consultations, is expected to provide additional protection for nesting loggerhead sea turtles, sea turtle nests, and hatchlings. In addition, protocols for beach landings include lookout requirements that would further reduce the potential for impacts on nesting loggerhead sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided.

Noise

LCAC beach landings would occur on TA Inchon Beach, TA Utah Beaches I and II, TA Anzio Beach 2 and 4. Weapons firing activities involving blanks and non-lethal training ammunition occurs on TA Omaha Beach. Potential noise impacts to sea turtles from training activities involving LCAC operations, amphibious vessels, vehicles, and weapons firing are discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). The potential for a sea turtle to be present on the beach and exposed to noise impacts during training activities is considered low because training activities involving LCAC operations, amphibious vessels, vehicles, and weapons firing would be conducted in relatively small portions of available beach area at JEB Fort Story and there is a low level of historical loggerhead sea turtle nesting activity documented at JEB Fort Story. Implementation of sea turtle management measures at JEB Fort Story, in accordance with the INRMP (Navy, 2017c) and USFWS consultations, is expected to reduce the potential for impacts on nesting loggerhead sea turtles, sea turtle nests, and hatchlings.

Therefore, no significant impacts to loggerhead sea turtles occur under the No Action Alternative at JEB Fort Story. Pursuant to the ESA, the No Action Alternative at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed loggerhead sea turtle.

4.3.5.1.6.7 Green Sea Turtles

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.7 (Impacts Common to All Locations Under All Alternatives, Sea Turtles). Green sea turtles are known to forage in the Chesapeake Bay and have been observed annually in these areas (Swingle et al., 2016). However, green sea turtles were not detected during acoustic and satellite telemetry studies in the Chesapeake Bay areas offshore of JEB Fort Story (Barco & Lockhart, 2016; Navy, 2017c). Furthermore, no green sea turtle nests have been documented on JEB Fort Story since 1970 when data collection efforts began (VDGIF, 2016; Navy, 2017c). Therefore, while green sea turtle occurrence at JEB Fort Story is possible, it is not considered likely. Implementation of sea turtle management measures at JEB Fort Story, in accordance with the INRMP (Navy, 2017c) and USFWS consultations, is expected to reduce the potential for impacts to green sea turtles from training activities at JEB Fort Story. In addition, protocols for beach landings include lookout requirements that further reduce the potential for impacts because a sea turtle observed on the beach would be avoided. Based on the discussion in Section 4.3.3, no significant impacts to green sea turtles occur at JEB Fort Story under the No Action Alternative. Pursuant to the ESA, there would be no effect on the ESA-listed green sea turtle under the No Action Alternative at JEB Fort Story.

4.3.5.1.6.8 Kemp's Ridley Sea Turtles

While no Kemp's ridley sea turtle nests have been documented on JEB Fort Story since 1970 when data collection efforts began (VDGIF, 2016; Navy, 2017c), they are considered one of the most abundant sea turtle species to occur offshore of JEB Fort Story, and acoustic telemetry and satellite tagging studies have confirmed their occurrence in these areas (Barco & Lockhart, 2016). Therefore, Kemp's ridley sea turtles may potentially nest on JEB Fort Story beaches.

Physical Strike

The potential for physical strike impacts to nesting sea turtles from training activities are discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). While no Kemp's ridley nests have been documented at JEB Fort Story, their abundance in waters offshore of JEB Fort Story suggests they have the potential to nest on JEB Fort Story beaches. Implementation of sea turtle management measures at JEB Fort Story, in accordance with the INRMP (Navy, 2017c) and USFWS consultations, is expected to reduce the potential for impacts to Kemp's ridley sea turtles from training activities at JEB Fort Story. In addition, protocols for beach landings include lookout requirements that further reduce the potential for impacts because a sea turtle observed on the beach would be avoided.

Noise

LCAC beach landings would occur on TA Inchon Beach, TA Utah Beaches I and II, and TA Anzio Beach 2 and 4. Weapons firing activities involving blanks and non-lethal training ammunition occurs on TA Omaha Beach. Potential noise impacts to nesting sea turtles from training activities involving LCAC operations, amphibious vessels, vehicles, and weapons firing are discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). The potential for a sea turtle to be present on the beach and exposed to noise impacts during training activities is considered low because training activities involving LCAC operations, amphibious vessels, vehicles, and weapons firing would be conducted in relatively small portions of available beach area at JEB Fort Story and the likelihood of encountering a Kemp's ridley sea turtle is considered low. Implementation of sea turtle management measures at JEB Fort Story, in accordance with the INRMP (Navy, 2017c) and USFWS consultations, is expected to provide additional protection for Kemp's ridley sea turtles, nests, and hatchlings. Therefore, no significant impacts to Kemp's ridley sea turtles occur as a result of the No Action Alternative at JEB Fort Story. Pursuant to the ESA, the No Action Alternative at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed Kemp's ridley sea turtles.

4.3.5.2 Alternative 1

Alternative 1 training events are described in Chapter 2 (see Table 2-15, Figure 2-16, and Figure 2-17) and Table 4.3-2. An additional 165 beach landings and 79 additional personnel movement and vehicle movement events would occur on beach/dune training areas at JEB Fort Story under Alternative 1 as compared to the No Action Alternative. Implementation of Alternative 1 would more than double the total number of paintball rounds fired under the No Action Alternative. The additional explosives detonations would occur within bermed areas, with expended materials removed after training events.

4.3.5.2.1 Habitats and Vegetation

Physical disturbance impacts are expected to be generally the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action

Alternative, and the likelihood of physical disturbance of individual plants and soils would be expected to increase and degrade habitats over time, for the reasons discussed under Section 4.3.3.1, impacts would not be significant. Training that utilizes beach habitats would be restricted to unvegetated portions of the beach. Training activities that require traversing primary dunes would be completed using existing access points. Vehicles training at inland areas would typically use existing roads and trails. Signs and fencing to limit access to sensitive areas would be utilized. In addition, natural resource managers may use INRMPs and annual INRMP reviews to assess the management of habitats. No significant impacts would occur to habitats and vegetation at JEB Fort Story as a result of Alternative 1.

4.3.5.2.2 Mammals

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual mammals would be expected to increase, for the reasons discussed under Section 4.3.3.2, impacts would not be significant. Most mammals are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, move into a protected location, such as a burrow or vegetation, for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to mammals. No significant impacts would occur to mammals at JEB Fort Story as a result of Alternative 1.

4.3.5.2.3 Invertebrates

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual invertebrates would be expected to increase, for the reasons discussed under Section 4.3.3.3, impacts would not be significant. Most invertebrates are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to invertebrates. No significant impacts would occur to invertebrates at JEB Fort Story as a result of Alternative 1.

4.3.5.2.4 Reptiles and Amphibians

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual reptiles and amphibians would be expected to increase, for the reasons discussed under Section 4.3.3.4, impacts would not be significant. Most reptiles and amphibians are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike

and noise impacts to reptiles and amphibians. No significant impacts would occur to reptiles and amphibians at JEB Fort Story as a result of Alternative 1.

4.3.5.2.5 Birds

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual birds would be expected to increase, for the reasons discussed under Section 4.3.3.5, impacts would not be significant. Most birds are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to birds. No significant impacts would occur to birds at JEB Fort Story as a result of Alternative 1.

4.3.5.2.6 Federally Protected Species and Habitats

Several federally protected species, including the northern long-eared bat (*Myotis septentrionalis*), piping plover (*Charadrius melodus*), red knot (*Calidris canutus*), roseate tern (*Sterna dougallii*), harbor seal (*Phoca vitulina*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and Kemp's ridley sea turtle (*Lepidochelys kempii*), occur or have the potential to occur at JEB Fort Story.

4.3.5.2.6.1 Northern Long-Eared Bat

A July 2015 mist net survey for bats at the installation did not capture the northern long-eared bat (*Myotis septentrionalis*); however, the species was detected during an acoustic survey that was conducted from March 11 through November 16, 2015 (Navy, 2016a). Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. Therefore, the additional training under Alternative 1 would have no significant impacts to northern long-eared bat at JEB Fort Story. Pursuant to the ESA, Alternative 1 at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.5.2.6.2 Piping Plover

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.2 (Impacts Common to All Locations Under All Alternatives, Piping Plover). The additional training under Alternative 1 would have no significant impacts to piping plover. Pursuant to the ESA, Alternative 1 at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed piping plover.

4.3.5.2.6.3 Red Knot

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.3 (Impacts Common to All Locations Under All Alternatives, Red Knot). The additional training under Alternative 1 would have no significant impacts to red knot. Pursuant to the ESA, Alternative 1 at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed red knot.

4.3.5.2.6.4 Roseate Tern

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.4 (Impacts Common to All Locations Under All Alternatives, Roseate Tern). The additional training under Alternative 1 would have no significant impacts to roseate tern. Pursuant to the ESA, Alternative 1 at JEB Fort Story would have no effect on the ESA-listed roseate tern.

4.3.5.2.6.5 Harbor Seal

Physical Strike

Under Alternative 1 additional personnel and vehicle movement would occur along with explosives on land within designated detonation areas. Hauled-out harbor seals may react to the presence of people and vehicles and temporarily return to the water. As noted for the No Action Alternative, while strikes of in-water seals are documented, strikes of hauled-out harbor seals have not been identified for the study area. Since the species is likely to return to the water when people or vehicles are present or approaching, strikes typically would not occur and this disturbance is unlikely to result in more than short-term interference with resting activities of seals. In addition, explosives on land would occur within a designated bermed area and the presence of people prior to the detonation would likely result in seals temporarily returning to the water; detonations would not occur with seals present on the beach. These disturbances would not result in a significant impact to harbor seals. The potential for in-water seal strikes in the study area are addressed in the AFTT EIS/Overseas EIS.

Noise

Noise impacts from amphibious craft would be the same as under the No Action Alternative. The operation of vehicles is not anticipated to have noise impacts on harbor seals as they would likely temporarily return to the water upon vehicle approach. Amphibious craft noise during beach landings may disturb, mask hearing or vocalization, or affect the behavior of marine mammals including harbor seals. In Alaska, harbor seals showed a higher probability of ending a haul-out (i.e., entering the water from land or ice) when vessels approached (Blundell & Pendleton, 2015). However, whether the response was related to noise or visual presence of the vessel was not studied. Marine mammal responses to vessel presence and vessel noise are relatively well studied but can be difficult to distinguish from one another, particularly during field studies. Behavioral responses appear to depend on behavioral context in many species and on the characteristics of the vessel's movement in some situations (Richardson et al., 1995).

Based on existing studies, it is likely that harbor seals found in the study area would have relatively minor behavioral reactions to vessels that maintain a reasonable distance. The distance that will provoke a response varies based on many factors including, but not limited to, vessel size, geographic location, and individual animal tolerance levels (Jahoda et al., 2003; Baker et al., 1983; Watkins, 1981). Should the vessels approach close enough to evoke a reaction, animals may engage in avoidance behaviors and/or alter their breathing patterns.

Under Alternative 1, vessel noise would potentially have behavioral effects on the harbor seal in the winter, spring, and fall, when these animals are most likely to occur. Results from monitoring of harbor seals at rock islands in the lower Chesapeake Bay possibly suggest a preference for these areas (Rees et al., 2016), the closest of which is over 3 nautical miles from JEB Fort Story. Additionally, the majority of sightings occurred at the rock islands furthest away (over 6 nautical miles) from JEB Fort Story. Occurrence of this species is, therefore, expected to be occasional, and reactions exhibited by harbor

seals would likely be temporary in nature. In addition, beach landings would continue to occur and the Navy uses highly qualified operators on amphibious craft to maintain awareness of the surrounding environment. As a result, the Navy has determined that Alternative 1 would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.5.2.6.6 Loggerhead Sea Turtles

Loggerhead sea turtles have nested at JEB Fort Story (VDGIF, 2016), and occurrence in Chesapeake Bay areas offshore of JEB Fort Story has been documented (Barco & Lockhart, 2016). Therefore, this species has the potential to occur at JEB Fort Story.

Physical Strike

Under Alternative 1, beach landings, personnel movement, and vehicle movement would increase over what is proposed under the No Action Alternative to include three additional events at TA Utah Beaches I and II resulting in approximately 38 percent more beach landings annually. In addition, weapons firing events involving blanks and non-lethal training ammunition would increase over what is proposed under the No Action Alternative consisting of 76 additional events at TA Omaha Beach and TA Utah Beaches I and II, annually. The potential for physical strike impacts to nesting sea turtles and hatchlings resulting from training activities are described in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). The increased level of training activities proposed at JEB Fort Story under Alternative 1 does not substantially increase the potential for impacts over the No Action Alternative because there is a very low density of historical loggerhead sea turtle nests at JEB Fort Story. In addition, training activities involving beach landings, personnel movement, and vehicle movement are conducted throughout the year, whereas loggerhead sea turtles would only occur seasonally. As a result, the likelihood of encountering a loggerhead sea turtle during training activities is considered low. Implementation of sea turtle management measures at JEB Fort Story, in accordance with the INRMP (Navy, 2017c) and USFWS consultations, is expected to reduce the potential for impacts to nesting loggerhead sea turtles, sea turtle nests, and hatchlings. In addition, protocols for beach landings include lookout requirements that would further reduce the potential for impacts on nesting loggerhead sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided.

Noise

Additional training activities that involve amphibious vehicle beach landings, vehicle movements, and weapons firing would result in only a minor increase in noise levels at JEB Fort Story. As discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives), noise impacts from these training activities may result in short-term behavioral responses, however no long term impacts to loggerhead sea turtles would occur. Furthermore, there is a low level of historical loggerhead sea turtle nesting activity documented at JEB Fort Story therefore the likelihood of encountering a loggerhead sea turtle during training activities is considered very low. Implementation of sea turtle management measures at JEB Fort Story, in accordance with the INRMP (Navy, 2017c) and USFWS consultations, is expected to provide additional protection for nesting loggerhead sea turtles, sea turtle nests, and hatchlings. Therefore, no significant impacts to loggerhead sea turtles would occur as a result of Alternative 1 at JEB Fort Story. Pursuant to the ESA, Alternative 1 at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed loggerhead sea turtle.

4.3.5.2.6.7 Green Sea Turtles

Physical strike and noise impacts are generally the same as those described in Section 4.3.3.6.7 (Impacts Common to All Locations Under All Alternatives, Sea Turtles). Green sea turtles are known to forage in the Chesapeake Bay and have been observed annually in these areas (Swingle et al., 2016). However, green sea turtles were not detected during acoustic and satellite telemetry studies in the Chesapeake Bay areas offshore of JEB Fort Story (Barco & Lockhart, 2016; Navy, 2017c). Furthermore, no green sea turtle nests have been documented on JEB Fort Story since 1970 when data collection efforts began (VDGIF, 2016; Navy, 2017c). Therefore, while green sea turtle occurrence at JEB Fort Story is possible, it is not considered likely. Implementation of sea turtle management measures at JEB Fort Story, in accordance with the INRMP (Navy, 2017c) and USFWS consultations, is expected to reduce the potential for impacts to green sea turtles from training activities at JEB Fort Story. In addition, protocols for beach landings include lookout requirements that would further reduce the potential for impacts because a sea turtle observed on the beach would be avoided. Based on the discussion in Section 4.3.3, no significant impacts to green sea turtles would occur at JEB Fort Story under Alternative 1. Pursuant to the ESA, there would be no effect on the ESA-listed green sea turtle at JEB Fort Story under Alternative 1.

4.3.5.2.6.8 Kemp's Ridley Sea Turtles

Kemp's ridley sea have not been documented to nest at JEB Fort Story (VDGIF, 2016); however, they are considered one of the most abundant sea turtle species to occur offshore of JEB Fort Story, and occurrence in the Chesapeake Bay offshore of JEB Fort Story has been documented (Barco & Lockhart, 2016). Therefore, this species has the potential to occur at JEB Fort Story.

Physical Strike

The potential for physical strike impacts to nesting sea turtles from beach landings, vehicle movement, and weapons firing events are discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). There is a low probability that a Kemp's ridley sea turtle would be encountered during a training activity, and the increased level of training activities proposed at JEB Fort Story under Alternative 1 does not substantially increase the potential for impacts over the No Action Alternative. In addition, training activities involving beach landings, personnel movement, and vehicle movement are conducted throughout the year, whereas Kemp's ridley sea turtles would only occur seasonally. Implementation of sea turtle management measures at JEB Fort Story, in accordance with the INRMP (Navy, 2017c) and USFWS consultations, is expected to reduce the potential for impacts to nesting sea turtles, sea turtle nests, and hatchlings. In addition, protocols for beach landings include lookout requirements that would further reduce the potential for impacts on nesting sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided.

Noise

Additional training activities that involve amphibious vehicle beach landings, vehicle movements, and weapons firing would result in only a minor increase in noise levels at JEB Fort Story. The potential for noise impacts to sea turtles from training activities are described in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). Since the likelihood of encountering a Kemp's ridley sea turtle during training activities is considered very low, the increased level of training activities proposed at JEB Fort Story under Alternative 1 does not substantially increase the potential for impacts over the No Action Alternative. Implementation of sea turtle management measures at JEB Fort Story, in accordance with the INRMP (Navy, 2017c) and USFWS consultations, is expected to reduce the potential for impacts

on nesting Kemp's ridley sea turtles, sea turtle nests, and hatchlings. Therefore, no significant impacts to Kemp's ridley sea turtles would occur as a result of Alternative 1 at JEB Fort Story. Pursuant to the ESA, Alternative 1 at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed Kemp's ridley sea turtle.

4.3.5.3 Alternative 2

Alternative 2 training events are described in Chapter 2 (see Table 2-17 and Figure 2-19) and Table 4.3-2. Under Alternative 2, EOD training would expand into a new training area that overlaps with the existing explosive training areas in Alternative 1 and the No Action Alternative. The new training area would add to the existing explosive training areas that include explosives on land, personnel movement, vehicle movement, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition.

4.3.5.3.1 Habitats and Vegetation

Physical disturbance impacts are expected to be generally the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical disturbance of individual plants and soils would be expected to increase and degrade habitats over time, for the reasons discussed under Section 4.3.3.1, impacts would not be significant. Training that utilizes beach habitats would be restricted to unvegetated portions of the beach. Training activities that require traversing primary dunes would be completed using existing access points. Vehicles training at inland areas would typically use existing roads and trails. Signs and fencing to limit access to sensitive areas would be utilized. In addition, natural resource managers may use INRMPs and annual INRMP reviews to assess the management of habitats. No significant impacts would occur to habitats and vegetation at JEB Fort Story as a result of Alternative 2.

4.3.5.3.2 Mammals

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual mammals would be expected to increase, for the reasons discussed under Section 4.3.3.2, impacts would not be significant. Most mammals are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, move into a protected location, such as a burrow or vegetation, for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to mammals. No significant impacts would occur to mammals at JEB Fort Story as a result of Alternative 2.

4.3.5.3.3 Invertebrates

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual invertebrates would be expected to increase, for the reasons discussed under Section 4.3.3.3, impacts would not be significant. Most

invertebrates are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to invertebrates. No significant impacts would occur to invertebrates at JEB Fort Story as a result of Alternative 2.

4.3.5.3.4 Reptiles and Amphibians

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual reptiles and amphibians would be expected to increase, for the reasons discussed under Section 4.3.3.4, impacts would not be significant. Most reptiles and amphibians are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to reptiles and amphibians. No significant impacts would occur to reptiles and amphibians at JEB Fort Story as a result of Alternative 2.

4.3.5.3.5 Birds

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual birds would be expected to increase, for the reasons discussed under Section 4.3.3.5, impacts would not be significant. Most birds are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to birds. No significant impacts would occur to birds at JEB Fort Story as a result of Alternative 2.

4.3.5.3.6 Federally Protected Species and Habitats

Several federally protected species, including the northern long-eared bat (*Myotis septentrionalis*), piping plover (*Charadrius melodus*), red knot (*Calidris canutus*), roseate tern (*Sterna dougallii*), harbor seal (*Phoca vitulina*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and Kemp's ridley sea turtle (*Lepidochelys kempii*), occur or have the potential to occur at JEB Fort Story.

4.3.5.3.6.1 Northern Long-Eared Bat

A July 2015 mist net survey for bats at the installation did not capture the northern long-eared bat (*Myotis septentrionalis*); however, the species was detected during an acoustic survey that was conducted from March 11 through November 16, 2015 (Navy, 2016a). Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another

area. Therefore, the additional training under Alternative 2 would have no significant impacts to northern long-eared bat at JEB Fort Story. Pursuant to the ESA, Alternative 2 at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.5.3.6.2 Piping Plover

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.2 (Impacts Common to All Locations Under All Alternatives, Piping Plover). The additional training under Alternative 2 would have no significant impacts to piping plover. Pursuant to the ESA, Alternative 2 at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed piping plover.

4.3.5.3.6.3 Red Knot

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.3 (Impacts Common to All Locations Under All Alternatives, Red Knot). The additional training under Alternative 2 would have no significant impacts to red knot. Pursuant to the ESA, Alternative 2 at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed red knot.

4.3.5.3.6.4 Roseate Tern

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.4 (Impacts Common to All Locations Under All Alternatives, Roseate Tern). The additional training under Alternative 2 would have no significant impacts to roseate tern. Pursuant to the ESA, Alternative 2 at JEB Fort Story would have no effect on the ESA-listed roseate tern.

4.3.5.3.6.5 Harbor Seal

Physical Strike

Under Alternative, 2 additional personnel and vehicle movement would occur along with explosives on land within designated detonation areas. Hauled-out harbor seals may react to the presence of people and vehicles and temporarily return to the water. As noted for the No Action Alternative and Alternative 1, while strikes of in-water seals are documented, strikes of hauled-out harbor seals have not been identified for the study area. Since the species is likely to return to the water when people or vehicles are present or approaching, strikes typically would not occur, and this disturbance is unlikely to result in more than short-term interference with resting activities of seals. In addition, explosives on land would occur within a designated bermed area, and the presence of people prior to the detonation would likely result in seals temporarily returning to the water; detonations would not occur with seals present on the beach. These disturbances would not result in a significant impact to harbor seals. The potential for in-water seal strikes in the study area is addressed in the AFTT EIS/Overseas EIS.

Noise

Noise impacts from amphibious craft would be the same as under the No Action Alternative and Alternative 1. The operation of vehicles is not anticipated to have noise impacts on harbor seals, as they would likely temporarily return to the water upon vehicle approach. Amphibious craft noise during beach landings may disturb, mask hearing or vocalization, or affect the behavior of marine mammals including harbor seals. In Alaska, harbor seals showed a higher probability of ending a haul-out (i.e., entering the water from land or ice) when vessels approached (Blundell & Pendleton, 2015). However, whether the response was related to noise or visual presence of the vessel was not studied. Marine mammal responses to vessel presence and vessel noise are relatively well studied but can be difficult to

distinguish from one another, particularly during field studies. Behavioral responses appear to depend on behavioral context in many species and on the characteristics of the vessel's movement in some situations (Richardson et al., 1995).

Based on existing studies, it is likely that harbor seals found in the study area would have relatively minor behavioral reactions to vessels that maintain a reasonable distance. The distance that will provoke a response varies based on many factors including, but not limited to, vessel size, geographic location, and individual animal tolerance levels (Jahoda et al., 2003; Baker et al., 1983; Watkins, 1981). Should the vessels approach close enough to evoke a reaction, animals may engage in avoidance behaviors and/or alter their breathing patterns.

Under Alternative 2, vessel noise would potentially have behavioral effects on the harbor seal in the winter, spring, and fall, when these animals are most likely to occur. Results from monitoring of harbor seals at rock islands in the lower Chesapeake Bay possibly suggest a preference for these areas (Rees et al., 2016), the closest of which is over 3 nautical miles from JEB Fort Story. Additionally, the majority of sightings occurred at the rock islands furthest away (over 6 nautical miles) from JEB Fort Story. Occurrence of this species is, therefore, expected to be occasional, and reactions exhibited by harbor seals would likely be temporary in nature. In addition, beach landings would continue to occur, and the Navy uses highly qualified operators on amphibious craft to maintain awareness of the surrounding environment. As a result, the Navy has determined that Alternative 2 would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.5.3.6.6 Loggerhead Sea Turtles

Loggerhead sea turtles have nested at JEB Fort Story (VDGIF, 2016), and occurrence in Chesapeake Bay areas offshore of JEB Fort Story has been documented (Barco & Lockhart, 2016). Therefore, this species has the potential to occur at JEB Fort Story.

Physical Strike

Under Alternative 2, beach landings, personnel movement, and vehicle movement would increase over what is proposed under the No Action Alternative resulting in approximately 38 percent more beach landings, 17 percent more personnel movement, and 19 percent more vehicle movements annually. In addition, weapons firing events involving blanks and non-lethal training ammunition would increase over what is proposed under the No Action Alternative consisting of 76 additional events at TA Omaha Beach and TA Utah Beaches I and II, annually. Potential physical strike from training activities are described in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). Similar to Alternative 1, the increased level of training activities proposed under Alternative 2 does not substantially increase the potential for physical strike impacts to loggerhead sea turtles because there is a very low density of historical loggerhead sea turtle nests at JEB Fort Story and the likelihood of encountering a loggerhead sea turtle during training activities is considered low.

Noise

Additional training activities proposed under Alternative 2 including LCAC operations, vehicle movements, and weapons firing would result in only a minor increase in noise levels at JEB Fort Story. Potential noise impacts to sea turtles from training activities are discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). Similar to Alternative 1, the increased level of training activities proposed under Alternative 2 does not substantially increase the potential for noise impacts to

loggerhead sea turtles. Therefore, noise impacts to loggerhead sea turtles would be the same as described in Section 4.3.5.2.6.6 (Alternative 1, Loggerhead Sea Turtles), and no significant impacts to loggerhead sea turtles would occur as a result of Alternative 2 at JEB Fort Story. Pursuant to the ESA, Alternative 2 at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed loggerhead sea turtles.

4.3.5.3.6.7 Green Sea Turtles

Impacts to green sea turtles are the same as those described in Section 4.3.5.2.6.7 (Alternative 1, Green Sea Turtles). No significant impacts to green sea turtles would occur at JEB Fort Story under Alternative 2. Pursuant to the ESA, Alternative 2 at JEB Fort Story would have no effect on the ESA-listed green sea turtle.

4.3.5.3.6.8 Kemp's Ridley Sea Turtles

Kemp's ridley sea have not been documented to nest at JEB Fort Story (VDGIF, 2016); however, they are considered one of the most abundant sea turtle species to occur offshore of JEB Fort Story, and occurrence in the Chesapeake Bay offshore of JEB Fort Story has been documented (Barco & Lockhart, 2016). Therefore, this species has the potential to occur at JEB Fort Story.

Physical Strike

Potential physical strike impacts from training activities are described in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). Similar to Alternative 1, increased levels of beach landings, vehicle movement, and weapons firing events are not expected to substantially increase the potential for physical strike impacts to Kemp's ridley sea turtles over the No Action Alternative. Therefore, physical strike impacts to Kemp's ridley sea turtles would be the same as those described in Section 4.3.5.2.6.8 (Alternative 1, Kemp's Ridley Sea Turtles), and no significant impacts to Kemp's ridley sea turtles would result under Alternative 2.

Noise

Additional training activities proposed under Alternative 2 that involve LCAC operations, vehicle movements, and weapons firing would result in only a minor increase in noise levels at JEB Fort Story. Potential noise impacts to sea turtles from training activities are discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). Similar to Alternative 1, the increased level of training activities proposed under Alternative 2 does not substantially increase the potential for noise impacts to Kemp's ridley sea turtles. Therefore, noise impacts to Kemp's ridley sea turtles would be the same as described in Section 4.3.5.2.6.8 (Alternative 1, Kemp's Ridley Sea Turtles), and no significant impacts to Kemp's ridley sea turtles would occur as a result of Alternative 2 at JEB Fort Story. Pursuant to the ESA, Alternative 2 at JEB Fort Story may affect, but is not likely to adversely affect, the ESA-listed Kemp's ridley sea turtles.

4.3.5.4 Summary

The stressors applicable to biological resources at JEB Fort Story are physical disturbance associated with beach landings, personnel movement, vehicle movement, and explosives on land; physical strike associated with beach landings, vehicle movement, weapons firing – non-lethal training ammunition, and explosives on land; and noise associated with beach landings, vehicle movement, explosives on land, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.3-2). JEB Fort Story was originally established in 1914 and since that time has been used for a variety of military

training activities. As a result, many of the training areas have long been established. Implementation of the No Action Alternative would be consistent with the baseline conditions within existing training areas and is not expected to result in significant impacts. In addition, although new or additional activities are proposed, the activities conducted under Alternatives 1 and 2 would be similar in nature to those conducted under the No Action Alternative and would not be expected to result in significant impacts to biological resources at JEB Fort Story.

4.3.6 Dam Neck Annex and Camp Pendleton

The PTEAs applicable to biological resources at Dam Neck Annex and Camp Pendleton that contribute to the physical disturbance stressor include beach landings, personnel movement, and vehicle movement; that contribute to the physical strike stressor include beach landings, vehicle movement, and weapons firing – non-lethal training ammunition; and that contribute to the noise stressor include beach landings, vehicle movement, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.3-3).

4.3.6.1 No Action Alternative

No Action Alternative training is described in Chapter 2 (see Figure 2-5 and Table 2-4) and Table 4.3-2.

4.3.6.1.1 Habitats and Vegetation

Physical disturbance impacts are the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). No significant impacts to habitats and vegetation at Dam Neck Annex or Camp Pendleton occur as a result of the No Action Alternative.

4.3.6.1.2 Mammals

Physical strike and noise impacts are the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). No significant impacts to mammals at Dam Neck Annex or Camp Pendleton occur as a result of the No Action Alternative.

4.3.6.1.3 Invertebrates

Physical strike and noise impacts are the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). No significant impacts to invertebrates at Dam Neck Annex or Camp Pendleton occur as a result of the No Action Alternative.

4.3.6.1.4 Reptiles and Amphibians

Physical strike and noise impacts are the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). No significant impacts to reptiles and amphibians at Dam Neck Annex or Camp Pendleton occur as a result of the No Action Alternative.

4.3.6.1.5 Birds

Physical strike and noise impacts are the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). No significant impacts to birds at Dam Neck Annex or Camp Pendleton occur as a result of the No Action Alternative.

Table 4.3-3. Dam Neck Annex and Camp Pendleton Biological Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*											
			No Action Alternative				*Alternative 1 (difference from the No Action Alternative)*				*Alternative 2 (difference from Alternative 1)*			
			No. of Events	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*
Land – Beaches/ Dunes	Beach Landings	amphibious	22	380 landings	380 landings	380 landings								
	Personnel Movement	NA	103	1,454 people			76	1,368 people						
	Vehicle Movement	tactical and non-tactical vehicles	64	3,781 hours	3,781 hours	3,781 hours	76	291 hours	291 hours	291 hours				
	Weapons Firing – Blank-Fire	small caliber					76			7,600 rounds				
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun					76		30,400 rounds	30,400 rounds				
Land – Non-Beaches/ Dunes	Personnel Movement	NA	28	560 people										
	Weapons Firing – Blank-Fire	small caliber	28			1,400 rounds								

Key: NA = not applicable; No. = number.

4.3.6.1.6 Federally Protected Species and Habitats

Several federally protected species, including the northern long-eared bat (*Myotis septentrionalis*), piping plover (*Charadrius melodus*), red knot (*Calidris canutus*), roseate tern (*Sterna dougallii*), harbor seal (*Phoca vitulina*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and Kemp's ridley sea turtle (*Lepidochelys kempii*), occur or have the potential to occur at Dam Neck Annex or Camp Pendleton. No sea turtle nests have been documented at Camp Pendleton, but one nest was documented approximately one mile to the north on Croatan Beach in 2015.

4.3.6.1.6.1 Northern Long-Eared Bat

A July 2015 mist net survey for bats at the installation did not capture northern long-eared bat (*Myotis septentrionalis*); however, the species was identified during March–November 2015 acoustic survey (Tetra Tech, 2016). Physical strike and noise impacts are the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. No significant impacts to northern long-eared bat occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at Dam Neck Annex or Camp Pendleton may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.6.1.6.2 Piping Plover

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.2 (Impacts Common to All Locations Under All Alternatives, Piping Plover). No significant impacts to piping plover occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at Dam Neck Annex or Camp Pendleton may affect, but is not likely to adversely affect, the ESA-listed piping plover.

4.3.6.1.6.3 Red Knot

As described in Section 4.3.3.6.3 (Impacts Common to All Locations Under All Alternatives, Red Knot), no significant impacts to red knot occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at Dam Neck Annex or Camp Pendleton may affect, but is not likely to adversely affect, the ESA-listed red knot.

4.3.6.1.6.4 Roseate Tern

As described in Section 4.3.3.6.4 (Impacts Common to All Locations Under All Alternatives, Roseate Tern), no significant impacts to roseate tern occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at Dam Neck Annex or Camp Pendleton would have no effect on the ESA-listed roseate tern.

4.3.6.1.6.5 Harbor Seal

Physical Strike

Under the No Action Alternative there is a potential for physical strike of a hauled-out harbor seal. While strikes of in-water seals are documented, strikes of hauled-out harbor seals have not been identified for the study area. Since the species is likely to return to the water when people, amphibious craft, or vehicles are present or approaching, strikes of hauled-out seals are not likely to occur. The Navy uses highly qualified operators on amphibious craft to maintain awareness of the surrounding environment.

These disturbances would not result in a significant impact to harbor seals. The potential for in-water seal strikes in the study area are addressed in the updated AFTT EIS/Overseas EIS.

Noise

Under the No Action Alternative, hauled-out harbor seals may react to the presence of people, amphibious craft, and vehicles and temporarily return to the water. In Alaska, harbor seals showed a higher probability of ending a haul-out (i.e., entering the water from land or ice) when vessels approached (Blundell & Pendleton, 2015). However, whether the response was related to noise or visual presence of the vessel was not studied. Such reactions would reduce the potential for hauled-out seals to incur injury from physical strike, as discussed above. Marine mammal responses to vessel presence and vessel noise are relatively well studied but can be difficult to distinguish from one another, particularly during field studies. Behavioral responses appear to depend on behavioral context in many species and on the characteristics of the vessel's movement in some situations (Richardson et al., 1995). Hauled-out pinnipeds may be disturbed when approached at close distance, though research indicates such reactions are somewhat context dependent (Andersen et al., 2012; Curtin et al., 2009; Hoover-Miller et al., 2013; Jansen et al., 2010; Johnson & Acevedo-Gutiérrez, 2007; Suryan & Harvey, 1998; Weiss & Morrill, 2014; Young et al., 2014). For example, one study showed that harbor seals were disturbed by tourism-related vessels, small boats, and kayaks that stopped or lingered by haul-out sites but that the seals "do not pay attention to" passing vessels at closer distances (Johnson & Acevedo-Gutiérrez, 2007). Pinnipeds in the water generally appear less responsive (Richardson et al., 1995) than those at haul-out sites. Based on existing studies, it is likely that harbor seals found in the study area would have relatively minor behavioral reactions to vessels that maintain a reasonable distance. The distance that will provoke a response varies based on many factors including, but not limited to, vessel size, geographic location, and individual animal tolerance levels (Jahoda et al., 2003; Baker et al., 1983; Watkins, 1981). Should the vessels approach close enough to evoke a reaction, animals may engage in avoidance behaviors and/or alter their breathing patterns.

Under the No Action Alternative, vessel noise would potentially have behavioral effects on the harbor seal in the winter, spring, and fall, when these animals are most likely to occur. Results from monitoring of harbor seals at rock islands in the lower Chesapeake Bay possibly suggest a preference for these areas (Rees et al., 2016). The majority of sightings occurred at the rock islands over 12 nautical miles from Dam Neck Annex and Camp Pendleton. Occurrence of this species is, therefore, expected to be occasional, and reactions exhibited by harbor seals would likely be temporary in nature. As a result, the Navy has determined that the No Action Alternative would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.6.1.6.6 Loggerhead Sea Turtles

Loggerhead sea turtles have successfully nested at Dam Neck Annex, including one nest in 1992, one nest and two false crawls in 2002, one false crawl in 2014, and two nests in 2017 (VDGIF, 2016; Navy, 2017d). In addition, loggerhead sea turtles are the most common sea turtle observed in the nearshore areas of Dam Neck Annex (Navy, 2017d).

Physical Strike

No weapons firing activities would occur at Dam Neck Annex under the No Action Alternative. Therefore, the potential for physical strike impacts to nesting sea turtles would only result from

amphibious vessels and vehicle movements, which are discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). The likelihood of encountering a loggerhead sea turtle during training activities at Dam Neck Annex is considered low because there is a very low density of historical loggerhead sea turtle nesting at Dam Neck Annex. Furthermore, training activities involving beach landings and vehicle movement are conducted throughout the year, whereas loggerhead sea turtles would only occur seasonally. Implementation of SOPs for sea turtles at Dam Neck Annex as required in the INRMP (Navy, 2015; USFWS, 2016c; Navy, 2017d) and summarized in Section 4.3.3 is expected to provide additional protection for nesting loggerhead sea turtles, nests, and hatchlings because daily patrols of beach areas would be conducted and any nest left in situ would be visibly marked and avoided. In addition, protocols for beach landings include lookout requirements that further reduce the potential for impacts on nesting loggerhead sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided.

Noise

Potential noise impacts to sea turtles from training activities would only result from amphibious vessels and vehicles, discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). The potential for a loggerhead sea turtle to be present on the beach and exposed to noise impacts during training activities is considered low because there is a low level of historical loggerhead sea turtle nesting activity documented at Dam Neck Annex and there is limited temporal overlap between year-round training activities and seasonal occurrence of loggerhead sea turtles. Implementation of SOPs for sea turtles at Dam Neck Annex as required in the INRMP (Navy, 2015; USFWS, 2016c; Navy, 2017d) and summarized in Section 4.3.3 is expected to provide additional protection for nesting loggerhead sea turtles, nests, and hatchlings because daily patrols of beach areas would be conducted and any nest left in situ would be visibly marked and avoided. Therefore, no significant impacts to loggerhead sea turtles occur as a result of the No Action Alternative at Dam Neck Annex. Pursuant to the ESA, the No Action Alternative at Dam Neck Annex under the No Action Alternative may affect, but is not likely to adversely affect, the ESA-listed loggerhead sea turtle.

4.3.6.1.6.7 Green Sea Turtles

While no green sea turtle nests or false crawls have been documented on Dam Neck Annex or Camp Pendleton, one green sea turtle nested on Sandbridge Beach in August 2005, which is just a few miles south of Dam Neck Annex (VDGIF, 2016). Based on this previous nesting record in southeastern Virginia, green sea turtles may potentially nest on Dam Neck Annex.

Physical Strike

The potential for physical strike impacts to green sea turtles would only result from amphibious vessels and vehicles, which are discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). Implementation of SOPs for sea turtles at Dam Neck Annex as required in the INRMP (Navy, 2015; USFWS, 2016c; Navy, 2017d) and summarized in Section 4.3.3 is expected to reduce the potential for physical strike and disturbance impacts to green sea turtles from training activities at Dam Neck Annex because daily patrols of beach areas would be conducted and any nest left in situ would be visibly marked and avoided. In addition, protocols for beach landings include lookout requirements that would further reduce the potential for impacts because a green sea turtle observed on the beach would be avoided.

Noise

Potential noise impacts to sea turtles from training activities would only result from amphibious vessels and vehicles, which are discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). Furthermore, the potential for a green sea turtle to be present on the beach and exposed to noise impacts during training activities is considered low. Implementation of SOPs for sea turtles at Dam Neck Annex as required in the INRMP (Navy, 2015; USFWS, 2016c; Navy, 2017d) and summarized in Section 4.3.3 is expected to provide reduce the potential for noise impacts to green sea turtles, nests, and hatchlings because daily patrols of beach areas would be conducted and any nest left in situ would be visibly marked and avoided. In addition, protocols for beach landings include lookout requirements that would further reduce the potential for impacts because a green sea turtle observed on the beach would be avoided. Therefore, no significant impacts to green sea turtles occur as a result of the No Action Alternative at Dam Neck Annex and Camp Pendleton. Pursuant to the ESA, the No Action Alternative at Dam Neck Annex may affect, but is not likely to adversely affect, the ESA-listed green sea turtle.

4.3.6.1.6.8 Kemp's Ridley Sea Turtles

The first recorded Kemp's ridley nesting in Virginia occurred on Dam Neck Annex beaches in June 2012 and successfully hatched in August (VDGIF, 2016). A second nest was recorded in 2014 in False Cape State Park, which is outside the study area. In addition, Kemp's ridley sea turtles are frequently observed in the nearshore areas of Dam Neck Annex (Navy, 2017d).

Physical Strike

The potential for physical strike impacts to Kemp's ridley sea turtles would only result from amphibious vessels and vehicles, which are discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). The likelihood of encountering a Kemp's ridley sea turtle during training activities at Dam Neck Annex is considered low because there is a very low density of historical Kemp's ridley sea turtle nesting at Dam Neck Annex. Furthermore, training activities involving beach landings and vehicle movement are conducted throughout the year, whereas Kemp's ridley sea turtles would only occur seasonally. Implementation of SOPs for sea turtles at Dam Neck Annex as required in the INRMP (Navy, 2015; USFWS, 2016c; Navy, 2017d) and summarized in Section 4.3.3 is expected to provide reduce the potential for direct strike and disturbance impacts to Kemp's ridley sea turtles, nests, and hatchlings because daily patrols of beach areas would be conducted and any nest left in situ would be visibly marked and avoided. In addition, protocols for beach landings include lookout requirements that further reduce the potential for impacts because a green sea turtle observed on the beach would be avoided.

Noise

Potential noise impacts to Kemp's ridley sea turtles from training activities would only result from amphibious vessels and vehicles, which are discussed in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives). The potential for a loggerhead sea turtle to be present on the beach and exposed to noise impacts during training activities is considered low because there is a low level of historical Kemp's ridley sea turtle nesting activity documented at Dam Neck Annex and there is limited temporal overlap between year-round training activities and seasonal occurrence of loggerhead sea turtles. Implementation of SOPs for sea turtles at Dam Neck Annex as required in the INRMP (Navy, 2015; USFWS, 2016c; Navy, 2017d) and summarized in Section 4.3.3 is expected to provide reduce the potential for noise impacts to Kemp's ridley sea turtles, nests, and hatchlings because daily patrols of beach areas would be conducted and any nest left in situ would be visibly marked and avoided. In

addition, protocols for beach landings include lookout requirements that further reduce the potential for impacts because a Kemp's ridley sea turtle observed on the beach would be avoided. Therefore, no significant impacts to Kemp's ridley sea turtles occur as a result of the No Action Alternative at Dam Neck Annex. Pursuant to the ESA, the No Action Alternative at Dam Neck Annex may affect, but is not likely to adversely affect, the ESA-listed Kemp's ridley sea turtle.

4.3.6.2 Alternative 1

Alternative 1 training events are described in Chapter 2 (see Table 2-16 and Figure 2-18) and Table 4.3-3. Alternative 1 would result in an additional 76 events involving personnel movement, vehicle movement, and weapons firing (blank fire and non-lethal training ammunition) as compared to the No Action Alternative.

4.3.6.2.1 Habitats and Vegetation

Physical disturbance impacts are expected to be generally the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical disturbance of individual plants and soils would be expected to increase and degrade habitats over time, for the reasons discussed under Section 4.3.3.1, impacts would not be significant. Training that utilizes beach habitats would be restricted to unvegetated portions of the beach. Training activities that require traversing primary dunes would be completed using existing access points. Vehicles training at inland areas would typically use existing roads and trails. Signs and fencing to limit access to sensitive areas would be utilized. In addition, natural resource managers may use INRMPs and annual INRMP reviews to assess the management of habitats. No significant impacts would occur to habitats and vegetation at Dam Neck Annex or Camp Pendleton as a result of Alternative 1.

4.3.6.2.2 Mammals

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual mammals would be expected to increase, for the reasons discussed under Section 4.3.3.2, impacts would not be significant. Most mammals are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, move into a protected location, such as a burrow or vegetation, for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to mammals. No significant impacts would occur to mammals at Dam Neck Annex or Camp Pendleton as a result of Alternative 1.

4.3.6.2.3 Invertebrates

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual invertebrates would be expected

to increase, for the reasons discussed under Section 4.3.3.3, impacts would not be significant. Most invertebrates are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to invertebrates. No significant impacts would occur to invertebrates at Dam Neck Annex or Camp Pendleton as a result of Alternative 1.

4.3.6.2.4 Reptiles and Amphibians

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptile and Amphibians). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual reptiles and amphibians would be expected to increase, for the reasons discussed under Section 4.3.3.4, impacts would not be significant. Most reptiles and amphibians are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to reptiles and amphibians. No significant impacts would occur to reptiles and amphibians at Dam Neck Annex or Camp Pendleton as a result of Alternative 1.

4.3.6.2.5 Birds

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). Although the quantity of training activities would increase under Alternative 1 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual birds would be expected to increase, for the reasons discussed under Section 4.3.3.5 impacts would not be significant. Most birds are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to birds. No significant impacts would occur to birds at Dam Neck Annex or Camp Pendleton as a result of Alternative 1.

4.3.6.2.6 Federally Protected Species and Habitats

Several federally protected species, including the northern long-eared bat (*Myotis septentrionalis*), piping plover (*Charadrius melodus*), red knot (*Calidris canutus*), roseate tern (*Sterna dougallii*), harbor seal (*Phoca vitulina*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and Kemp's ridley sea turtle (*Lepidochelys kempii*), occur or have the potential to occur at Dam Neck Annex or Camp Pendleton. No sea turtle nests have been documented at Camp Pendleton, but one nest was documented approximately 1 mile to the north on Croatan Beach in 2015.

4.3.6.2.6.1 Northern Long-Eared Bat

A July 2015 mist net survey for bats at the installation did not capture northern long-eared bat (*Myotis septentrionalis*); however, the species was identified during the March–November 2015 acoustic survey

(Tetra Tech, 2016). Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. Therefore, the additional training under Alternative 1 would have no significant impacts to northern long-eared bat at Dam Neck Annex or Camp Pendleton. Pursuant to the ESA, Alternative 1 at Dam Neck Annex or Camp Pendleton may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.6.2.6.2 Piping Plover

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.2 (Impacts Common to All Locations Under All Alternatives, Piping Plover). The additional training under Alternative 1 would have no significant impacts to piping plover. Pursuant to the ESA, Alternative 1 at Dam Neck Annex or Camp Pendleton may affect, but is not likely to adversely affect, the ESA-listed piping plover.

4.3.6.2.6.3 Red Knot

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.3 (Impacts Common to All Locations Under All Alternatives, Red Knot). The additional training under Alternative 1 would have no significant impacts to red knot. Pursuant to the ESA, Alternative 1 at Dam Neck Annex or Camp Pendleton may affect, but is not likely to adversely affect, the ESA-listed red knot.

4.3.6.2.6.4 Roseate Tern

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.4 (Impacts Common to All Locations Under All Alternatives, Roseate Tern). The additional training under Alternative 1 would have no significant impacts to roseate tern. Pursuant to the ESA, Alternative 1 at Dam Neck Annex or Camp Pendleton would have no effect on the ESA-listed roseate tern.

4.3.6.2.6.5 Harbor Seal

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.4 (Impacts Common to All Locations Under All Alternatives, Harbor Seals).

Under Alternative 1, beach landings associated with USFF training would be the same as under the No Action Alternative. However, vehicle movements would increase by 76 additional training events resulting in 94 percent additional people and 8 percent additional vehicle hours annually. In addition, 76 weapons firing events involving blanks and non-lethal training ammunition would occur at Dam Neck Annex North Beach annually. Vessel noise would potentially have behavioral effects on the harbor seal in the winter, spring and fall, when these animals are most likely to occur. Monitoring of harbor seals at rock islands in the lower Chesapeake Bay possibly suggest a preference for these areas (Rees et al., 2016). The majority of sightings occurred at the rock islands over 12 nautical miles from Dam Neck Annex and Camp Pendleton. Occurrence of this species is therefore expected to be occasional, and reactions exhibited by harbor seals would likely be temporary in nature. Therefore, the additional training under Alternative 1 would have no significant impacts to harbor seals at Dam Neck Annex and Camp Pendleton. Thus, physical strike or noise from Alternative 1 at Dam Neck Annex and Camp Pendleton would not result in the reasonably foreseeable “take” of a marine mammal species by

harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.6.2.6.6 Loggerhead Sea Turtles

Loggerhead sea turtles (*Caretta caretta*) have been documented to nest on Dam Neck Annex (VDGIF, 2016).

Physical Strike

Under Alternative 1, beach landings associated with USFF training would be the same as under the No Action Alternative. However, vehicle movements would increase by 76 additional training events resulting in 94 percent additional people and 8 percent additional vehicle hours annually. In addition, 76 weapons firing events involving blanks and non-lethal training ammunition would occur at Dam Neck Annex North Beach annually. Personnel movements would not result in a direct strike of sea turtles or nests because nesting females on the beach are large enough to be seen and nests are visibly marked, both of which can be easily avoided. Similarly, since nests are monitored daily near the hatch window to determine if they will successfully hatch, the potential for hatchlings to be present on the beach would be known and these areas would be avoided. As a result, increasing the number of personnel under Alternative 1 would not increase the risk for direct strike of a sea turtle or nest. In addition, the level of increased vehicle use under Alternative 1 would not substantially increase the potential for physical strike impacts to loggerhead sea turtles. As indicated in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives), the potential for direct strike from weapons firing involving blanks and non-lethal training ammunition is considered negligible. Physical disturbance impacts to sea turtles from amphibious vessels, vehicles, and personnel movement are described in Section 4.3.3.6.7 (Impacts Common to All Locations Under All Alternatives, Sea Turtles). Implementation of SOPs for sea turtles at Dam Neck Annex as required in the INRMP (Navy, 2015; USFWS, 2016c; Navy, 2017d) is expected to reduce the potential for physical strike and disturbance impacts to loggerhead sea turtles, nests, and hatchlings because daily patrols of beach areas would be conducted and any nest left in situ would be visibly marked and avoided. Additionally, protocols for beach landings include lookout requirements that would further reduce the potential for impacts on nesting loggerhead sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided.

Noise

Under Alternative 1, 76 weapons firing events involving blanks and non-lethal training ammunition would occur at Dam Neck Annex North Beach annually. As described in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives), the potential for loggerhead sea turtles to experience noise impacts is not likely because there is a very low density of loggerhead sea turtle nesting activity documented at Dam Neck Annex and the potential for a loggerhead sea turtle to be present on the beach and exposed to noise impacts during training activities is considered low. Implementation of SOPs for sea turtles at Dam Neck Annex as required in the INRMP (Navy, 2015; USFWS, 2016c; Navy, 2017d) and summarized in Section 4.3.3 is expected to reduce the potential for noise impacts to loggerhead sea turtles, nests, and hatchlings because daily patrols of beach areas would be conducted and any nest left in situ would be visibly marked and avoided. Therefore, there would be no significant impacts to loggerhead sea turtles at Dam Neck Annex under Alternative1. Pursuant to the ESA, Alternative 1 at Dam Neck Annex may affect, but is not likely to adversely affect, the ESA-listed loggerhead sea turtle.

4.3.6.2.6.7 Green Sea Turtles

While no green sea turtle nests or false crawls have been documented on Dam Neck Annex or Camp Pendleton, one green sea turtle nested on Sandbridge Beach in August 2005, which is just a few miles south of Dam Neck Annex (VDGIF, 2016). Based on this previous nesting record in southeastern Virginia, green sea turtles may potentially nest on Dam Neck Annex but are not expected to occur at Camp Pendleton.

Physical Strike

Under Alternative 1, beach landings associated with USFF training would be the same as under the No Action Alternative. However, vehicle movements would increase by 76 additional training events resulting in 94 percent additional people and 8 percent additional vehicle hours annually. In addition, 76 weapons firing events involving blanks and non-lethal training ammunition would occur at Dam Neck Annex North Beach annually. Personnel movements would not result in a direct strike of sea turtles or nests because nesting females on the beach are large enough to be seen and nests are visibly marked, both of which can be easily avoided. Similarly, since nests are monitored daily near the hatch window to determine if they will successfully hatch, the potential for hatchlings to be present on the beach would be known and these areas would be avoided. As a result, increasing the number of personnel under Alternative 1 would not increase the risk for direct strike of a sea turtle or nest. In addition, the level of increased vehicle use under Alternative 1 would not substantially increase the potential for physical strike impacts to green sea turtles. As indicated in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives), the potential for direct strike from weapons firing involving blanks and non-lethal training ammunition is considered negligible. Physical disturbance impacts to sea turtles from amphibious vessels, vehicles, and personnel movement are described in Section 4.3.3.6.7 (Impacts Common to All Locations Under All Alternatives, Sea Turtles). Implementation of SOPs for sea turtles at Dam Neck Annex as required in the INRMP (Navy, 2015; USFWS, 2016c; Navy, 2017d) and summarized in Section 4.3.3 is expected to reduce potential physical strike and disturbance impacts to green sea turtles, nests, and hatchlings because daily patrols of beach areas would be conducted and any nest left in situ would be visibly marked and avoided. Additionally, protocols for beach landings include lookout requirements that would further reduce the potential for impacts on nesting loggerhead sea turtles and hatchlings, because a sea turtle observed on the beach would be avoided.

Noise

Under Alternative 1, 76 weapons firing events involving blanks and non-lethal training ammunition would occur at Dam Neck Annex North Beach annually. As described in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives), the potential for green sea turtles to experience noise impacts is not likely because there is a low probability that a green turtle would nest in this area and the potential for a green sea turtle to be present on the beach and exposed to noise impacts during training activities is considered low. Implementation of SOPs for sea turtles at Dam Neck Annex as required in the INRMP (Navy, 2015; USFWS, 2016c; Navy, 2017d) and summarized in Section 4.3.3 is expected to reduce the potential for noise impacts to green sea turtles, nests, and hatchlings because daily patrols of beach areas would be conducted and any nest left in situ would be visibly marked and avoided. Therefore, there would be no significant impacts to green sea turtles at Dam Neck Annex under Alternative 1. Pursuant to the ESA, Alternative 1 at Dam Neck Annex may affect, but is not likely to adversely affect, the ESA-listed green sea turtle.

4.3.6.2.6.8 Kemp's Ridley Sea Turtles

Kemp's ridley sea turtles (*Lepidochelys kempii*) have been documented to nest on Dam Neck Annex and False Cape State Park, which is outside the study area (VDGIF, 2016).

Physical Strike

Under Alternative 1, beach landings associated with USFF training would be the same as under the No Action Alternative. However, vehicle movements would increase by 76 additional training events, resulting in 94 percent additional people and 8 percent additional vehicle hours annually. In addition, 76 weapons firing events involving blanks and non-lethal training ammunition would occur at Dam Neck Annex North Beach annually. Personnel movements would not result in a direct strike of sea turtles or nests because nesting females on the beach are large enough to be seen and nests are visibly marked, both of which can be easily avoided. Similarly, since nests are monitored daily near the hatch window to determine if they will successfully hatch, the potential for hatchlings to be present on the beach would be known and these areas would be avoided. As a result, increasing the number of personnel under Alternative 1 would not increase the risk for direct strike of a sea turtle or nest. In addition, the level of increased vehicle use under Alternative 1 would not substantially increase the potential for physical strike impacts to Kemp's ridley sea turtles. As indicated in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives), the potential for direct strike from weapons firing involving blanks and non-lethal training ammunition is considered negligible. Physical disturbance impacts to sea turtles from amphibious vessels, vehicles, and personnel movement are described in Section 4.3.3.6.7 (Impacts Common to All Locations Under All Alternatives, Sea Turtles). Implementation of SOPs for sea turtles at Dam Neck Annex as required in the INRMP (Navy, 2015; USFWS, 2016c; Navy, 2017d) is expected to reduce the potential for physical strike and disturbance impacts to Kemp's ridley sea turtles, nests, and hatchlings because daily patrols of beach areas would be conducted and any nest left in situ would be visibly marked and avoided.

Noise

Under Alternative 1, 76 weapons firing events involving blanks and non-lethal training ammunition would occur at Dam Neck Annex North Beach annually. As described in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives), the potential for Kemp's ridley sea turtles to experience noise impacts is not likely because there is a very low density of Kemp's ridley sea turtle nesting activity documented at Dam Neck Annex and the potential for a Kemp's ridley sea turtle to be present on the beach and exposed to noise impacts during training activities is considered low. Implementation of SOPs for sea turtles at Dam Neck Annex as required in the INRMP (Navy, 2015; USFWS, 2016c; Navy, 2017d) and summarized in Section 4.3.3 is expected to reduce the potential for noise impacts to Kemp's ridley sea turtles, nests, and hatchlings because daily patrols of beach areas would be conducted and any nest left in situ would be visibly marked and avoided. Therefore, there would be no significant impacts to Kemp's ridley sea turtles at Dam Neck Annex under Alternative1. Pursuant to the ESA, Alternative 1 at Dam Neck Annex may affect, but is not likely to adversely affect, the ESA-listed Kemp's ridley sea turtle.

4.3.6.3 Alternative 2

Alternative 2 training events are the same as those under Alternative 1 at this location; as noted in Table 4.3-3, no additional training would occur under Alternative 2 versus Alternative 1. Impacts under Alternative 2 would be the same as under Alternative 1 and are discussed below (previous analysis is repeated for the reader's convenience).

4.3.6.3.1 Habitats and Vegetation

Physical disturbance impacts are expected to be generally the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical disturbance of individual plants and soils would be expected to increase and degrade habitats over time, for the reasons discussed under Section 4.3.3.1, impacts would not be significant. Training that utilizes beach habitats would be restricted to unvegetated portions of the beach. Training activities that require traversing primary dunes would be completed using existing access points. Vehicles training at inland areas would typically use existing roads and trails. Signs and fencing to limit access to sensitive areas would be utilized. In addition, natural resource managers may use INRMPs and annual INRMP reviews to assess the management of habitats. No significant impacts would occur to habitats and vegetation at Dam Neck Annex or Camp Pendleton as a result of Alternative 2.

4.3.6.3.2 Mammals

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual mammals would be expected to increase, for the reasons discussed under Section 4.3.3.2, impacts would not be significant. Most mammals are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, move into a protected location, such as a burrow or vegetation, for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to mammals. No significant impacts would occur to mammals at Dam Neck Annex or Camp Pendleton as a result of Alternative 2.

4.3.6.3.3 Invertebrates

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual invertebrates would be expected to increase, for the reasons discussed under Section 4.3.3.3, impacts would not be significant. Most invertebrates are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to invertebrates. No significant impacts would occur to invertebrates at Dam Neck Annex or Camp Pendleton as a result of Alternative 2.

4.3.6.3.4 Reptiles and Amphibians

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). Although

the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual reptiles and amphibians would be expected to increase, for the reasons discussed under Section 4.3.3.4, impacts would not be significant. Most reptiles and amphibians are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to reptiles and amphibians. No significant impacts would occur to reptiles and amphibians at Dam Neck Annex or Camp Pendleton as a result of Alternative 2.

4.3.6.3.5 Birds

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual birds would be expected to increase, for the reasons discussed under Section 4.3.3.5, impacts would not be significant. Most birds are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to birds. No significant impacts would occur to birds at Dam Neck Annex or Camp Pendleton as a result of Alternative 2.

4.3.6.3.6 Federally Protected Species and Habitats

Several federally protected species, including the northern long-eared bat (*Myotis septentrionalis*), piping plover (*Charadrius melodus*), red knot (*Calidris canutus*), roseate tern (*Sterna dougallii*), harbor seal (*Phoca vitulina*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and Kemp's ridley sea turtle (*Lepidochelys kempii*), occur or have the potential to occur at Dam Neck Annex or Camp Pendleton. No sea turtle nests have been documented at Camp Pendleton, but one nest was documented approximately 1 mile to the north on Croatan Beach in 2015.

4.3.6.3.6.1 Northern Long-Eared Bat

A July 2015 mist net survey for bats at the installation did not capture northern long-eared bat (*Myotis septentrionalis*); however, the species was identified during the March–November 2015 acoustic survey (Tetra Tech, 2016). Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. Therefore, the additional training under Alternative 2 would have no significant impacts to northern long-eared bat at Dam Neck Annex or Camp Pendleton. Pursuant to the ESA, Alternative 2 at Dam Neck Annex or Camp Pendleton may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.6.3.6.2 Piping Plover

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.2 (Impacts Common to All Locations Under All Alternatives, Piping Plover). The additional training under Alternative 2 would have no significant impacts to piping plover. Pursuant to the ESA, Alternative

2 at Dam Neck Annex or Camp Pendleton may affect, but is not likely to adversely affect, the ESA-listed piping plover.

4.3.6.3.6.3 Red Knot

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.3 (Impacts Common to All Locations Under All Alternatives, Red Knot). The additional training under Alternative 2 would have no significant impacts to red knot. Pursuant to the ESA, Alternative 2 at Dam Neck Annex or Camp Pendleton may affect, but is not likely to adversely affect, the ESA-listed red knot.

4.3.6.3.6.4 Roseate Tern

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.6.4 (Impacts Common to All Locations Under All Alternatives, Roseate Tern). The additional training under Alternative 2 would have no significant impacts to roseate tern. Pursuant to the ESA, Alternative 2 at Dam Neck Annex or Camp Pendleton would have no effect on the ESA-listed roseate tern.

4.3.6.3.6.5 Harbor Seal

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.6 (Impacts Common to All Locations Under All Alternatives, Harbor Seals). Alternative 2 would include the same increase in training activities at Dam Neck Annex North Beach annually as under Alternative 1. Similar to the No Action Alternative and Alternative 1, vessel noise would potentially have behavioral effects on the harbor seal in the winter, spring and fall, when these animals are most likely to occur. Monitoring of harbor seals at rock islands in the lower Chesapeake Bay possibly suggest a preference for these areas (Rees et al., 2016). The majority of sightings occurred at the rock islands over 12 nautical miles from Dam Neck Annex and Camp Pendleton. Occurrence of this species is therefore expected to be occasional, and reactions exhibited by harbor seals would likely be temporary in nature. Therefore, the additional training under Alternative 2 would have no significant impacts to harbor seals at Dam Neck Annex and Camp Pendleton. Thus, physical strike or noise from Alternative 2 at Dam Neck Annex and Camp Pendleton would not result in the reasonably foreseeable “take” of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.6.3.6.6 Loggerhead Sea Turtles

Loggerhead sea turtles have been documented to nest on Dam Neck Annex (VDGIF, 2016). No sea turtle nests have been documented at Camp Pendleton and are, therefore, not expected to occur. Potential physical strike and noise impacts to loggerhead sea turtles are the same as those described in Section 4.3.6.2.6.6 (Alternative 1, Loggerhead Sea Turtles); therefore, no significant impacts to loggerhead sea turtles at Dam Neck Annex would occur as a result of Alternative 2. Pursuant to the ESA, Alternative 2 at Dam Neck Annex may affect, but is not likely to adversely affect, the ESA-listed loggerhead sea turtles.

4.3.6.3.6.7 Green Sea Turtles

While no green sea turtle nests or false crawls have been documented on Dam Neck Annex or Camp Pendleton, one green sea turtle nested on Sandbridge Beach in August 2005, which is just a few miles south of Dam Neck Annex (VDGIF, 2016). Based on this previous nesting record in southeastern Virginia, green sea turtles may potentially nest on Dam Neck Annex but are not expected to occur at Camp

Pendleton. Potential physical strike and noise impacts to green sea turtles are the same as those described in Section 4.3.6.2.6.7 (Alternative 1, Green Sea Turtles); therefore, no significant impacts to green sea turtles at Dam Neck Annex would occur under Alternative 2. Pursuant to the ESA, Alternative 2 at Dam Neck Annex may affect, but is not likely to adversely affect, the ESA-listed green sea turtle.

4.3.6.3.6.8 Kemp's Ridley Sea Turtles

Kemp's ridley sea turtles (*Lepidochelys kempii*) have been documented to nest on Dam Neck Annex (VDGIF, 2016). No sea turtle nests have been documented at Camp Pendleton and are, therefore, not expected to occur. Potential physical strike and noise impacts to Kemp's ridley sea turtles are the same as those described in Section 4.3.6.2.6.8 (Alternative 1, Kemp's Ridley Sea Turtles); therefore, no significant impacts to Kemp's ridley sea turtles at Dam Neck Annex would occur under Alternative 2. Pursuant to the ESA, Alternative 2 at Dam Neck Annex may affect, but is not likely to adversely affect, the ESA-listed Kemp's ridley sea turtle.

4.3.6.4 Summary

The stressors applicable to biological resources at Dam Neck Annex and Camp Pendleton are physical disturbance associated with beach landings, personnel movement, and vehicle movement; physical strike associated with beach landings, vehicle movement, and weapons firing – non-lethal training ammunition; and noise associated with beach landings, vehicle movement, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.3-3). Dam Neck Annex was founded in 1941 and since that time has been used for a variety of military training activities (Navy, 2017d). Implementation of the No Action Alternative would be consistent with the baseline conditions within existing training areas and is not expected to result in significant impacts. In addition, although new or additional activities are proposed, the activities conducted under Alternatives 1 and 2 would be similar in nature to those conducted under the No Action Alternative and would not be expected to result in significant impacts to biological resources at these locations.

4.3.7 Naval Auxiliary Landing Field Fentress

The PTEAs applicable to biological resources at NALF Fentress that contribute to the physical disturbance stressor include personnel movement and vehicle movement; that contribute to the physical strike stressor include vehicle movement, and weapons firing – non-lethal training ammunition; and that contribute to the noise stressor include vehicle movement, equipment use, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.3-4). NALF Fentress does not include Beach/Dune training areas.

4.3.7.1 No Action Alternative

4.3.7.1.1 Habitats and Vegetation

Physical disturbance impacts are the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). No significant impacts to habitats and vegetation at NALF Fentress occur as a result of the No Action Alternative.

4.3.7.1.2 Mammals

Physical strike and noise impacts are the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). No significant impacts to mammals at NALF Fentress occur as a result of the No Action Alternative.

4.3.7.1.3 Invertebrates

Physical strike and noise impacts are the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). No significant impacts to invertebrates at NALF Fentress occur as a result of the No Action Alternative.

4.3.7.1.4 Reptiles and Amphibians

Physical strike and noise impacts are the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). No significant impacts to reptiles and amphibians at NALF Fentress occur as a result of the No Action Alternative.

4.3.7.1.5 Birds

Physical strike and noise impacts are the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). No significant impacts to birds at NALF Fentress occur as a result of the No Action Alternative.

4.3.7.1.6 Federally Protected Species and Habitats

4.3.7.1.6.1 Northern Long-Eared Bat

The federally protected northern long-eared bat has been observed on the installation during mist net surveys in the summer of 2015 (Tetra Tech, 2016). The large deciduous and mixed forest at NALF Fentress offers excellent spring and summer habitat. The bat migrates out of the area during the fall and winter months. In the spring and summer, this species roosts underneath the bark of live and dead trees in wooded habitats but sometimes roosts in buildings, barns, and bridges (USFWS, 2014) during the day. At dusk, the bat emerges for nighttime foraging flights, often near forest openings and open water sources such as creeks and ponds.

No other federally threatened or endangered species have been identified on the installation nor has any critical habitat, for northern long-eared bats or any other species, been identified at NALF Fentress.

Generally, physical strike and noise impacts are the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. With regard to noise impacts, the USFWS states that northern long-eared bats are expected to habituate to noise and can be found in and adjacent to high noise areas, such as active military ranges (USFWS, 2016d). Considering this, in addition to the fact that NALF Fentress is already a high noise environment due to an average of 84,300 annual aircraft operations (e.g., some locations greater than or equal to 85 dB day-night average sound level (DNL), noise impacts would have a discountable effect on the northern long-eared bat. No significant impacts to northern long-eared bat occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at NALF Fentress may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

Table 4.3-4. NALF Fentress Biological Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*											
			No Action Alternative				*Alternative 1 (difference from the No Action Alternative)*				*Alternative 2 (difference from Alternative 1)*			
			No. of Events	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*
Land – Non-Beaches/ Dunes	Equipment Use	diesel generators									4			6,300 hours
	Personnel Movement	NA	90	1,800 people							4	1,493 people		
	Vehicle Movement	tactical and non-tactical vehicles	90	4,500 hours	4,500 hours	4,500 hours					4	1,072 hours	1,072 hours	1,072 hours
	Weapons Firing – Blank-Fire	small arms	90			4,500 rounds					4			12,800 rounds
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	90		9,000 rounds	9,000 rounds								

Key: NA = not applicable; No. = number.

4.3.7.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative and, therefore, no significant impacts would occur.

4.3.7.3 Alternative 2

Alternative 2 training events at NALF Fentress are described in Chapter 2 (see Table 2-18 and Figure 2-20) and Table 4.3-4. Alternative 2 would result in an increase in equipment use (diesel generators), personnel movement, vehicle movement, and weapons firing of blanks by four events compared to the No Action Alternative. Alternative 2 would include the use of diesel generators to provide temporary power to electrical equipment. When operating, diesel generators would add to the background noise in an affected area.

4.3.7.3.1 Habitats and Vegetation

Physical disturbance impacts are expected to be generally the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical disturbance of individual plants and soils would be expected to increase and degrade habitats over time, for the reasons discussed under Section 4.3.3.1, impacts would not be significant. Vehicles training at inland areas would typically use existing roads and trails. Signs and fencing to limit access to any sensitive areas would be utilized. In addition, natural resource managers may use INRMPs and annual INRMP reviews to assess the management of habitats. No significant impacts would occur to habitats and vegetation at NALF Fentress as a result of Alternative 2.

4.3.7.3.2 Mammals

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual mammals would be expected to increase, for the reasons discussed under Section 4.3.3.2, impacts would not be significant. Most mammals are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, move into a protected location, such as a burrow or vegetation, for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to mammals. No significant impacts would occur to mammals at NALF Fentress as a result of Alternative 2.

4.3.7.3.3 Invertebrates

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual invertebrates would be expected to increase, for the reasons discussed under Section 4.3.3.3, impacts would not be significant. Most invertebrates are highly mobile and agile and would likely move away from a training activity or move

into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to invertebrates. No significant impacts would occur to invertebrates at NALF Fentress as a result of Alternative 2.

4.3.7.3.4 Reptiles and Amphibians

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual reptiles and amphibians would be expected to increase, for the reasons discussed under Section 4.3.3.4, impacts would not be significant. Most reptiles and amphibians are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to reptiles and amphibians. No significant impacts would occur to reptiles and amphibians at NALF Fentress as a result of Alternative 2.

4.3.7.3.5 Birds

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual birds would be expected to increase, for the reasons discussed under Section 4.3.3.5, impacts would not be significant. Most birds are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to birds. No significant impacts would occur to birds at NALF Fentress as a result of Alternative 2.

4.3.7.3.6 Federally Protected Species and Habitats

4.3.7.3.6.1 Northern Long-Eared Bat

The federally protected northern long-eared bat has been observed on the installation during mist net surveys in the summer of 2015 (Tetra Tech, 2016). The large deciduous and mixed forest at NALF Fentress offers excellent spring and summer habitat. The bat migrates out of the area during the fall and winter months. In the spring and summer, this species roosts underneath the bark of live and dead trees in wooded habitats but sometimes roosts in buildings, barns, and bridges (USFWS, 2014) during the day. At dusk, the bat emerges for nighttime foraging flights, often near forest openings and open water sources such as creeks and ponds. If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area.

No other federally threatened or endangered species have been identified on the installation nor has any critical habitat, for northern long-eared bats or any other species, been identified at NALF Fentress.

Generally, physical strike and noise impacts are the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. With regards to noise impacts, the USFWS states that northern long-eared bats are expected to habituate to noise and can be found in and adjacent to high noise areas, such as active military ranges (USFWS, 2016d). Considering this, in addition to the fact that NALF Fentress is already a high noise environment due to an average of 84,300 annual aircraft operations (e.g., some locations greater than or equal to 85 dB DNL), noise impacts would have a discountable effect on the northern long-eared bat. Therefore, the additional training under Alternative 2 would have no significant impacts to northern long-eared bat. Pursuant to the ESA, Alternative 2 at NALF Fentress may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.7.4 Summary

The stressors applicable to biological resources at NALF Fentress are physical disturbance associated with personnel movement and vehicle movement; physical strike associated with vehicle movement, and weapons firing – non-lethal training ammunition; and noise associated with vehicle movement, equipment use, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.3-4). NALF Fentress does not include Beach/Dune training areas. NALF Fentress was founded in 1937 and since that time has been used for a variety of military training activities (Navy, 2017e). Implementation of the No Action Alternative would be consistent with the baseline conditions within existing training areas and is not expected to result in significant impacts to biological resources. Alternative 1 would be the same as the No Action Alternative and therefore would not result in significant impacts to biological resources. Alternative 2 would be similar to the No Action Alternative and Alternative 1, but would include an increase in equipment use, personnel movement, vehicle movement, and weapons firing of blanks by four events per year. Additional training activities under Alternative 2 would not be expected to result in significant impacts to biological resources at NALF Fentress.

4.3.8 Northwest Annex

The PTEAs applicable to biological resources at Northwest Annex that contribute to the physical disturbance stressor include personnel movement and vehicle movement, that contribute to the physical strike stressor include vehicle movement, and that contribute to the noise stressor include vehicle movement (Table 4.3-5). Northwest Annex does not include Beaches/Dunes training areas.

4.3.8.1 No Action Alternative

Training events at Northwest Annex under the No Action Alternative are described in Chapter 2 (see Figure 2-10 and Table 2-7) and Table 4.3-5.

4.3.8.1.1 Habitats and Vegetation

Physical disturbance impacts are the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). No significant impacts to habitats and vegetation at Northwest Annex occur as a result of the No Action Alternative.

4.3.8.1.2 Mammals

Physical strike and noise impacts are the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). No significant impacts to mammals at Northwest Annex occur as a result of the No Action Alternative.

4.3.8.1.3 Invertebrates

Physical strike and noise impacts are the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). No significant impacts to invertebrates at Northwest Annex occur as a result of the No Action Alternative.

4.3.8.1.4 Reptiles and Amphibians

Physical strike and noise impacts are the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). No significant impacts to reptiles and amphibians at Northwest Annex occur as a result of the No Action Alternative.

4.3.8.1.5 Birds

Physical strike and noise impacts are the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). No significant impacts to birds at Northwest Annex occur as a result of the No Action Alternative.

4.3.8.1.6 Federally Protected Species and Habitats

4.3.8.1.6.1 Northern Long-Eared Bat

The federally protected northern long-eared bat has been observed on the installation during mist net surveys in 2015 (Tetra Tech, 2016). The large deciduous and mixed forest at Northwest Annex offers excellent spring and summer habitat. The bat migrates out of the area during the fall and winter months. In the spring and summer, this species roosts underneath the bark of live and dead trees in wooded habitats but sometimes roosts in buildings, barns, and bridges (USFWS, 2014) during the day. At dusk, the bat emerges for nighttime foraging flights, often near forest openings and open water sources such as creeks and ponds.

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.1. If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. No significant impacts to northern long-eared bat occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at Northwest Annex may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

No other federally threatened or endangered species have been identified on the installation, nor has any critical habitat, for northern long-eared bats or any other species, been identified at Northwest Annex.

Table 4.3-5. Northwest Annex Biological Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*											
			No Action Alternative				*Alternative 1 (difference from the No Action Alternative)*				*Alternative 2 (difference from Alternative 1)*			
			No. of Events	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*
Land – Non-Beaches/ Dunes	Personnel Movement	NA	170	1,190 people										
	Vehicle Movement	tactical and non-tactical vehicles	170	510 hours	510 hours	510 hours								

Key: NA = not applicable; No. = number.

4.3.8.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative and, therefore, no significant impacts would occur.

4.3.8.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative and, therefore, no significant impacts would occur.

4.3.8.4 Summary

The stressors applicable to biological resources at Northwest Annex are physical disturbance associated with personnel movement and vehicle movement, physical strike associated with vehicle movement, and noise associated with vehicle movement (Table 4.3-5). Acquisition of lands for Northwest Annex began in 1951 and since that time has been used for a variety of military training activities (Navy, 2017f). As a result, many of the training areas have long been established. Implementation of the No Action Alternative would be consistent with the baseline conditions within existing training areas and is not expected to result in significant impacts to biological resources. Alternatives 1 and 2 would be the same as the No Action Alternative and therefore would not result in significant impacts to biological resources.

4.3.9 St. Juliens Creek Annex

The PTEAs applicable to biological resources at St. Juliens Creek Annex that contribute to the physical disturbance stressor include personnel movement and vehicle movement; that contribute to the physical strike stressor include vehicle movement; and that contribute to the noise stressor include vehicle movement, equipment use, and weapons firing – blank-fire (Table 4.3-6). St. Juliens Creek Annex does not include Beaches/Dunes training areas.

4.3.9.1 No Action Alternative

Training events at St. Juliens Creek Annex under the No Action Alternative are described in Chapter 2 (see Figure 2-11 and Table 2-8) and Table 4.3-6.

4.3.9.1.1 Habitats and Vegetation

Physical disturbance impacts are the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). No significant impacts to habitats and vegetation at St. Juliens Creek Annex occur as a result of the No Action Alternative.

4.3.9.1.2 Mammals

Physical strike and noise impacts are the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). No significant impacts to mammals at St. Juliens Creek Annex occur as a result of the No Action Alternative.

4.3.9.1.3 Invertebrates

Physical strike and noise impacts are the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). No significant impacts to invertebrates at St. Juliens Creek Annex occur as a result of the No Action Alternative.

4.3.9.1.4 Reptiles and Amphibians

Physical strike and noise impacts are the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). No significant impacts to reptiles and amphibians at St. Juliens Creek Annex occur as a result of the No Action Alternative.

4.3.9.1.5 Birds

Physical strike and noise impacts are the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). No significant impacts to birds at St. Juliens Creek Annex occur as a result of the No Action Alternative.

4.3.9.1.6 Federally Protected Species and Habitats

4.3.9.1.6.1 Northern Long-Eared Bat

The federally protected northern long-eared is known to occur in the area and given its mobility there is the potential for the bat to occur on-site. The deciduous and mixed forest at St. Juliens Creek Annex offers potential spring and summer habitat. The bat migrates out of the area during the fall and winter months. In the spring and summer, this species roosts underneath the bark of live and dead trees in wooded habitats but sometimes roosts in buildings, barns, and bridges (USFWS, 2014) during the day. At dusk, the bat emerges for nighttime foraging flights, often near forest openings and open water sources such as creeks and ponds.

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.1. If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. No significant impacts to northern long-eared bat occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at St. Juliens Creek Annex may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

No other federally threatened or endangered species have been identified on the installation nor has any critical habitat, for northern long-eared bats or any other species, been identified at St. Juliens Creek Annex.

4.3.9.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative and, therefore, no significant impacts would occur.

4.3.9.3 Alternative 2

Alternative 2 training events at St. Juliens Creek Annex are described in Chapter 2 (see Table 2-19 and Figure 2-21) and Table 4.3-6. Under Alternative 2, a new training area within St. Juliens Creek Annex would be used to support EOD training using vehicle and personnel movement. These activities would result in an increase in personnel movement and vehicle movement by 28 events per year compared to the No Action Alternative.

Table 4.3-6. St. Juliens Creek Annex Biological Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*											
			No Action Alternative				*Alternative 1 (difference from the No Action Alternative)*				*Alternative 2 (difference from Alternative 1)*			
			No. of Events	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*
Land – Non-Beaches/ Dunes	Equipment Use	diesel generator	17			21,948 hours								
	Personnel Movement	NA	17	4,843 people							28	392 people		
	Vehicle Movement	tactical and non-tactical vehicles	16	4,527 hours	4,527 hours	4,527 hours					28	1,890 hours	1,890 hours	1,890 hours
	Weapons Firing – Blank-Fire	small arms	11			35,200 rounds								

Key: NA = not applicable; No. = number.

4.3.9.3.1 Habitats and Vegetation

Physical disturbance impacts are expected to be generally the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical disturbance of individual plants and soils would be expected to increase and degrade habitats over time, for the reasons discussed under Section 4.3.3.1, impacts would not be significant. Vehicles training at inland areas would typically use existing roads and trails. Signs and fencing to limit access to any sensitive areas would be utilized. In addition, natural resource managers may use INRMPs and annual INRMP reviews to assess the management of habitats. No significant impacts would occur to habitats and vegetation at St. Juliens Creek Annex as a result of Alternative 2.

4.3.9.3.2 Mammals

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual mammals would be expected to increase, for the reasons discussed under Section 4.3.3.2, impacts would not be significant. Most mammals are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, move into a protected location, such as a burrow or vegetation, for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to mammals. No significant impacts would occur to mammals at St. Juliens Creek Annex as a result of Alternative 2.

4.3.9.3.3 Invertebrates

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual invertebrates would be expected to increase, for the reasons discussed under Section 4.3.3.3, impacts would not be significant. Most invertebrates are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to invertebrates. No significant impacts would occur to invertebrates at St. Juliens Creek Annex as a result of Alternative 2.

4.3.9.3.4 Reptiles and Amphibians

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual reptiles and amphibians would be expected to increase, for the reasons discussed under Section 4.3.3.4, impacts

would not be significant. Most reptiles and amphibians are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to reptiles and amphibians. No significant impacts would occur to reptiles and amphibians at St. Juliens Creek Annex as a result of Alternative 2.

4.3.9.3.5 Birds

Physical strike and noise impacts are expected to be generally the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). Although the quantity of training activities would increase under Alternative 2 when compared to the No Action Alternative, and the likelihood of physical strike and noise disturbance of individual birds would be expected to increase, for the reasons discussed under Section 4.3.3.5, impacts would not be significant. Most birds are highly mobile and agile and would likely move away from a training activity or move into a protected location for cover. Furthermore, most noise events would be localized and occur for a relatively short period of time (minutes to hours). Implementation of certain INRMP management measures has the effect of minimizing physical strike and noise impacts to birds. No significant impacts would occur to birds at St. Juliens Creek Annex as a result of Alternative 2.

4.3.9.3.6 Federally Protected Species and Habitats

The northern long-eared bat (*Myotis septentrionalis*) is known to occur at St. Juliens Creek Annex. No other federally protected species occur or have the potential to occur at St. Juliens Creek Annex.

4.3.9.3.6.1 Northern Long-Eared Bat

The federally protected northern long-eared is known to occur in the area and given its mobility there is the potential for the bat to occur on-site. The deciduous and mixed forest at St. Juliens Creek Annex offers potential spring and summer habitat. The bat migrates out of the area during the fall and winter months. In the spring and summer, this species roost underneath the bark of live and dead trees in wooded habitats but sometimes roosting in buildings, barns, and bridges (USFWS, 2014) during the day. At dusk, the bat emerges for nighttime foraging flights, often near forest openings and open water sources such as creeks and ponds. If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. Pursuant to the ESA, Alternative 2 at St. Juliens Creek Annex may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.9.4 Summary

The stressors applicable to biological resources at St. Juliens Creek Annex are physical disturbance associated with personnel movement and vehicle movement; physical strike associated with vehicle movement; and noise associated with vehicle movement, equipment use, and weapons firing – blank-fire (Table 4.3-6). St. Juliens Creek Annex does not include Beaches/Dunes training areas nor does the installation have an INRMP. Implementation of the No Action Alternative would be consistent with the baseline conditions within existing training areas and is not expected to result in significant impacts to biological resources. Alternative 1 would be the same as the No Action Alternative and therefore would not result in significant impacts to biological resources. Alternative 2 would include a new training area

within St. Juliens Creek Annex that would be used to support EOD training using vehicle and personnel movement, and would result in an increase in these activities by 28 events per year compared to the No Action Alternative. No significant impacts to biological resources would occur under Alternative 2.

4.3.10 NWS Yorktown

The PTEAs applicable to biological resources at NWS Yorktown that contribute to the physical disturbance stressor include personnel movement, explosives on land, and vehicle movement; that contribute to the physical strike stressor include explosives on land, vehicle movement, and weapons firing – non-lethal training ammunition; and that contribute to the noise stressor include vehicle movement, equipment use, explosives on land, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.3-7). NWS Yorktown does not include Beaches/Dunes training areas.

4.3.10.1 No Action Alternative

Under the No Action Alternative training at NWS Yorktown is described in Chapter 2 (see Figure 2-12 and Table 2-9) and Table 4.3-7.

4.3.10.1.1 Habitats and Vegetation

Physical disturbance impacts are the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). No significant impacts to habitats and vegetation at NWS Yorktown occur as a result of the No Action Alternative.

4.3.10.1.2 Mammals

Physical strike and noise impacts are the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). No significant impacts to mammals at NWS Yorktown occur as a result of the No Action Alternative.

4.3.10.1.3 Invertebrates

Physical strike and noise impacts are the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). No significant impacts to invertebrates at NWS Yorktown occur as a result of the No Action Alternative.

4.3.10.1.4 Reptiles and Amphibians

Physical strike and noise impacts are the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). No significant impacts to reptiles and amphibians at NWS Yorktown occur as a result of the No Action Alternative.

4.3.10.1.5 Birds

Physical strike and noise impacts are the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). No significant impacts to birds at NWS Yorktown occur as a result of the No Action Alternative.

4.3.10.1.6 Federally Protected Species and Habitats

The northern long-eared bat (*Myotis septentrionalis*) and small whorled pogonia (*Isotria medeoloides*) are the only federally protected species that occur or have the potential to occur at NWS Yorktown.

4.3.10.1.6.1 Northern Long-Eared Bat

The federally protected northern long-eared bat was documented at NWS Yorktown during a 2014 mist net survey (Navy, 2014a) and again during a 2016 mist net survey (Navy, 2016b). The large deciduous and mixed forest at NWS Yorktown offers excellent spring and summer habitat. The bat migrates out of the area during the fall and winter months. In the spring and summer, this species roost underneath the bark of live and dead trees in wooded habitats but sometimes roosting in buildings, barns, and bridges (USFWS, 2014) during the day. At dusk, the bat emerges for nighttime foraging flights, often near forest openings and open water sources such as creeks and ponds.

Noise has the potential to disturb bats by disrupting foraging success (Schaub et al., 2008); however, historically high ambient sounds caused by military operations (e.g., such as aircraft noise) may lessen disturbance by habituating bats to the high noise levels or else the bats would avoid the area (Schaub et al., 2008). Noise levels associated with the No Action Alternative are much less than the level produced during flight operations and as a result noise impacts on the northern long-eared bat are expected to be temporary and negligible.

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. No significant impacts to northern long-eared bat occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at NWS Yorktown may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.10.1.6.2 Small Whorled Pogonia

The small whorled pogonia has not been documented at NWS Yorktown. NWS Yorktown is in the historical range of the small whorled pogonia and contains appropriate habitats for the species. Habitat preferences include older hardwood stands of beech, birch, maple, oak, and hickory with an open understory, acidic soils, and a leaf layer (USFWS, 2016a). Training areas are primarily paved surfaces, mowed lawn, and mowed old field outside of any the potential habitats for this species. Physical disturbance impacts are the same as those described in Section 4.3.3.6.5 (Impacts Common to All Locations Under All Alternatives, Small Whorled Pogonia). No significant impacts to small whorled pogonia occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at NWS Yorktown would have no effect on the ESA-listed small whorled pogonia.

4.3.10.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative and, therefore, no significant impacts would occur.

Table 4.3-7. NWS Yorktown Biological Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*											
			No Action Alternative				*Alternative 1 (difference from the No Action Alternative)*				*Alternative 2 (difference from Alternative 1)*			
			No. of Events	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*
Land – Non-Beaches/ Dunes	Equipment Use	diesel generators	8			2,16 hours								
	Explosives on Land	demolition materials and charge	104	104 events (average 13 detonations/event with maximum NEW of 25 pounds)	104 events (average 13 detonations/event with maximum NEW of 25 pounds)	104 events (average 13 detonations/event with maximum NEW of 25 pounds)								
	Personnel Movement	NA	104	1,560 people										
	Vehicle Movement	tactical and non-tactical vehicles	228	27,192 hours	27,192 hours	27,192 hours								
	Weapons Firing – Blanks	small arms	162			29,452 rounds								
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	50		5,000 rounds	5,000 rounds								

Key: NA = not applicable; NEW = net explosive weight; No. = number.

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4.3.10.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative and, therefore, no significant impacts would occur.

4.3.10.4 Summary

The stressors applicable to biological resources at NWS Yorktown are physical disturbance associated with personnel movement, explosives on land, and vehicle movement, physical strike associated with explosives on land, vehicle movement, and weapons firing – non-lethal training ammunition, and noise associated with vehicle movement, equipment use, explosives on land, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.3-7). Acquisition of lands for NWS Yorktown began in 1918 and since that time has been used for a variety of military activities (Navy, 2010a). As a result, many of the training areas have long been established. Implementation of the No Action Alternative would be consistent with the baseline conditions within existing training areas and is not expected to result in significant impacts to biological resources. Alternatives 1 and 2 would be the same as the No Action Alternative and, therefore, would not result in significant impacts to biological resources.

4.3.11 Cheatham Annex

The PTEAs applicable to biological resources at Cheatham Annex that contribute to the physical disturbance stressor include personnel movement and vehicle movement; that contribute to the physical strike stressor include vehicle movement and underwater movement; and that contribute to the noise stressor include vehicle movement, equipment use, underwater movement, and weapons firing – blank-fire (Table 4.3-8). Cheatham Annex does not include Beaches/Dunes training areas but does include a water training area.

4.3.11.1 No Action Alternative

Training events at Cheatham Annex under the No Action Alternative are described in Chapter 2 (see Figure 2-13 and Table 2-10) and Table 4.3-8.

4.3.11.1.1 Habitats and Vegetation

Physical Disturbance

Physical disturbance impacts associated with personnel and vehicle movement are the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation).

At Jones Pond, negligible, short-term impacts such as increased turbidity from contact with the bottom and disturbance of hydrilla likely occur. Impacts from personnel movement (24 people per year), including kayaking and underwater movement (one time per year) of tethered remotely operated vehicles, is not distinguishable from recreational use of the pond (e.g., boating and fishing). Additionally, pre-disturbance conditions return soon after training is completed. No significant impacts to habitats and vegetation at Cheatham Annex occur as a result of the No Action Alternative.

Table 4.3-8. Cheatham Annex Biological Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*											
			No Action Alternative				*Alternative 1 (difference from the No Action Alternative)*				*Alternative 2 (difference from Alternative 1)*			
			No. of Events	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Noise*
Land – Non-Beaches/ Dunes	Equipment Use	diesel generator	99			74,380 hours								
	Personnel Movement	NA	32	11,585 people										
	Vehicle Movement	tactical and non-tactical vehicles	62	8,683 hours	8,683 hours	8,683 hours								
	Weapons Firing – Blanks	small arms	28			82,400 rounds								
Water and Adjacent Shoreline	Personnel Movement	NA	1	24 people										
	Underwater Movement	remotely operated vehicles	1		8 hours	8 hours								

Key: NA = not applicable; No. = number.

4.3.11.1.2 Mammals

Physical strike and noise impacts are the same as those described in Section 4.3.3.2 (Impacts Common to All Locations Under All Alternatives, Mammals). No significant impacts to mammals at Cheatham Annex occur as a result of the No Action Alternative.

4.3.11.1.3 Invertebrates

Physical strike and noise impacts are the same as those described in Section 4.3.3.3 (Impacts Common to All Locations Under All Alternatives, Invertebrates). No significant impacts to invertebrates at Cheatham Annex occur as a result of the No Action Alternative.

4.3.11.1.4 Fish

Remotely operated vehicles that are deployed in Jones Pond would be unlikely to strike juvenile or adult fish because of their ability to detect and move away from the vehicles. Strike potential would mostly be limited to concentrations of larval fish or eggs suspended in the water column. The potential for direct strikes is decreased by the dispersed distribution of fish, infrequent use of the water body, and slow operational speed/hydrodynamic shape of the remotely operated vehicles. Only one event occurs annually, for a total of eight hours, and it is unlikely that vehicles are operated continuously for the entire eight-hour period. Overall, the potential for strike impacts to freshwater fish in Jones Pond is considered to be very low, and there is no discernible impact to populations of any species.

Use of remotely operated vehicles in Jones Pond results in noise that could disturb fish. Affected individuals could exhibit behavioral responses such as avoidance, altered swimming speed and direction, and physiological stress. Impacts are limited to fish located near the vehicles, and disturbance is short-term, as individuals likely resume normal activities after encountering an underwater vehicle. The potential for disturbance is decreased by the dispersed distribution of fish and infrequent use of remotely operated vehicles. Only one event occurs annually, for a total of eight hours, and it is unlikely that vehicles are operated continuously for the entire eight-hour period.

There is no discernible impact to populations of any fish species. No significant impacts to fish species at Cheatham Annex occur as a result of the No Action Alternative.

4.3.11.1.5 Reptiles and Amphibians

Physical strike and noise impacts are the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). No significant impacts to reptiles and amphibians at Cheatham Annex occur as a result of the No Action Alternative.

4.3.11.1.6 Birds

Physical strike and noise impacts are the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). No significant impacts to birds at Cheatham Annex occur as a result of the No Action Alternative.

4.3.11.1.7 Federally Protected Species and Habitats

The northern long-eared bat (*Myotis septentrionalis*) and small whorled pogonia (*Isotria medeoloides*) are the only federally protected species that occur or have the potential to occur at Cheatham Annex.

4.3.11.1.7.1 Northern Long-Eared Bat

The federally protected northern long-eared bat was documented at Cheatham Annex during a 2015 acoustic survey effort (Tetra Tech, 2016). The large deciduous and mixed forest at Cheatham Annex offers excellent spring and summer habitat. The bat migrates out of the area during the fall and winter months. In the spring and summer, this species roost underneath the bark of live and dead trees in wooded habitats but sometimes roosting in buildings, barns, and bridges (USFWS, 2014) during the day. At dusk, the bat emerges for nighttime foraging flights, often near forest openings and open water sources such as creeks and ponds.

Noise has the potential to disturb bats by disrupting foraging success (Schaub et al., 2008); however, the historically high ambient sound caused by military operations (e.g., aircraft operations) may lessen disturbance by habituating bats to the high noise levels or else the bats would avoid the area (Schaub et al., 2008). Noise levels associated with the No Action Alternative are much less than the level produced during flight operations and as a result noise impacts on the northern long-eared bat are expected to be temporary and negligible.

Physical strike and noise impacts are the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area. No significant impacts to northern long-eared bat occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at Cheatham Annex may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.11.1.7.2 Small Whorled Pogonia

The small whorled pogonia has not been documented at Cheatham Annex; however, the installation is in the historical range and contains suitable habitats for the species. Habitat preferences include older hardwood stands of beech, birch, maple, oak, and hickory with an open understory, acidic soils, and a leaf layer (USFWS, 2016a). Training areas are primarily paved surfaces, mowed lawn, and mowed old field outside of any the potential habitats for this species. Physical disturbance impacts are the same as those described in Section 4.3.3.6.5 (Impacts Common to All Locations Under All Alternatives, Small Whorled Pogonia). No significant impacts to small whorled pogonia occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at Cheatham Annex has no effect on the ESA-listed small whorled pogonia.

4.3.11.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative and, therefore, no significant impacts would occur.

4.3.11.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative and, therefore, no significant impacts would occur.

4.3.11.4 Summary

The stressors applicable to biological resources at Cheatham Annex are physical disturbance associated with personnel movement and vehicle movement, physical strike associated with vehicle movement and underwater movement, and noise associated with vehicle movement, equipment use, underwater movement, and weapons firing – blank-fire (Table 4.3-8). The Navy purchased the land in 1943 and since that time has been used for a variety of military activities. As a result, many of the training areas have long been established. Implementation of the No Action Alternative would be consistent with the baseline conditions within existing training areas and is not expected to result in significant impacts to biological resources. Alternatives 1 and 2 would be the same as the No Action Alternative and would not result in significant impacts to biological resources.

4.3.12 First Landing State Park

The PTEA applicable to biological resources at First Landing State Park that contributes to the physical disturbance stressor includes personnel movement (Table 4.3-9). First Landing State Park does not include Beaches/Dunes training areas.

Table 4.3-9. First Landing State Park Biological Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Physical Disturbance*	*No. of Events*	*Physical Disturbance*	*No. of Events*	*Physical Disturbance*
Land – Non-Beaches/ Dunes	Personnel Movement	NA	12	592 people				

Key: NA = not applicable; No. = number.

4.3.12.1 No Action Alternative

No Action Alternative training locations at First Landing State Park are described in Chapter 2 (see Figure 2-14 and Table 2-11) and Table 4.3-9.

4.3.12.1.1 Habitats and Vegetation

Physical disturbance impacts are the same as those described in Section 4.3.3.1 (Impacts Common to All Locations Under All Alternatives, Habitats and Vegetation). No significant impacts to habitats and vegetation at First Landing State Park occur as a result of the No Action Alternative.

4.3.12.1.2 Mammals

Personnel movement on First Landing State Park trails introduce no stressors to impact mammals and, therefore, no significant impacts occur as a result of the No Action Alternative.

4.3.12.1.3 Invertebrates

Personnel movement on First Landing State Park trails introduce no stressors to impact invertebrates and, therefore, as a result no significant impacts occur as a result of the No Action Alternative.

4.3.12.1.4 Reptiles and Amphibians

Personnel movement on First Landing State Park trails introduce no stressors to impact reptiles and amphibians and, therefore, no significant impacts occur as a result of the No Action Alternative.

4.3.12.1.5 Birds

Personnel movement on First Landing State Park trails introduce no stressors to impact birds and, therefore, no significant impacts occur as a result of the No Action Alternative.

4.3.12.1.6 Federally Protected Species and Habitats

No federally protected species and/or their critical habitat have been identified at First Landing State Park; however, the northern long-eared bat and the harbor seal have the potential to occur.

4.3.12.1.6.1 Northern Long-Eared Bat

Personnel movement on First Landing State Park trails introduce no stressors to impact the northern long-eared bat and as a result, no significant impacts occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative at First Landing State Park would have no effect on the ESA-listed northern long-eared bat.

4.3.12.1.6.2 Harbor Seal

Personnel movement on First Landing State Park trails introduce no stressors to impact hauled-out harbor seals and as a result, no significant impacts occur as a result of the No Action Alternative. Thus, the No Action Alternative at First Landing State Park would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.12.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative and, therefore, no significant impacts would occur. Thus, Alternative 1 at First Landing State Park would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.12.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative and, therefore, no significant impacts would occur. Thus, Alternative 2 at First Landing State Park would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.12.4 Summary

The stressor applicable to biological resources at First Landing State Park is physical disturbance associated with personnel movements (Table 4.3-9). First Landing State Park does not include Beaches/Dunes training areas. All training will be limited to existing trail systems. Implementation of the No Action Alternative would be consistent with the baseline conditions and is not expected to result in significant impacts to biological resources. Alternatives 1 and 2 would be the same as the No Action Alternative and would not result in significant impacts to biological resources.

4.3.13 Southern Branch of the Elizabeth River

The PTEAs applicable to biological resources at the Southern Branch of the Elizabeth River that contribute to the physical disturbance stressor include vessel movement and weapons firing – blank-fire (uncaptured rounds), that contribute to the physical strike stressor include vessel movement, that contribute to the ingestion stressor include weapons firing – blank-fire (uncaptured rounds), and that contribute to the noise stressor include vessel movement and weapons firing – blank-fire (Table 4.3-10).

4.3.13.1 No Action Alternative

Training events under the No Action Alternative training along the Southern Branch of the Elizabeth River are described in Chapter 2 (see Figure 2-15 and Table 2-12) and Table 4.3-10. Navy riverine units conduct training exercises along the Southern Branch of the Elizabeth River. Exercises take place both during the day and at night, primarily along the waterway between the Interstate 64 Bridge (the "High Rise Bridge") over the Southern Branch of the Elizabeth River and an area designated for blank fire.

4.3.13.1.1 Habitats and Vegetation

Physical Disturbance

Vessel movement has the potential to temporarily increase water column turbidity by making contact with and/or disturbing sediments on the bottom as well as by the generation of surface wakes and propeller wash. Increased turbidity decreases the amount of light penetrating the water, stressing submerged aquatic vegetation through reduced photosynthesis. Turbidity also affects the ability of oysters to filter feed because high sediment loads trigger oysters to stop filtering, stressing the oyster and preventing growth (Gonda-King et al., 2010). In addition, turbidity can impact a fish's ability to see and feed as well as damage and clog gills. Incidental contact with the bottom potentially occurs during vessel movement in shallow waters where the hull, propeller or other appurtenance make contact with the bottom. Interactions with the bottom would temporarily increase water column turbidity.

Vessel movement and personnel insertion/extraction activities have the potential to temporarily increase water column turbidity by making contact with and/or disturbing sediments on the bottom as well as by the generation of surface wakes and propeller wash during vessel movements. Increased turbidity decreases the amount of light penetrating the water, stressing submerged aquatic vegetation through reduced photosynthesis. Turbidity also affects the ability of oysters to filter feed because high sediment loads trigger oysters to stop filtering, stressing the oyster and limiting growth (Gonda-King et al., 2010) and can impact a fish's ability to see and feed as well as damage and clog gills.

Incidental contact with the bottom potentially occurs during vessel movement in shallow waters where the hull, propeller, or other appurtenance makes contact with the bottom. As part of the insertion/extraction training events, vessels are intentionally grounded and personnel disembarked into shallow water, thus impacting both the sediments and the water column in the immediate vicinity of the event. Interactions with the sediments and shoreline by both the vessels and personnel would increase water column turbidity and have an adverse effect on soft bottom and water column habitats designated as essential fish habitat (EFH). However, the increase in turbidity would be minor and temporary, lasting between several hours up to a day depending on conditions, and localized to the immediate training area and a small distance downstream. There would be no long-term reduction in the quantity or quality of substrate or water column habitat resulting from training activities.

Table 4.3-10. Southern Branch of the Elizabeth River Biological Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*														
			No Action Alternative					*Alternative 1 (difference from the No Action Alternative)*					*Alternative 2 (difference from Alternative 1)*				
			No. of Events	*Physical Disturbance*	*Strike*	*Ingestion*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Ingestion*	*Noise*	*No. of Events*	*Physical Disturbance*	*Strike*	*Ingestions*	*Noise*
Water and Adjacent Shoreline	Personnel Movement	NA	30	2,160 people													
	Vessel Movement	small vessels	30	30 nearshore activity	1,980 hours		1,980 hours										
	Weapons Firing – Blank-Fire	small caliber	30	21,600 uncaptured rounds		21,600 uncaptured rounds	144,000 rounds										

Key: NA = not applicable; No. = number.

During the ground force insertion and extraction training events, vessels would be intentionally grounded along the shoreline for short periods of time. A small stretch of the river bottom is typically exposed during low tide on which the vessels will ground. During periods of high tide, however, the vessels need to ground in the salt marsh, composed primarily of saltmarsh cordgrass (*Spartina alterniflora*), that lines the edges of the river and which is designated as summer flounder Habitat Areas of Particular Concern (HAPC). As a result, small sections of tidal wetland vegetation would periodically be impacted. In most cases, the wetland vegetation would be flattened in the immediate vicinity of the grounding but would recover shortly following the conclusion of the training event. However, in some rare cases, the marsh grass may be damaged or uprooted in small areas leading to a longer recovery period of weeks to months. Grounding of vessels in the marsh during training events may result in short-term, minimal, and highly localized impacts to salt marsh habitats designated as HAPC for summer flounder.

Vessels conducting high-speed defensive tactical maneuvers would also potentially impact designated EFH within the river. When transiting a sheltered area with unprotected shoreline (e.g., no rip-rap or bulkheads), vessels generate an excessive wake during the maneuvers that may contribute to the gradual increase in shoreline erosion over time. In addition, the erosion of the shoreline may also temporarily increase water column turbidity in the immediate area. Recorded times for turbidity levels return to normal as a result of boating activities range from 5 to 24 hours (Asplund, 2000). Tidal wetland vegetation may also be impacted by vessel movement if excessive wake is generated during training. Excessive wake would potentially increase water column turbidity of wetlands during flood tides, and during ebb tides, it would potentially cause erosion of sediment in which the cordgrass is rooted. Overall, high-speed vessel maneuvers may adversely affect water column and soft sediment habitats designated as EFH, but any impacts to these habitats would be temporary in duration (several hours to a day), minimal, and localized. In addition, these activities may also result in a minor, long-term reduction in the quantity or quality of tidal macrophyte habitat as a result of potential shoreline erosion. However, as the area is continuously subjected to wake effects from thousands of recreational and commercial vessels annually, the Navy's contribution to the shoreline erosion due to high-speed defensive tactical maneuvers (which represent a very small proportion of the overall vessel traffic along the Southern Branch of the Elizabeth River) would be extremely minor.

Blank weapons firing from vessels results in a small percentage of brass casings incidentally entering the water. Casings are captured and retained to the greatest extent possible in catch cans. Casings that escape capture strike the water at varying angles and disperse from the point of entry when sinking to the bottom. Dense accumulations of casings on the bottom are not likely. The present state of the river bottom in the assessment area with regard to accumulated debris is not known. Putatively, casings could convert areas of soft mud bottom into a coarse hard bottom. Encrusting algae or sedentary invertebrates may colonize the casings if sufficient flow and nutrients or suspended food particles exist and they are not buried by sedimentation. If there is sufficient oxygen, the casings might corrode over time and disintegrate. The primary constituents of brass casings are copper and zinc, typically with less than 1 percent tin and lead added to inhibit corrosion and dezincification (USEPA, 2001). The most likely scenario, however, is that the casings would be buried by tidal action, shoaling, and sedimentation from canals draining developments and agricultural lands. As a result, blank weapons firing may result in short-term, minimal impacts to soft bottoms designated as EFH in small, localized areas.

EFH Conclusion

Based upon the above assessment of impacts associated with river vessel movements, personnel insertion/extraction, and blank weapons fire, the Navy determined that the Proposed Action would result in minimal adverse effects to EFH and HAPC found within the Southern Branch of the Elizabeth River. Therefore, consultation with National Marine Fisheries Service (NMFS) was undertaken. Via letter dated December 8, 2017, NMFS concurred with the Navy's determination that VACAPES inland training activities along the Southern Branch of the Elizabeth River will not substantially adversely affect EFH, or sandbar shark and summer flounder HAPC and had no conservation recommendations to provide. The Navy EFH Assessment and NMFS concurrence letter are provided in Appendix A (Agency Correspondence).

4.3.13.1.2 Mammals

Physical Strike

Physical strike associated with vessel movements has the potential to impact aquatic mammals such as the river otter, nutria and muskrat. However, most mammals are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, move into a protected location, such as a burrow or vegetation, for cover. In addition, as noted above, there are only 30 training events per year, and, because there are over 12,000 annual vessel transits in the Southern Branch of the Elizabeth River (Drawbridge Operation Regulations, 2010), the Navy training represents a relatively small number of vessels in the study area.

Noise

Noise associated with vessel movements has the potential to disturb mammals to varying degrees. A multitude of studies evaluating a wide range of noise generators and analyzing a number of different stress responses in wildlife have been completed. The level of response depends on a number of factors, including the life-history characteristics of the species, characteristics of the aircraft and flight activities, habitat type, and the species' previous exposure to the noise generator. Several studies indicate a strong tendency for many species to acclimate or habituate to noise disturbances (Grubb & King, 1991; Ellis et al., 1991; Black et al., 1984; Conomy et al., 1998). Most noise events would be localized and occur for a relatively short period of time (minutes to hours).

Ingestion

Blank weapons use could result in spent shell casings entering the water annually. Casings that sink to the bottom could be ingested by mammals that forage for food items on or within the sediment. An encounter may not lead to ingestion, and ingestion would not necessarily cause injury. While ingestion could result in lethal or sublethal effects to a small number of individuals, ingestion would be unlikely. In addition, casings could eventually become covered with sediment or encrusting organisms, further reducing ingestion potential. The number of mammals potentially impacted would be low compared with overall population numbers, and population-level effects would not be expected.

No significant impacts to mammals along the Southern Branch of the Elizabeth River occur as a result of the No Action Alternative.

4.3.13.1.3 Invertebrates

Strike

Vessels could impact invertebrates by directly striking organisms. Impacts would primarily be limited to species that occur near the surface (e.g., zooplankton, jellyfish). Vessels moving at low speed would pose little risk to macroinvertebrates (those large enough to be seen easily with the unaided eye). Most invertebrates are generally disturbed, rather than struck, as water flows around a vessel hull. Vessels operated at high speed would create more of a risk through propeller action. Propeller wash (water displaced by propellers) and water displaced from vessel hulls is a likely cause of some zooplankton mortality (Bickel et al., 2011). Exposure to vessel and propeller movements could displace, injure, or kill zooplankton, invertebrate eggs or larvae, and larger invertebrates near the surface. However, zooplankton and planktonic larvae of larger animals are abundant in the water column and typically experience high natural mortality rates. Oyster bed restoration sites are present at two known areas near St. Juliens Creek Annex, but not known within the blank-fire training area. If these sites, or other present but undocumented oyster beds, are unmarked and shallow, there is potential for oysters and other invertebrates associated with these habitats to be struck by vessels transiting to the training area. Due to the low occurrence of these habitats in the Elizabeth River, the likelihood of running aground on oyster beds during any training event is considered low. The number of invertebrates potentially affected by vessel strikes is not discernible at the population level.

Noise

Aquatic invertebrates are known to be sensitive only to water particle motion caused by nearby low-frequency sources, and likely do not sense distant or mid- and high-frequency sounds. Therefore, invertebrates would probably only sense the low-frequency component of vessel noise generated near the affected individuals. Several studies have found behavioral and physiological responses in some invertebrate species in response to playback of vessel noise (Filiciotto, et al., 2016; Celi et al., 2015; Wale et al., 2013a; Wale et al., 2013b) although one study found no reaction in krill to an approaching vessel (Brierley et al., 2003). Behavioral effects observed in various species included shell closing and changes in feeding, coloration, swimming, and other movements. Physiological effects included biochemical changes indicative of stress in some species. Noise exposure in the studies occurred over a duration of 3.5 to 30 minutes to captive individuals unable to escape the stimulus, so the direct applicability of the results to Navy training activities is uncertain. However, it is plausible that invertebrates that are exposed to vessel noise could exhibit similar reactions.

Invertebrates capable of sensing vessel noise may alter their behavior or experience masking of other sounds if exposed to such noise. Because the distance over which most invertebrates are expected to detect sounds is limited and because vessel noise is transient and intermittent, most behavioral reactions and masking effects would likely be short term, ceasing soon after the vessels leave an area. Without prolonged exposure to nearby noise sources, measurable impacts are not expected. Although vessel noise may briefly impact some individuals, intermittent exposures are not expected to impact survival, growth, recruitment, or reproduction of any invertebrate population. No significant impacts to invertebrate species along the Southern Branch of the Elizabeth River occur as a result of the No Action Alternative.

4.3.13.1.4 Fish

Physical Strike

Surface vessels operated at high speed could potentially kill or injure fish located at or near the water surface as a result of direct strikes. Generally, vessels do not typically collide with adult fish because of their ability to detect and avoid the threat. Many species can detect the sound or pressure wave of an oncoming vessel. Many fish species occurring in the Southern Branch of the Elizabeth River are small and highly mobile (e.g., herrings, silversides) and would typically be able to avoid strikes. Therefore, although it is possible that some individuals could be struck, most fish would likely swim away from operating vessels. Larvae and juveniles do not necessarily have the same swimming ability as adults and would be somewhat more susceptible to strikes or entrainment in propeller wash. However, larvae and juveniles are far more numerous than adults and experience significantly higher natural mortality rates. For example, the mortality rates for early life stages of most marine fishes range from 10 to 85 percent per day (Helfman et al., 2009). The mortality rate for early life stages of three freshwater fish species over a time period of about one to three weeks was found to be 43 to 87 percent for larvae and 67 to 74 percent for post-larvae (Dahlberg, 1979). The numbers of larvae and juvenile fishes exposed to vessel strikes would likely be low relative to the total number of individuals that occur in the Southern Branch of the Elizabeth River, and measurable effects on fish populations would not be expected.

Noise

Vessel operation produces underwater noise in the training area. Sound levels fluctuate with the level of activity, as vessels do not operate continuously throughout the year (30 events per year). Each event is from one to three days in duration, with activities occurring for eight to nine hours per day. It is estimated that continuous vessel run time is approximately four hours per day, and that half of the vessel operation occurs at high speed (above 10 knots). Between four and eight vessels are involved in each event. In total, there are approximately 1,980 hours of vessel operation annually that would produce noise (66 hours per event for all vessels combined on average). Vessel noise could result in physiological effects (e.g., stress, increased heart rate) or behavioral responses from fish. Behavioral effects potentially include temporary avoidance of the affected area and startle responses resulting in disruption or alteration of natural activities such as swimming, schooling, feeding, and breeding. Avoidance reactions are variable, depending on the type of fish, its life history stage, behavior, time of day, and the sound propagation characteristics of the water (Schwartz, 1985). Sudden changes in sound level can cause fish to dive, rise, or change swimming direction. Changes in sound intensity may be more important to a fish's behavior than the maximum sound level. Sounds that fluctuate in level tend to elicit stronger responses from fish than sounds with a continuous level (Schwartz, 1985).

Noise would be transient as the vessels move between St. Juliens Creek Annex and the blank-fire area (about 5.5 river miles). Startle effects experienced by fish due to passing vessels would be short term, and individuals would likely resume normal activities after the vessels move past them. The reactions would be similar to those resulting from other commercial and recreational vessel traffic in the area. Vessel operation would be concentrated in the blank-fire training area. Noise would be of longer duration in this area and would likely change in intensity during various phases of the training. Rapid variations in vessel speed in areas used for tactical maneuvers, insertion/extraction exercises, and weapons firing could cause greater physiological and behavioral reactions than in transit areas where vessels are more likely to be operated at a continuous speed.

Vessel operation on the Elizabeth River occurs among relatively high levels of commercial and recreational vessel traffic, suggesting that noise produced by transiting vessels may be similar to the existing sound environment. Fish occurring in the affected area may be habituated to vessel noise to some degree. Studies have shown that habituation to different stimuli can, but does not always, occur in various fish species (Folkedal et al., 2010; Matsunaga & Watanabe, 2010; Wong et al., 2010; Laming & Ennis, 1982). In a study by Chapman and Hawkins (1973), the low-frequency sounds of accelerating small vessels caused avoidance responses by herring. However, avoidance ended within 10 seconds after the vessel departed. Seventy-five percent of the responsive fish groups habituated to the sound of small boats.

In summary, vessel movements expose some fish to sound, likely resulting in behavioral or physiological responses. Effects are more likely to occur in the blank-fire training area where vessel operation is more sustained and involves rapid changes in speed. Individual fish or groups of fish that remain in the training area may be exposed to noise multiple times during an event, prolonging physiological or behavioral responses, although the probability of multiple exposures is difficult to predict and depends on fish movement, specific locations of vessel operation, and noise levels produced. It is unlikely that the same individuals are affected by multiple training events over the course of a year. Some individuals may be habituated to vessel noise due to the ongoing commercial and recreational boat traffic in the area. Although individuals are negatively affected by vessel noise, the overall number of fish impacted is unlikely to result in lasting impacts on the survival, growth, recruitment, or reproduction of any fish population.

Ingestion

Blank weapons use could result in an estimated 21,600 spent shell casings entering the water annually. Casings that sink to the bottom could be ingested by fish that forage for food items on or within the sediment. The Atlantic sturgeon is an example of fish that forage on the bottom, although the likelihood of occurrence for this species south of St. Juliens Creek Annex is considered low. An encounter may not lead to ingestion, and ingestion would not necessarily cause injury. The potential for impacts would be limited to large individual fish that might consume an item and experience a negative (injurious) effect. Many bottom fish can smell their food and would not generally pick up something that does not smell like food, unless it was incidental to an actual food item. Therefore, while ingestion could result in lethal or sublethal effects to a small number of individuals, ingestion would be unlikely. In addition, casings could eventually become covered with sediment or encrusting organisms, further reducing ingestion potential. The number of fish potentially impacted would be low compared with overall population numbers, and population-level effects would not be expected. No significant impacts to fish along the Southern Branch of the Elizabeth River occur as a result of the No Action Alternative.

4.3.13.1.5 Reptiles and Amphibians

Physical strike and noise impacts are the same as those described in Section 4.3.3.4 (Impacts Common to All Locations Under All Alternatives, Reptiles and Amphibians). No significant impacts to reptiles and amphibians along the Southern Branch of the Elizabeth River occur as a result of the No Action Alternative.

4.3.13.1.6 Birds

Physical strike and noise impacts are the same as those described in Section 4.3.3.5 (Impacts Common to All Locations Under All Alternatives, Birds). No significant impacts to birds along the Southern Branch of the Elizabeth River occur as a result of the No Action Alternative.

4.3.13.1.7 Federally Protected Species and Habitats

Several federally protected species, including the northern long-eared bat (*Myotis septentrionalis*), Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus)*, Atlantic bottlenose dolphin (*Tursiops truncatus*), West Indian manatee (*Trichechus manatus*), and harbor seal (*Phoca vitulina*) occur or have the potential to occur on the Southern Branch of the Elizabeth River.

4.3.13.1.7.1 Northern Long-Eared Bat

The larger wooded areas along the training route offer potential habitat for the northern long-eared bat. No information is available to indicate that the species may be present along the waterway training route. Physical strike and noise impacts are the same as those described in Section 4.3.3.6.1 (Impacts Common to All Locations Under All Alternatives, Northern Long-Eared Bat). If encountered, bats are very responsive, alert, and mobile and should easily avoid personnel and vessel movements by relocating to another area. No significant impacts to northern long-eared bat occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative on the Southern Branch of the Elizabeth River may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat.

4.3.13.1.7.2 Atlantic Sturgeon

Physical Strike

Comparatively less mobile fish such as sturgeons are more susceptible to vessel strikes, particularly during high speed operations. Although sturgeons are generally considered to occur near the bottom, individuals may be found near the surface at times. For example, Brown and Murphy (2010) and Balazik et al. (2012) have reported numerous Atlantic sturgeon mortalities due to vessel strikes in the Delaware River estuary and upstream areas of the James River, respectively. Numerous ship strikes of Atlantic sturgeon have also been documented throughout much of the lower Chesapeake Bay, including around the mouth of the James River (Virginia Commonwealth University, unpublished data). Atlantic sturgeon occurrence has not been studied specifically in the portion of the Southern Branch of the Elizabeth River where blank-fire and associated vessel movement are conducted. Atlantic sturgeons are known to be present in the vicinity of Naval Station Norfolk, near the mouth of the Elizabeth River, throughout the year. Available tagging data indicate that tagged adult sturgeons do not move far into the Elizabeth River, nor spend much time in the river (Hager, 2015). However, sturgeons have not been captured and tagged in the Elizabeth River, and receivers capable of detecting tagged individuals have not been deployed in the Southern Branch. Therefore, although available data suggest the likelihood of occurrence is low, there is potential for juveniles, subadults, and adults to use the Southern Branch of the Elizabeth River. Based on vessel strike mortality documented in other nearby areas such as the Chesapeake Bay and James River, any sturgeons present in training areas and located near the surface could be struck by moving vessels. The potential for impact would be greater during activities associated with high-speed vessel movement (e.g., tactical maneuvers, insertion/extraction exercises), when fish would have less time to react to an approaching vessel.

Ingestion

Atlantic sturgeons that may be present in the Southern Branch of the Elizabeth River have the potential to ingest small-caliber shell casings that sink to the bottom. Adults and subadults are more likely to ingest an item than juveniles due to the size of the fish's mouth relative to the casings. Sturgeons feed on benthic organisms such as crustaceans (e.g., amphipods, shrimps), worms, molluscs, and some fish, primarily by sucking prey from the substrate. Therefore, casings on the bottom or within the substrate could possibly be mistaken for a food item or could be incidentally taken along with other food items. An encounter with a casing would not necessarily lead to ingestion or swallowing of the item, as a fish might "taste" the item and then expel it. However, the hard body parts of some natural sturgeon prey items could increase the likelihood of ingestion due to similarity of physical characteristics. Sharp edges of the casings could cause physical distress by tearing or cutting the mouth, throat, or stomach. If the casing is large relative to the fish's size, it may block the throat or obstruct the flow of waste through the digestive system. Ingestion of foreign objects could lead to disruption of a fish's normal feeding behavior, which could be sublethal or lethal. However, ingestion would not necessarily cause injury. Relatively small, smooth objects such as small-caliber casings could pass through the digestive tract without causing harm. In addition, the mouth and digestive system of sturgeons are presumably better able to process hard items compared to fish that normally feed on softer prey. The potential impacts of ingesting small-caliber casings would be limited to individual fish that might suffer a negative response from a given ingestion event. It is expected that the number of fish that experience sublethal or lethal effects is small. Injury or mortality to sturgeons resulting from ingestion of casings or other similar items is not known, although studies specific to such materials have not been conducted. Overall, the number of fish potentially impacted by ingestion of casings is assumed to be low, and population-level effects would not be expected.

No significant impacts to Atlantic sturgeon occur as a result of the No Action Alternative. Pursuant to the ESA, the No Action Alternative on the Southern Branch of the Elizabeth River may affect, but is not likely to adversely affect, the ESA-listed Atlantic sturgeon. Via letter dated December 19, 2017, NMFS concurred with the Navy's conclusion that the Proposed Action is not likely to adversely affect any NMFS ESA-listed species. Therefore, no further consultation pursuant to section 7 of the ESA is required (Appendix A, Agency Correspondence).

4.3.13.1.7.3 Atlantic Bottlenose Dolphin

Physical Strike

Under the No Action Alternative, bottlenose dolphin may occur in areas of vessel activity, thus incurring risk of collision or strike. Vessel collisions with bottlenose dolphins may potentially result in injury or death. Vessel-related injuries to bottlenose dolphins are documented (Bechdel et al., 2009). In one study, 6 percent of a bottlenose dolphin population in a Florida inland waterway exhibited injuries from vessel collisions (Bechdel et al., 2009).

Bottlenose dolphins primarily occur in the Elizabeth River in the late spring, summer and fall. Thus the potential for strike is highest during these times. There is low to no potential for vessel strike during the winter months.

The Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the

water. In addition, the Navy vessel operators practice safe navigation, travel at a safe speed, and are trained to take proper action to avoid collisions.

Noise

Vessel noise may disturb, masking of hearing or vocalization, or affect the behavior of marine mammals including bottlenose dolphins. Marine mammal responses to vessel presence and vessel noise are relatively well studied, but can be difficult to distinguish from one another, particularly during field studies. Behavioral responses appear to depend on behavioral context in many species, and on the characteristics of the vessel's movement in some situations (Richardson et al., 1995).

Masking occurs when one sound, distinguished as the "noise," interferes with the detection or recognition of another sound. The quantitative definition of masking is the amount in decibels (dB) an auditory detection or discrimination threshold is raised in the presence of a masker (Erbe et al., 2015). Masking can effectively limit the distance over which a marine mammal can communicate, detect biologically relevant sounds, and echolocate (odontocetes). Masking only occurs in the presence of the masking noise and does not persist after the cessation of the noise. Masking can lead to vocal and behavior changes (e.g., cessation of foraging, leaving an area) to both signalers and receivers, in an attempt to compensate for noise levels.

Masking is more likely to occur in the presence of relatively continuous noise sources like moving vessels. Multiple delphinid species have also been shown to increase the minimum or maximum frequencies of their whistles in the presence of anthropogenic noise (Papale et al., 2015). Broadband vessel noise may extend up to 160 kilohertz at ranges from 60 to 1,200 meters; the higher frequency portion of that noise might mask harbor porpoise clicks (Hermannsen et al., 2014). However, given their mobility, harbor porpoises may avoid vessels and so may not be close enough to have their clicks masked (Polacheck & Thorpe, 1990; Dyndo et al., 2015; Sairenan, 2014).

Bottlenose dolphins have been observed altering their swimming patterns by increasing speed, changing their heading, and changing their breathing patterns in response to an approaching vessel (Nowacek et al., 2007; Nowacek et al., 2004). Avoidance reactions of bottlenose dolphins include a decrease in resting behavior or change in travel direction (Bejder et al., 2006). Incidents of attraction include bottlenose dolphins bow riding and jumping in the wake of a vessel (Ritter, 2002; Wursig et al., 1998; Shane et al., 1986; Norris & Prescott, 1961). Some odontocetes have been shown to make short-term changes to vocal parameters such as intensity (Parks et al., 2011; Holt et al., 2008) (as an immediate response to vessel noise, as well as increase the pitch, frequency modulation, and length of whistling (May-Collado & Wartzok, 2008).

Based on existing studies, it is likely that protected marine mammal species found in the study area would have relatively minor behavioral reactions to vessels that maintain a reasonable distance. The distance that will provoke a response varies based on many factors including, but not limited to, vessel size, geographic location, and individual animal tolerance levels (Jahoda et al., 2003; Baker et al., 1983; Watkins, 1981). Should the vessels approach close enough to evoke a reaction, animals may engage in avoidance behaviors and/or alter their breathing patterns.

Under the No Action Alternative, vessel noise would potentially have behavioral effects on bottlenose dolphins during the late spring, summer and fall, when these animals are most likely to occur. Reactions exhibited by dolphins would likely be temporary in nature. In one study, dolphins that altered their behavior in response to passing speedboats resumed their original behavior once the boats had passed

(Lemon et al., 2006). Thus, bottlenose dolphins in the study would be expected to return to their pre-disturbance activities once the vessel has left the area.

Ingestion

Under the No Action Alternative, blank munitions casings could land in the water, where they could potentially be ingested by bottlenose dolphins. In a comprehensive review of documented ingestion of debris by marine mammals, odontocetes had the most ingestion records, with 21 species represented (Laist, 1997). A follow-up to this review revealed an increase in odontocete ingestion of marine debris. Bergmann et al. (2015) reported 40 odontocete species have documented records of ingestion. Weaned juveniles who are investigating multiple types of prey items, may be particularly vulnerable to ingesting non-food items, as found in a study of juvenile harbor porpoises (Baird & Hooker, 2000).

Random encounters of a dolphin with a casing may occur. However, it is unknown whether a dolphin would ingest a casing, and unlikely a dolphin would ingest every projectile it encountered. Furthermore, a dolphin may attempt to ingest a projectile and then reject it when it realizes it is not a food item. Even ingestion of certain items (fishing hooks), if they do not become embedded in tissue, do not end up resulting in injury or mortality to the individual (Wells et al., 2008). Potential impacts of ingestion would be limited to the unlikely event in which a marine mammal might suffer a negative response from ingesting a casing that becomes embedded in tissue or is too large to be passed through the digestive system. The Navy considers the likelihood of this occurring to be very low.

Under the No Action Alternative dolphins may by chance encounter expended brass casings but significant impacts are not expected as the occurrences would be expected to be random with a low probability of adverse effects. No significant impacts to bottlenose dolphins from training activities occur under the No Action Alternative. As a result, the Navy has determined that the No Action Alternative would not result in the reasonably foreseeable "take" of a bottlenose dolphin by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.13.1.7.4 West Indian Manatee

Physical Strike

Under the No Action Alternative, manatee may occur in areas of vessel activity, thus incurring risk of collision or strike. Vessel collisions with manatees may potentially result in injury or death and manatees are especially susceptible to vessel strike. Manatee mortality from vessel collision is documented (Miksis-Olds, 2006; Nowacek et al., 2004). Vessel collisions are responsible for more than 30 percent of manatee mortalities annually and scarring on live animals indicate a higher rate of collision (Nowacek et al., 2004). Researchers have studied behavioral responses of manatees to vessels finding manatees perceive approaching vessels and exhibit a flight response including movement to deeper water (Nowacek et al., 2004). Seals in general appear to suffer fewer impacts from vessel strikes than do cetaceans or sirenians. This may be due, at least in part, to the large amount of time they spend on land (especially when resting and breeding) and their high maneuverability in the water. Manatees primarily occur in the Atlantic Intracoastal Waterway and Elizabeth River in the late spring, summer and fall. Thus the potential for strike is highest during these times. There is low to no potential for vessel strike during the winter months.

The Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water. In general, known manatee areas have posted requirements for vessels to maintain low speeds. In addition, the Navy vessel operators practice safe navigation, travel at a safe speed, and are trained to take proper action to avoid collisions.

Noise

Vessel noise may disturb, masking of hearing or vocalization, or affect the behavior of marine mammals including manatees. Dugong (an animal similar to a manatee) vocalizations were recorded in the presence of passing boats, and although the call rate, intensity or frequency of the calls did not change, the duration of the vocalizations was increased, as was the presence of harmonics. This may indicate more energy was being used to vocalize in order to maintain the same received level (Ando-Mizobata et al., 2014).

Manatees responded to noise of approaching vessels by altering behavior and moving out of the geographical area (Miksis-Olds, 2006).

Based on existing studies, it is likely that protected marine mammal species, including manatees, found in the study area would have relatively minor behavioral reactions to vessels that maintain a reasonable distance. The distance that will provoke a response varies based on many factors including, but not limited to, vessel size, geographic location, and individual animal tolerance levels (Jahoda et al., 2003; Baker et al., 1983; Watkins, 1981). Should the vessels approach close enough to evoke a reaction, animals may engage in avoidance behaviors and/or alter their breathing patterns.

Under the No Action Alternative, vessel noise potentially has behavioral effects on manatees during the late spring, summer and fall when these animals are most likely to occur. Manatees occur infrequently and thus have a low likelihood of being affected by vessel noise from the No Action Alternative. If present, manatees would likely attempt to avoid vessel activity. Manatees were noted to exhibit flight response to vessel noise and to prefer feeding in quieter areas (Nowacek et al., 2004).

Ingestion

Manatees feed on seagrass beds in relatively shallow coastal or estuarine waters. In a comprehensive review of documented ingestion of debris by marine mammals, the West Indian manatee had ingestion records that included monofilament line, plastic bags, string, twine, rope, fish hooks, wire, paper, cellophane, and rubber bands (Laist, 1997). Some researchers suggest that manatees incidentally ingest fishing gear and plastic while foraging on plants in shallow habitats where debris can accumulate and become entwined in the food resources (Adimey et al., 2014; Beck & Barros, 1991). Ingestion of fishing gear can cause impaction, abdominal infections, inversions of the intestine (Beck & Barros, 1991) and other indirect effects. Under the No Action Alternative, the potential for manatees to ingest blank munitions casings or projectiles would be very low based on the limited overlap between West Indian manatee occurrence and the study area. The Navy does not anticipate that a West Indian manatee would ingest items expended during training.

Therefore, the Navy has determined that the No Action Alternative would have no effect on the West Indian manatee. Additionally, the Navy has determined that the No Action Alternative would not result in the reasonably foreseeable “take” of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.13.1.7.5 Harbor Seals

Physical Strike

Under the No Action Alternative, harbor seals may occur in areas of vessel activity, thus incurring risk injury or death from a vessel collision or strike. Navy training activities involving small, fast-moving vessels may occur year-round; therefore, the potential for impacts from vessel strike, while low, is dependent on the seasonal occurrence of harbor seals in the study area. Harbor seals and pinniped in general spend large amounts of time on the land and display high maneuverability in the water, suggesting they could avoid interactions with small crafts. Pinnipeds are rarely affected by vessel strikes (Barco & Swingle, 2014b), and are not as susceptible compared to other slower species such as the manatee. Further, while their presence in the Southern Branch of the Elizabeth River cannot be ruled out during the fall and winter months, there is also no evidence to support a frequent occurrence. Regardless, the Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water. In addition, the Navy vessel operators practice safe navigation, travel at a safe speed, and are trained to take proper action to avoid collisions.

Noise

Under the No Action Alternative, there is a potential for vessel noise to affect harbor seals in the water. Pinniped reactions to vessels are variable, and reports include a wide spectrum of possibilities from avoidance and alert, including cases where animals in the water are attracted and cases on land where there is lack of significant reaction, suggesting habituation to or tolerance of vessels (Richardson et al., 1995). Specific case reports vary based on factors such as routine anthropogenic activity, distance from the vessel, engine type, wind direction, and ongoing subsistence hunting (Richardson et al., 1995). As with reactions to sound, pinniped responses to vessels are affected by the context of the situation and by the animal's experience (Southall et al., 2007). While harbor seals may potentially enter the Southern Branch of the Elizabeth River, they appear to prefer rocky outcrops in the Chesapeake Bay. There is no evidence to support their occurrence of any frequency or numbers in the Elizabeth River. With a low probability of harbor seal occurrence in the Elizabeth River and low number of training events (30), the likelihood of vessel noise affecting harbor seals is low. Regardless, the Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water.

Ingestion

Under the No Action Alternative, blank munitions casings could land in the water, where they could potentially be ingested by harbor seals. Harbor seals have been noted to ingest plastic debris with younger animals more susceptible (Rebolledo et al., 2013). A harbor seal foraging on the bottom would not necessarily ingest every casing it encountered, and if it attempts to ingest a projectile, it may reject it when it realizes it is not a food item. Therefore, potential ingestion impacts from brass casings would only occur in the unlikely event in which a harbor seal encounters an item, ingests it, and that item subsequently becomes embedded in tissue or is too large to pass through the digestive system. The Navy considers the likelihood of this occurring to be very low. Therefore, under the No Action Alternative, harbor seals may by chance encounter expended brass casings but significant impacts are not expected as the occurrences would be expected to be random with a low probability of adverse effects. No significant impacts to harbor seals from ingestion are expected. As a result, the Navy has determined that the No Action Alternative would not result in the reasonably foreseeable "take" of a

harbor seal by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.13.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative, and, therefore, no significant impacts would occur. Pursuant to the ESA, the Navy has determined that Alternative 1 would have no effect on the West Indian manatee and Alternative 1 may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat and the Atlantic sturgeon. Via letter dated December 19, 2017, NMFS concurred with the Navy's conclusion that the Proposed Action is not likely to adversely affect any NMFS ESA-listed species. Therefore, no further consultation pursuant to section 7 of the ESA is required (Appendix A, Agency Correspondence). Additionally, the Navy has determined Alternative 1 would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.13.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative and, therefore, no significant impacts would occur. Pursuant to the ESA, the Navy has determined that Alternative 1 would have no effect on the West Indian manatee and Alternative 1 may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat and the Atlantic sturgeon. Via letter dated December 19, 2017, NMFS concurred with the Navy's conclusion that the Proposed Action is not likely to adversely affect any NMFS ESA-listed species. Therefore, no further consultation pursuant to section 7 of the ESA is required (Appendix A, Agency Correspondence). Additionally, the Navy has determined that Alternative 2 would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.13.4 Summary

The stressors applicable to biological resources along the Southern Branch of the Elizabeth River are physical disturbance associated with vessel movement and weapons firing – blank-fire (uncaptured rounds), physical strike associated with vessel movement, ingestion associated with weapons firing – blank-fire (uncaptured rounds), and noise associated with vessel movement and weapons firing – blank-fire (Table 4.3-10). Implementation of the No Action Alternative would be consistent with the baseline conditions and is not expected to result in significant impacts to biological resources. Alternatives 1 and 2 would be the same as the No Action Alternative and would not result in significant impacts to biological resources.

4.3.14 Biological Resources Summary

All proposed training at the installations would occur within existing training locations. Training at non-installation sites would utilize existing facilities and adhere to all Federal/State/Local laws, regulations, and rules. No new infrastructure or any other development would be required for any of the Alternatives considered.

The Proposed Action's increase in training operations would not have a significant impact on MBTA-protected species at the population level. The Navy has determined that the Proposed Action PTEA of explosives on land may result in takes of migratory birds. These takes would not result in a significant adverse effect on a population of a migratory bird species. The Proposed Action is a military readiness activity; therefore, these takes are in compliance with the MBTA.

In addition, the Navy has determined that the Proposed Action would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

4.3.14.1 No Action Alternative Biological Resources Summary

INRMP management measures employed to protect habitats and vegetation would continue to be implemented at all study area installations and include use of signage and physical barriers to limit access when appropriate, restricting vehicles to existing trails and roadways, and including any restrictions in installation planning documents and maps (e.g., INRMPs, Range Management Plans, and Installation Master Plans). In addition, installation natural resource managers monitor conditions on installations to identify potential issues before they become a problem.

While physical disturbance associated with beach landings, personnel movement, vehicle movement, and explosives on land have the potential to disturb individual plants and soils, which could degrade habitats over time, training that utilizes beach habitats would be restricted to unvegetated portions of the beach, and vehicles training at inland areas would be restricted to utilizing existing roads and trails.

Physical strike associated with beach landings, personnel movement, vehicle movement, explosives on land and weapons firing – non-lethal training ammunition has the potential to impact wildlife. However, most mammals, reptiles, amphibians, and birds are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, invertebrates, less mobile reptiles, and amphibians, move into a protected location, such as a burrow or vegetation, for cover. Weapons firing – blank-fire results in expended brass casings; however, the casings are picked up by the Navy and do not pose a strike risk as they are expended in close proximity to the weapon, where mammals would not be expected to occur. INRMP management measures benefiting wildlife include implementing projects that enhance and restore native habitats.

Noise associated with vehicle movement, operation of generators, use of explosives, and simulated weapons fire all have the potential to disturb wildlife to varying degrees. Most noise events would be localized and occur for a relatively short period of time (minutes to hours).

Training under the No Action Alternative would not have a significant impact on MBTA-protected species at the population level. Training with explosives on land under the No Action Alternative may result in takes of migratory birds. These takes would not result in a significant adverse effect on a population of a migratory bird species. The Proposed Action is a military readiness activity; therefore, these takes are in compliance with the MBTA.

Large wooded tracts within the study area offer potential habitat for northern long-eared bats which has been documented at many of the installations addressed in this document. Though remote, physical disturbance/strike and noise are potential stressors. Pursuant to the ESA, the No Action Alternative would affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat at all study area locations except First Landing State Park.

JEB Little Creek, JEB Fort Story, and Dam Neck Annex include appropriate foraging habitats and are in the range of the piping plover, red knot, and roseate tern. It is likely that any individuals observed on-site would be rare occurrences and considered transient individuals. Generally, birds are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area; therefore, the Navy has determined that the Proposed Action would have no effect on the red knot, roseate tern and piping plover at JEB Little Creek. The Proposed Action would have no effect on the roseate tern at any study area installation. Given that individual migrating piping plovers have been sighted on the installations in historical surveys at JEB Fort Story and Dam Neck Annex/Camp Pendleton and red knots have been reported during surveys at Dam Neck Annex, the Navy has determined that the Proposed Action may affect, but is not likely to adversely affect, the ESA-listed piping plover and red knot.

NWS Yorktown and Cheatham Annex are in the historical range of the small whorled pogonia, and both installations contain appropriate habitats for the species; however, the species has not been confirmed as present at either of the sites. And, though no formal critical habitat has been designated at NWS Yorktown or Cheatham Annex, a number of ecologically significant communities that support or have the potential to support rare or at risk species have been identified (Navy, 2010a). These communities, as well as existing information on rare species have formed the basis for the designation of eight ecological areas that merit conservation and protection at NWS Yorktown and Cheatham Annex. Six of the ecological areas are located at NWS Yorktown and three at Cheatham Annex. Delineating these areas and implementing the specific habitat management measures described in the INRMP ensures the continued protection of the natural heritage resources. Therefore, the Navy has determined that the Proposed Action would have no effect on the small whorled pogonia.

JEB Fort Story and Dam Neck Annex/Camp Pendleton implement sea turtle management in accordance with their INRMPs and USFWS consultations. The Navy conducts beach surveys for sea turtle nesting and strandings at Dam Neck Annex and Camp Pendleton daily during the summer nesting season. JEB Little Creek does not have a sea turtle monitoring program because no nesting has occurred on those beaches since data collection efforts began in 1970. However, other protocols for beach landings have been developed and include lookout requirements during beach landings that would provide additional protection for nesting sea turtles and hatchlings. Sea turtle nest monitoring and management guidelines for JEB Fort Story and Dam Neck Annex/Camp Pendleton would continue.

There is no historical evidence of nesting sea turtles at JEB Little Creek and, therefore, the Navy has determined that the Proposed Action would have no effect on loggerhead, green, and Kemp's ridley sea turtles. At JEB Fort Story and Dam Neck Annex offshore occurrences of loggerhead and Kemp's ridley sea turtles have been documented and they may potentially nest at these locations. Green sea turtles were not detected during acoustic and satellite tagging studies conducted offshore of JEB Fort Story and, thus, they are not expected to nest on JEB Fort Story beaches. The Navy has determined that the Proposed Action would have no effect on green sea turtles at JEB Fort Story. However, one green sea turtle nest was documented on Sandbridge Beach, a few miles south of Dam Neck Annex; based on this proximity, green sea turtles may potentially nest on Dam Neck Annex. Given the very low density of historical loggerhead and Kemp's ridley sea turtle nesting in the study area and the low probability that green sea turtles would be encountered during a training activity, the potential for impacts to loggerhead, green, and Kemp's ridley sea turtles under the No Action Alternative is not significant. Implementation of sea turtle management measures at JEB Fort Story and Dam Neck Annex in accordance with their INRMPs would reduce the potential for impacts to loggerhead, green, and Kemp's ridley sea turtles. As a result,

the Navy has determined that the Proposed Action may affect, but is not likely to adversely affect, loggerhead, green, and Kemp's ridley sea turtles. Therefore, the Navy initiated informal consultation with the USFWS.

Under the No Action Alternative manatee may occur in areas of vessel activity, thus incurring risk of collision or strike. The Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water. Known manatee areas (e.g., in Florida) have posted requirements for vessels to maintain low speeds. Given the rarity of manatees in Virginia, no such posted low speed zones are found in Virginia. In addition, the Navy vessel operators practice safe navigation, travel at a safe speed, and are trained to take proper action to avoid collisions.

Vessel noise may disturb, masking of hearing or vocalization, or affect the behavior of marine mammals including manatees. Based on existing studies, it is likely that protected marine mammal species found in the study area would have relatively minor behavioral reactions to vessels that maintain a reasonable distance. Under the No Action Alternative, vessel noise potentially has behavioral effects on manatees during the late spring, summer and fall when these animals are most likely to occur. Manatees occur infrequently and thus have a low likelihood of being affected by vessel noise from the No Action Alternative.

Manatees feed on seagrass beds in relatively shallow coastal or estuarine waters. Under the No Action Alternative manatees may by chance encounter expended brass casings but significant impacts are not expected as the occurrences would be expected to be random with a low probability of adverse effects.

Therefore, the Navy has determined that, with regard to potential effects from vessel strike, noise, and ingestion, the No Action Alternative would have no effect on the West Indian manatee. In addition, the Navy has determined that the No Action Alternative would not result in the reasonably foreseeable "take" of a West Indian manatee by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

Under the No Action Alternative, hauled-out harbor seals at JEB Little Creek, JEB Fort Story, First Landing State Park, and Dam Neck Annex may react to the presence of people, amphibious craft, and vehicles and temporarily return to the water. Since the species is likely to return to the water when people, amphibious craft, or vehicles are present or approaching, strikes of hauled-out seals typically would not occur and this disturbance is unlikely to result in more than short-term interference with resting activities of seals. The Navy uses highly qualified operators on amphibious craft to maintain awareness of the surrounding environment. As a result, the Navy has determined that, with regard to potential impacts from physical strike and noise, the No Action Alternative would not result in the reasonably foreseeable "take" of a harbor seal by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

Atlantic bottlenose dolphin and harbor seals may occur in areas of vessel activity, thus incurring risk of collision or strike. The Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water. In addition, the Navy vessel operators practice safe navigation, travel at a safe speed, and are trained to take proper action to avoid collisions.

Vessel noise may disturb, masking of hearing or vocalization, or affect the behavior of marine mammals including bottlenose dolphins and harbor seals. Under the No Action Alternative, vessel noise would

potentially have behavioral effects on bottlenose dolphins during the late spring, summer and fall, when these animals are most likely to occur. Reactions exhibited by dolphins would likely be temporary in nature.

Under the No Action Alternative blank munitions casings could land in the water, where they could potentially be ingested by bottlenose dolphins and harbor seals. Random encounters of a dolphin with a casing may occur. However, it is unknown whether a dolphin or harbor seal would ingest a casing, and unlikely a dolphin or harbor seal would ingest every projectile it encountered. Furthermore, a dolphin or harbor seal may attempt to ingest a projectile and then reject it when it realizes it is not a food item. Under the No Action Alternative dolphins or harbor seals may by chance encounter expended brass casings but significant impacts are not expected as the occurrences would be expected to be random with a low probability of adverse effects.

Therefore, the Navy has determined that, with regard to potential impacts from physical strike, noise, and ingestion, the No Action Alternative would not result in the reasonably foreseeable "take" of a bottlenose dolphin or harbor seal by harassment, injury, or mortality as defined under the MMPA. Thus, an application for takings under the MMPA is not required.

Vessels operated at high speed could strike fish located near the water surface. Vessels generally do not collide with adult fish because of their ability to detect and avoid the threat. Many species that occur in the live-fire training area are small and highly mobile. Strike potential for most species is primarily associated with larvae and juveniles, which are numerous and experience high natural mortality rates. Vessel noise may disturb fish and cause physiological or behavioral impacts, particularly when vessel speed and the resulting sound levels change frequently. Most individuals likely resume normal activities soon after the noise ceases, although some fish may be exposed to noise multiple times during a training event. Some individuals may be habituated to vessel noise. Overall, although individuals are negatively affected by vessel noise, the number of fish impacted does not likely result in lasting impacts on survival, growth, recruitment, or reproduction of fish populations. Small-caliber shell casings could be ingested by fish that forage on the bottom. Ingestion potential is limited to large fish that consume an item and experience injurious effects. An encounter with casings may not lead to ingestion, and ingestion does not necessarily cause injury. The number of fish impacted is likely low compared to population numbers, and population-level effects are not expected due to ingestion.

Atlantic sturgeons located near the surface are susceptible to vessel strikes, as numerous collision mortalities have been documented in the Delaware River estuary and James River. Atlantic sturgeon occurrence in the Southern Branch of the Elizabeth River is uncertain. Although available data suggest the likelihood of occurrence is low, there is potential for juveniles, subadults, and adults to use the Southern Branch. Individuals present in training areas and located near the surface could be struck by moving vessels. Individuals present in the blank-fire training area could ingest small-caliber shell casings that sink to the bottom. An encounter with a casing does not necessarily lead to ingestion, and ingestion does not necessarily cause injury or mortality. However, ingested casings may potentially cause cuts or obstruction in the mouth or digestive system. Overall, the number of individuals negatively affected is presumed to be low compared to population levels. Based on the preceding summary, vessel strikes and ingestion may affect, but are not likely to adversely affect, Atlantic surgeons. Consultation with NMFS is complete. NMFS concurrence with the Navy determination is contained in Appendix A, Agency Correspondence.

Proposed USFF VACAPES inland training under the No Action Alternative does not result in significant impacts to biological resources.

4.3.14.2 Alternative 1 Biological Resources Summary

INRMP management measures employed to protect habitats and vegetation would continue to be implemented at all study area installations and include use of signage and physical barriers to limit access when appropriate, restricting vehicles to existing trails and roadways, and including any restrictions in installation planning documents and maps (e.g., INRMPs, Range Management Plans, and Installation Master Plans). In addition, installation natural resource managers monitor conditions on installations to identify potential issues before they become a problem.

While physical disturbance associated with increased beach landings, personnel movement, vehicle movement, and explosives on land have the potential to disturb individual plants and soils, which could degrade habitats over time, training that utilizes beach habitats would be restricted to unvegetated portions of the beach and vehicles training at inland areas would be restricted to utilizing existing roads and trails.

Physical strike associated with increased beach landings, personnel movement, vehicle movement, explosives on land and weapons firing – non-lethal training ammunition has the potential to impact wildlife. However, most mammals, reptiles, amphibians, and birds are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, invertebrates, less mobile reptiles, and amphibians, move into a protected location, such as a burrow or vegetation, for cover. Weapons firing – blank-fire results in expended brass casings; however, the casings are picked up by the Navy and do not pose a strike risk as they are expended in close proximity to the weapon, where mammals would not be expected to occur. INRMP management measures benefiting wildlife include implementing projects that enhance and restore native habitats.

Noise associated with increased vehicle movement, operation of generators, use of explosives, and simulated weapons fire all have the potential to disturb wildlife to varying degrees. Most noise events would be localized and occur for a relatively short period of time (minutes to hours).

The increase in training operations under Alternative 1 would not have a significant impact on MBTA-protected species at the population level. The Navy has determined that training with explosives on land under Alternative 1 may result in takes of migratory birds. These takes would not result in a significant adverse effect on a population of a migratory bird species. The Proposed Action is a military readiness activity; therefore, these takes are in compliance with the MBTA.

Large wooded tracts within the study area offer potential habitat for the northern long-eared bat, which has been documented at many of the installations addressed in this document. Though the possibility is remote, strike and noise are potential stressors. Pursuant to the ESA, Alternative 1 may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat at all study area locations except First Landing State Park.

JEB Little Creek, JEB Fort Story, and Dam Neck Annex include appropriate foraging habitats and are in the range of the piping plover, red knot, and roseate tern. It is likely that any individuals observed on-site would be rare occurrences and considered transient individuals. Generally, birds are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area; therefore, the Navy has determined that Alternative 1 would have no effect on the red

knot, roseate tern and piping plover at JEB Little Creek. Alternative 1 would have no effect on the roseate tern at any study area installation. Given that individual migrating piping plovers have been sighted on the installations in historical surveys at JEB Fort Story and Dam Neck Annex/Camp Pendleton and red knots have been reported during surveys at Dam Neck Annex, the Navy has determined that Alternative 1 may affect, but is not likely to adversely affect, the ESA-listed piping plover and red knot.

NWS Yorktown and Cheatham Annex are in the historical range of the small whorled pogonia, and both installations contain appropriate habitats for the species; however, the species has not been confirmed as present at either of the sites. And, though no formal critical habitat has been designated at NWS Yorktown or Cheatham Annex, a number of ecologically significant communities that support or have the potential to support rare or at risk species have been identified (Navy, 2010a). These communities, as well as existing information on rare species have formed the basis for the designation of eight ecological areas that merit conservation and protection at NWS Yorktown and Cheatham Annex. Six of the ecological areas are located at NWS Yorktown and three at Cheatham Annex. Delineating these areas and implementing the specific habitat management measures described in the INRMP ensures the continued protection of the natural heritage resources. Therefore, the Navy has determined that Alternative 1 would have no effect on the small whorled pogonia.

JEB Fort Story and Dam Neck Annex/Camp Pendleton implement sea turtle management in accordance with their INRMPs and USFWS consultations. The Navy conducts beach surveys for sea turtle nesting and strandings at Dam Neck Annex and Camp Pendleton daily during the summer nesting season. JEB Little Creek does not have a sea turtle monitoring program because no nesting has occurred on those beaches since 1970. However, other protocols for beach landings have been developed and include lookout requirements during beach landings that would provide additional protection for nesting sea turtles and hatchlings. Sea turtle nest monitoring and management guidelines for JEB Fort Story and Dam Neck Annex/Camp Pendleton would continue.

There is no historical evidence of nesting sea turtles at JEB Little Creek; therefore, the Navy has determined that Alternative 1 would have no effect on loggerhead, green, and Kemp's ridley sea turtles at JEB Little Creek. At JEB Fort Story and Dam Neck Annex, offshore occurrences of loggerhead and Kemp's ridley sea turtles have been documented, and they may potentially nest at these locations. Green sea turtles were not detected during acoustic and satellite tagging studies conducted offshore of JEB Fort Story, and thus they are not expected to nest on JEB Fort Story beaches. However, one green sea turtle nest was documented on Sandbridge Beach, a few miles south of Dam Neck Annex; based on this proximity, green sea turtles may potentially nest on Dam Neck Annex. Given the very low density of historical loggerhead and Kemp's ridley sea turtle nesting in the study area and the low probability that green sea turtles would be encountered during a training activity, the potential for impacts to loggerhead, green, and Kemp's ridley sea turtles under Alternative 1 would not be significant. Implementation of sea turtle management measures at JEB Fort Story and Dam Neck Annex in accordance with their INRMPs would reduce the potential for impacts to loggerhead, green, and Kemp's ridley sea turtles. Therefore, the Navy has determined that Alternative 1 would have no effect on green sea turtles at JEB Fort Story, but may affect, but is not likely to adversely affect, green sea turtles at Dam Neck Annex. Additionally, the Navy has determined that Alternative 1 may affect, but is not likely to adversely affect, loggerhead and Kemp's ridley sea turtles at JEB Fort Story and Dam Neck Annex. The Navy initiated informal consultation with the USFWS.

Under Alternative 1, manatee may occur in areas of vessel activity, thus incurring risk of collision or strike. The Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water. In general, known manatee areas have posted requirements for vessels to maintain low speeds. In addition, the Navy vessel operators practice safe navigation, travel at a safe speed, and are trained to take proper action to avoid collisions.

Vessel noise may disturb, masking of hearing or vocalization, or affect the behavior of marine mammals including manatees. Based on existing studies, it is likely that protected marine mammal species found in the study area would have relatively minor behavioral reactions to vessels that maintain a reasonable distance. Under Alternative 1, vessel noise potentially has behavioral effects on manatees during the late spring, summer and fall when these animals are most likely to occur. Manatees occur infrequently and thus have a low likelihood of being affected by vessel noise from Alternative 1.

Manatees feed on seagrass beds in relatively shallow coastal or estuarine waters. Under Alternative 1 manatees may by chance encounter expended brass casings but significant impacts are not expected as the occurrences would be expected to be random with a low probability of adverse effects.

Therefore, the Navy has determined that with regard to potential impacts from vessel strike, noise, and ingestion, Alternative 1 would have no effect on the West Indian manatee. In addition, the Navy has determined that Alternative 1 would not result in the reasonably foreseeable "take" of a West Indian manatee by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

Under Alternative 1, hauled-out harbor seals at JEB Little Creek, JEB Fort Story, First Landing State Park and Dam Neck Annex may react to the presence of people, amphibious craft, and vehicles and temporarily return to the water. Since the species is likely to return to the water when people, amphibious craft, or vehicles are present or approaching, strikes of hauled-out seals typically would not occur, and this disturbance is unlikely to result in more than short-term interference with resting activities of seals. The Navy uses highly qualified operators on amphibious craft to maintain awareness of the surrounding environment. As a result, the Navy has determined that with regard to potential impacts from physical strike and noise, Alternative 1 would not result in the reasonably foreseeable "take" of a harbor seal by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

Atlantic bottlenose dolphin and harbor seals may occur in areas of vessel activity, thus incurring risk of collision or strike. The Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water. In addition, the Navy vessel operators practice safe navigation, travel at a safe speed, and are trained to take proper action to avoid collisions.

Vessel noise may disturb, masking of hearing or vocalization, or affect the behavior of marine mammals including bottlenose dolphins and harbor seals. Under Alternative 1, vessel noise would potentially have behavioral effects on bottlenose dolphins during the late spring, summer and fall, when these animals are most likely to occur. Reactions exhibited by dolphins and harbor seals would likely be temporary in nature.

Under Alternative 1, blank munitions casings could land in the water, where they could potentially be ingested by bottlenose dolphins or harbor seals. Random encounters of a dolphin or harbor seal with a casing may occur. However, it is unknown whether a dolphin or harbor seal would ingest a casing and unlikely a dolphin would ingest every projectile it encountered. Furthermore, a dolphin or harbor seal may attempt to ingest a projectile and then reject it when it realizes it is not a food item. Under Alternative 1, dolphins or harbors seals may by chance encounter expended brass casings but significant impacts are not expected as the occurrences would be expected to be random with a low probability of adverse effects.

Therefore, the Navy has determined that, with regard to potential impacts from physical strike, noise, and ingestion, the Alternative 1 would not result in the reasonably foreseeable "take" of a bottlenose dolphin or harbor seal by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

Vessels operated at high speed could strike fish located near the water surface. Vessels generally do not collide with adult fish because of their ability to detect and avoid the threat. Many species that occur in the live-fire training area are small and highly mobile. Strike potential for most species would be primarily associated with larvae and juveniles, which are numerous and experience high natural mortality rates. Vessel noise may disturb fish and cause physiological or behavioral impacts, particularly when vessel speed and the resulting sound levels change frequently. Most individuals would likely resume normal activities soon after the noise ceases, although some fish may be exposed to noise multiple times during a training event. Some individuals may be habituated to vessel noise. Overall, although individuals would be affected by vessel noise, the number of fish impacted would not likely result in lasting impacts on survival, growth, recruitment, or reproduction of fish populations. Small-caliber shell casings could be ingested by fish that forage on the bottom. Ingestion potential would be limited to large fish that consume an item and experience injurious effects. An encounter with casings may not lead to ingestion, and ingestion would not necessarily cause injury. The number of fish impacted would likely be low compared to population numbers, and population-level effects would not be expected due to ingestion.

Atlantic sturgeons located near the surface are susceptible to vessel strikes, as numerous collision mortalities have been documented in the Delaware River estuary and James River. Atlantic sturgeon occurrence in the Southern Branch of the Elizabeth River is uncertain. Although available data suggest the likelihood of occurrence is low, there is potential for juveniles, subadults, and adults to use the Southern Branch. Individuals present in training areas and located near the surface could be struck by moving vessels. Individuals present in the blank-fire training area could ingest small-caliber shell casings that sink to the bottom. An encounter with a casing would not necessarily lead to ingestion, and ingestion would not necessarily cause injury or mortality. However, ingested casings may potentially cause cuts or obstruction in the mouth or digestive system. Overall, the number of individuals negatively affected would presumably be low compared to population levels. Based on the preceding summary, vessel strikes and ingestion may affect, but are not likely to adversely affect, Atlantic sturgeons. Consultation with NMFS is complete. NMFS concurrence with the Navy determination is contained in Appendix A, Agency Correspondence.

Proposed USFF VACAPES inland training under Alternative 1 would result in no significant impacts to biological resources.

4.3.14.3 Alternative 2 Biological Resources Summary

INRMP management measures employed to protect habitats and vegetation would continue to be implemented at all study area installations and include use of signage and physical barriers to limit access when appropriate, restricting vehicles to existing trails and roadways, and including any restrictions in installation planning documents and maps (e.g., INRMPs, Range Management Plans, and Installation Master Plans). In addition, installation natural resource managers monitor conditions on installations to identify potential issues before they become a problem.

While physical disturbance associated with increased beach landings, personnel movement, vehicle movement, and explosives on land have the potential to disturb individual plants and soils, which could degrade habitats over time, training that utilizes beach habitats would be restricted to unvegetated portions of the beach and vehicles training at inland areas would be restricted to utilizing existing roads and trails.

Physical strike associated with increased beach landings, personnel movement, vehicle movement, explosives on land and weapons firing – non-lethal training ammunition has the potential to impact wildlife. However, most mammals, reptiles, amphibians, and birds are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, invertebrates, less mobile reptiles, and amphibians, move into a protected location, such as a burrow or vegetation, for cover. Weapons firing – blank-fire results in expended brass casings; however, the casings are picked up by the Navy and do not pose a strike risk as they are expended in close proximity to the weapon, where mammals would not be expected to occur. INRMP management measures benefiting wildlife include implementing projects that enhance and restore native habitats.

Noise associated with increased vehicle movement, operation of generators, use of explosives, and simulated weapons fire all have the potential to disturb wildlife to varying degrees. Most noise events would be localized and occur for a relatively short period of time (minutes to hours).

The increase in training operations under Alternative 2 would not have a significant impact on MBTA-protected species at the population level. The Navy has determined that training with explosives on land under Alternative 2 may result in takes of migratory birds. These takes would not result in a significant adverse effect on a population of a migratory bird species. The Proposed Action is a military readiness activity; therefore, these takes are in compliance with the MBTA.

Large wooded tracts within the study area offer potential habitat for northern long-eared bats, which has been documented at many of the installations addressed in this document. Though the possibility is remote, physical strike and noise are potential stressors. Pursuant to the ESA, Alternative 2 may affect, but is not likely to adversely affect, the ESA-listed northern long-eared bat at all study area locations except First Landing State Park.

JEB Little Creek, JEB Fort Story, and Dam Neck Annex include appropriate foraging habitats and are in the range of the piping plover, red knot, and roseate tern. It is likely that any individuals observed on-site would be rare occurrences and considered transient individuals. Generally, birds are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area; therefore, the Navy has determined that Alternative 2 would have no effect on the red knot, roseate tern and piping plover at JEB Little Creek. Alternative 2 would have no effect on the roseate tern at any study area installation. Given that individual migrating piping plovers have been sighted on the installations in historical surveys at JEB Fort Story and Dam Neck Annex/Camp Pendleton and red knots have been reported during surveys at Dam Neck Annex, the Navy has determined that Alternative 2 may affect, but is not likely to adversely affect, the ESA-listed piping plover and red knot.

NWS Yorktown and Cheatham Annex are in the historical range of the small whorled pogonia, and both installations contain appropriate habitats for the species; however, the species has not been confirmed as present at either of the sites. And, though no formal critical habitat has been designated at NWS Yorktown or Cheatham Annex, a number of ecologically significant communities that support or have the potential to support rare or at risk species have been identified (Navy, 2010a). These communities, as well as existing information on rare species have formed the basis for the designation of eight ecological areas that merit conservation and protection at NWS Yorktown and Cheatham Annex. Six of the ecological areas are located at NWS Yorktown and three at Cheatham Annex. Delineating these areas and implementing the specific habitat management measures described in the INRMP ensures the continued protection of the natural heritage resources. Therefore, the Navy has determined that Alternative 2 would have no effect on the small whorled pogonia.

JEB Fort Story and Dam Neck Annex/Camp Pendleton implement sea turtle management in accordance with their INRMPs and USFWS consultations. The Navy conducts beach surveys for sea turtle nesting and strandings at Dam Neck Annex and Camp Pendleton daily during the summer nesting season. JEB Little Creek does not have a sea turtle monitoring program because no nesting has occurred on those beaches since 1970. However, other protocols for beach landings have been developed and include lookout requirements during beach landings that would provide additional protection for nesting sea turtles and hatchlings. Sea turtle nest monitoring and management guidelines for JEB Fort Story and Dam Neck Annex/Camp Pendleton would continue.

There is no historical evidence of nesting sea turtles at JEB Little Creek; therefore, the Navy has determined that Alternative 2 would have no effect on loggerhead, green, and Kemp's ridley sea turtles at JEB Little Creek. At JEB Fort Story and Dam Neck Annex offshore occurrences of loggerhead and Kemp's ridley sea turtles have been documented and they may potentially nest at these locations. Green sea turtles were not detected during acoustic and satellite tagging studies conducted offshore of JEB Fort Story, and thus they are not expected to nest on JEB Fort Story beaches. However, one green sea turtle nest was documented on Sandbridge Beach, a few miles south of Dam Neck Annex; based on this proximity, green sea turtles may potentially nest on Dam Neck Annex. Given the very low density of historical loggerhead and Kemp's ridley sea turtle nesting in the study area and the low probability that green sea turtles would be encountered during a training activity, the potential for impacts to loggerhead, green, and Kemp's ridley sea turtles under Alternative 2 would not be significant. Implementation of sea turtle management measures at JEB Fort Story and Dam Neck Annex in accordance with their INRMPs would reduce the potential for impacts to loggerhead, green, and Kemp's ridley sea turtles. Therefore, the Navy has determined that Alternative 2 would have no effect on green sea turtles at JEB Fort Story, but may affect, but is not likely to adversely affect, green sea turtles at Dam Neck Annex. Additionally, the Navy has determined that Alternative 2 may affect, but is not likely to adversely affect, loggerhead and Kemp's ridley sea turtles at JEB Fort Story and Dam Neck Annex. The Navy initiated informal consultation with the USFWS.

Under Alternative 2, manatee may occur in areas of vessel activity, thus incurring risk of collision or strike. The Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water. In general, known manatee areas have posted requirements for vessels to maintain low speeds. In addition, the Navy vessel operators practice safe navigation, travel at a safe speed, and are trained to take proper action to avoid collisions.

Vessel noise may disturb, masking of hearing or vocalization, or affect the behavior of marine mammals including manatees. Based on existing studies, it is likely that protected marine mammal species found

in the study area would have relatively minor behavioral reactions to vessels that maintain a reasonable distance. Under Alternative 2, vessel noise potentially has behavioral effects on manatees during the late spring, summer and fall when these animals are most likely to occur. Manatees occur infrequently and thus have a low likelihood of being affected by vessel noise from Alternative 3.

Manatees feed on seagrass beds in relatively shallow coastal or estuarine waters. Under Alternative 2 manatees may by chance encounter expended brass casings but significant impacts are not expected as the occurrences would be expected to be random with a low probability of adverse effects.

Therefore, the Navy has determined that with regard to potential impacts from vessel strike, noise and ingestion, Alternative 2 would have no effect on the West Indian manatee. In addition, the Navy has determined that Alternative 2 would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

Under Alternative 2, hauled-out harbor seals at JEB Little Creek, JEB Fort Story, First Landing State Park, and Dam Neck Annex may react to the presence of people, amphibious craft, and vehicles and temporarily return to the water. Since the species is likely to return to the water when people, amphibious craft, or vehicles are present or approaching, strikes of hauled-out seals typically would not occur, and this disturbance is unlikely to result in more than short-term interference with resting activities of seals. The Navy uses highly qualified operators on amphibious craft to maintain awareness of the surrounding environment. As a result, the Navy has determined that with regard to potential impacts from physical strike and noise, Alternative 2 would not result in the reasonably foreseeable "take" of a harbor seal by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

Atlantic bottlenose dolphin and harbor seals may occur in areas of vessel activity, thus incurring risk of collision or strike. The Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water. In addition, the Navy vessel operators practice safe navigation, travel at a safe speed, and are trained to take proper action to avoid collisions.

Vessel noise may disturb, masking of hearing or vocalization, or affect the behavior of marine mammals including bottlenose dolphins and harbor seals. Under Alternative 2, vessel noise would potentially have behavioral effects on bottlenose dolphins during the late spring, summer and fall, when these animals are most likely to occur. Reactions exhibited by dolphins and harbor seals would likely be temporary in nature.

Under Alternative 2, blank munitions casings could land in the water, where they could potentially be ingested by bottlenose dolphins or harbor seals. Random encounters of a dolphin or harbor seal with a casing may occur. However, it is unknown whether a dolphin or harbor seal would ingest a casing, and unlikely a dolphin or harbor seal would ingest every projectile it encountered. Furthermore, a dolphin or harbor seal may attempt to ingest a projectile and then reject it when it realizes it is not a food item. Under Alternative 2, dolphins or harbor seals may by chance encounter expended brass casings but significant impacts are not expected as the occurrences would be expected to be random with a low probability of adverse effects.

As a result, the Navy has determined that with regard to potential impacts from physical strike, noise and ingestion, Alternative 2 would not result in the reasonably foreseeable "take" of a bottlenose dolphin or harbor seals by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required.

Vessels operated at high speed could strike fish located near the water surface. Vessels generally do not collide with adult fish because of their ability to detect and avoid the threat. Many species that occur in the live-fire training area are small and highly mobile. Strike potential for most species would be primarily associated with larvae and juveniles, which are numerous and experience high natural mortality rates. Vessel noise may disturb fish and cause physiological or behavioral impacts, particularly when vessel speed and the resulting sound levels change frequently. Most individuals would likely resume normal activities soon after the noise ceases, although some fish may be exposed to noise multiple times during a training event. Some individuals may be habituated to vessel noise. Overall, although individuals would be affected by vessel noise, the number of fish impacted would not likely result in lasting impacts on survival, growth, recruitment, or reproduction of fish populations. Small-caliber shell casings could be ingested by fish that forage on the bottom. Ingestion potential would be limited to large fish that consume an item and experience injurious effects. An encounter with casings may not lead to ingestion, and ingestion would not necessarily cause injury. The number of fish impacted would likely be low compared to population numbers, and population-level effects would not be expected due to ingestion.

Atlantic sturgeons located near the surface are susceptible to vessel strikes, as numerous collision mortalities have been documented in the Delaware River estuary and James River. Atlantic sturgeon occurrence in the Southern Branch of the Elizabeth River is uncertain. Although available data suggest the likelihood of occurrence is low, there is potential for juveniles, subadults, and adults to use the Southern Branch. Individuals present in training areas and located near the surface could be struck by moving vessels. Individuals present in the blank-fire training area could ingest small-caliber shell casings that sink to the bottom. An encounter with a casing would not necessarily lead to ingestion, and ingestion would not necessarily cause injury or mortality. However, ingested casings may potentially cause cuts or obstruction in the mouth or digestive system. Overall, the number of individuals negatively affected would presumably be low compared to population levels. Based on the preceding summary, vessel strikes and ingestion may affect, but are not likely to adversely affect, Atlantic sturgeons. Consultation with NMFS is complete. NMFS concurrence with the Navy determination is contained in Appendix A, Agency Correspondence.

Proposed USFF VACAPES inland training under Alternative 2 would result in no significant impacts to biological resources.

4.3.14.4 Summary of Endangered Species Act Determinations

Protected species were evaluated for no effect, may affect not likely to adversely affect, and likely to adversely affect in consideration of the ESA as applicable. Summary evaluations are presented in Table 4.3-11.

Table 4.3-11. Effect Determinations for Protected Species in the Study Area Under All Alternatives

Species	*JEB Little Creek*	*JEB Fort Story*	*Dam Neck Annex and Camp Pendleton*	*NALF Fentress*	*Northwest Annex*	*St. Juliens Creek Annex*	*NWS Yorktown*	*Cheatham Annex*	*First Landing State Park*	*Southern Branch of the Elizabeth River*
Species Listed Under the Endangered Species Act										
Northern long-eared bat	MA/NLAA	MA/NLAA	MA/NLAA	MA/NLAA	MA/NLAA	MA/NLAA	MA/NLAA	MA/NLAA	NE	MA/NLAA
Small whorled pogonia	NP	NP	NP	NP	NP	NP	NE	NE	NP	NP
Piping plover	NE	MA/NLAA	MA/NLAA	NP	NP	NP	NP	NP	NP	NP
Red knot	NE	MA/NLAA	MA/NLAA	NP	NP	NP	NP	NP	NP	NP
Roseate tern	NE	NE	NE	NP	NP	NP	NP	NP	NP	NP
Atlantic sturgeon	NP	NP	NP	NP	NP	NP	NP	NP	NP	MA/NLAA
Loggerhead sea turtle	NE	MA/NLAA	MA/NLAA	NP	NP	NP	NP	NP	NP	NP
Green sea turtle	NE	NE	MA/NLAA	NP	NP	NP	NP	NP	NP	NP
Kemp's ridley sea turtle	NE	MA/NLAA	MA/NLAA	NP	NP	NP	NP	NP	NP	NP
West Indian manatee	NP	NP	NP	NP	NP	NP	NP	NP	NP	NE
Species Listed Under the Marine Mammal Protection Act										
Atlantic bottlenose dolphin	NP	NP	NP	NP	NP	NP	NP	NP	NP	NT
West Indian manatee	NP	NP	NP	NP	NP	NP	NP	NP	NP	NT
Harbor seal	NT	NT	NT	NP	NP	NP	NP	NP	NT	NT

Key: LAA = Likely to Adversely Affect; MA/NLAA = May Affect, Not Likely to Adversely Affect; NE = No Effect; NP = Not Present; NT = No Take;
JEB = Joint Expeditionary Base; NALF = Naval Auxiliary Landing Field; NWS = Naval Weapons Station.

4.4 Cultural Resources

4.4.1 Overview

The training activities stressors with potential to impact cultural resources within the study area are physical disturbance associated with beach landings, personnel movement, explosives on land, and vehicle movement and noise associated with vehicle movement, explosives on land, and weapons firing. The potential impacts to significant cultural resources from each of these stressors are addressed for each of the 10 training locations within the study area.

The discussion in each training installation begins with identification of the specific training activities and the stressors with potential to impact cultural resources. The No Action Alternative, which represents the existing training activities, is fully analyzed for potential impacts to cultural resources from the identified training activities. The training activities under Alternative 1 and Alternative 2 are either the same as, or an incremental increase from the No Action Alternative. Because some stressors interact differently with archaeological resources and architectural resources, there is separate analysis discussion for each type (by training activity stressor) at installations where each type exists.

The discussion in each training installation concludes with a summary statement of the potential impacts on significant archaeological and architectural resources for each alternative at the installation, as well as a statement of the Navy's National Historic Preservation Act (NHPA) Section 106 determination of effects.

4.4.2 Methodology

Cultural resources that have been determined to be significant are listed on, or eligible for listing on the National Register of Historic Places (NRHP), and are called historic properties. Section 106 of the NHPA and its implementing regulations (36 CFR 800) require federal agencies to take into account the effects of their undertakings (i.e., any federally initiated, licensed or permitted projects) on historic properties. An effect may be considered adverse if it changes those qualities of a historic property that qualify it for the NRHP (36 CFR 800.16[i]), or if a cultural resource has been identified as important to Native Americans, as outlined in the American Indian Religious Freedom Act, EO 13007, Indian Sacred Sites, and other regulations. The NHPA also requires the agency to consult with the State Historic Preservation Office and as appropriate, other parties such as the Advisory Council on Historic Preservation, local governments, interested parties, and federally recognized Native American tribes regarding the undertaking and any effects to historic properties.

DoD American Indian and Alaska Native Policy and implementing instructions (DoD Instruction 4710.02) provide guidance for interacting and working with federally recognized Native American governments. DoD policy requires that installations provide timely notice to, and consult with, tribal governments prior to taking any actions that may have the potential to significantly affect protected tribal resources, tribal rights, or Native American lands.

Analysis of potential impacts to cultural resources considers impacts that may occur by the following:

- physically altering, damaging, or destroying all or part of a resource
- altering characteristics of the surrounding environment that contribute to the resource's significance

- introducing visual or audible elements that are out of character with the property or alter its setting
- neglecting the resource to the extent that it deteriorates or is destroyed

Direct impacts can be assessed by identifying the types and locations of proposed activities and determining the exact location of cultural resources that could be affected. Indirect impacts occur later in time or farther from the Proposed Action. For each training location, the area of potential effects (APE) for direct impacts (effects) is defined as the boundary of the training area where the training activities are/would be conducted; the APE for indirect impacts (effects) is the boundary of the installation, park, or waterway.

4.4.3 Impacts Common to All Locations Under All Alternatives

4.4.3.1 Architectural Resources

The NHPA charges federal agencies to identify and evaluate cultural resources under their stewardship and to nominate eligible properties to the NRHP. In addition, the NHPA calls for federal agencies to consider the effects of planned activities on NRHP-listed or -eligible properties.

To facilitate management of cultural resources in accordance with the NHPA, the Navy has developed and implemented a Regional Integrated Cultural Resources Management Plan for the Hampton Roads facilities, including those in this EA.

Commander, Navy Region Mid-Atlantic carries out its Section 106 responsibilities for actions affecting the built environment through implementation of the terms of their Regional Programmatic Agreement for undertakings at certain Navy Region Mid-Atlantic installations located in Hampton Roads area of southeastern Virginia (Navy, 2012b).

The following installations are currently covered under the Regional Programmatic Agreement, which was executed in 1999 among Commander, Navy Region Mid-Atlantic, the Advisory Council on Historic Preservation, and Virginia State Historic Preservation Officer (SHPO):

- Naval Station Norfolk
- Naval Support Activity Hampton Roads properties including Fleet Forces Compound, the Staff College, the Sewells Point Golf Course and Lafayette River Annex
- St. Juliens Creek Annex
- NAS Oceana and NALF Fentress
- NWS Yorktown and Cheatham Annex

The Regional Programmatic Agreement provides a system for categorizing buildings and structures and for assigning agreed upon treatments for each category of property. The Navy and the Virginia SHPO have agreed to the appropriate treatment categories for all resources predating 1948 that were constructed at the installations identified above. Each historic preservation priority category describe above has an applicable treatment category, which outlines specific historic preservation treatment considerations for each category. The Regional Programmatic Agreement also includes a list of activities which are acknowledged to have no adverse effect and which Commander, Navy Region Mid-Atlantic may implement without consultation with the Virginia SHPO (Navy, 2012b).

In compliance with Section 106 of the NHPA, the Navy conducted consultation with the Virginia Department of Historic Resources, which acts as the SHPO, federally recognized tribes, and interested

parties, regarding its determination of effects for the proposed training activities evaluated in this EA, and if necessary, to develop management actions and mitigation measures to resolve any adverse effects prior to implementation of the Proposed Action. In a memorandum to the Navy dated July 7, 2017, the Virginia Department of Historic Resources concurred with the Navy's determination that there would be no adverse effects on historic resources (Appendix A, Agency Correspondence). Correspondence with interested parties and tribes is also contained in Appendix A.

In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy would manage these resources in accordance with the NHPA and other federal and state laws, Navy, and DoD regulations and instructions, and DoD American Indian and Alaska Native Policy, by implementing SOP #12, *Project Specific Standard Treatment of Archaeological Resources*, of the Integrated Cultural Resources Management Plan, which contains procedures for inadvertent discovery of archaeological materials and for human remains.

In compliance with the DoD American Indian and Alaska Native Policy and DoD Instruction Number 4710.02: *DoD Interactions with Federally-Recognized Tribes*, the Navy has initiated government-to-government consultation with potentially affected federally recognized tribes, regarding their concerns about potential impacts on Tribal rights or Tribal resources under the proposed training activities evaluated in this EA.

Noise

No direct impacts on the NRHP-listed or -eligible historic properties at any of the training locations are expected to result from the existing and proposed training activities that generate noise, including beach landings, vehicle movement, weapons firing, and explosives training. Scientific studies of the effects of noise and vibration on historic properties have considered potential impacts on historic buildings, prehistoric structures, water tanks, archaeological cave/shelter sites, and rock art. These studies have concluded that overpressures generated by detonations of small amounts of explosives were well below established damage thresholds (U.S. Army Center for Health Promotion and Preventative Medicine, 2005). Although there may be an increase in subsonic noise associated with beach landings, vehicle movement, and weapons firing, and an increase in the occurrence of explosives training under Alternative 1 or Alternative 2 at some training locations, it would not be of sufficient magnitude to impact historic properties at the installations where training is conducted.

4.4.3.2 Impacts on Shipwrecks and Underwater Obstructions

Previously identified NRHP-eligible or -listed submerged historic properties present within the vicinity of the vessel movement routes that may be used during the course of existing and proposed training activities in the APE of water training areas are presented in Section 3.4.1.2 (General Information on Shipwrecks and Underwater Obstructions). No submerged historic properties are located within the Proposed Action APE. Therefore, no impacts to shipwrecks and underwater obstructions would be anticipated to result from implementation of any of the alternatives evaluated in this EA. The Virginia Department of Historic Resources has concurred with this determination (Appendix A).

4.4.4 Joint Expeditionary Base Little Creek

The PTEAs applicable to cultural resources at JEB Little Creek that contribute to the physical disturbance stressor include beach landings, personnel movement, explosives on land, and vehicle movement and that contribute to the noise stressor include beach landings, vehicle movement, explosives on land, and weapons firing – blank-fire (Table 4.4-1).

Table 4.4-1. Joint Expeditionary Base Little Creek Cultural Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*
Land – Beaches/ Dunes	Beach Landings	amphibious and small vessels	50	348 landings	348 landings						
	Explosives on Land	demolition materials and charge				2	2 events (2 detonations with a maximum NEW of 1.25 pounds)	2 events (2 detonations with a maximum NEW of 1.25 pounds)			
	Personnel Movement	NA	815	6,978 people		2	48 people				
	Vehicle Movement	tactical and non-tactical vehicles	815	3,560 hours	3,560 hours	2	1 hour	1 hour			
Land– Non-Beaches/ Dunes	Personnel Movement	NA	24	1,800 people							
	Weapons Firing - Blank	small caliber	6	595,400 rounds	595,400 rounds						

Key: NEW = net explosive weight; No. = number; NA = not applicable.

4.4.4.1 No Action Alternative

There are no NRHP-listed or -eligible architectural or archaeological resources within the APE of training activities conducted at JEB Little Creek. Under the No Action Alternative, existing training activities described in Section 2.2.2 (Joint Expeditionary Base Little Creek: No Action Alternative Training) would continue, and there would be no change to cultural resources. Therefore, there are no significant impacts on cultural resources associated with the No Action Alternative.

4.4.4.2 Alternative 1

Under Alternative 1, USFF training would increase only slightly from the No Action Alternative. However, the increase in PTEAs and associated stressors would not occur within the APE at JEB Little Creek. Therefore, there would be no significant impact on cultural resources with implementation of Alternative 1.

4.4.4.3 Alternative 2

Under Alternative 2, USFF training would be the same as Alternative 1 at this location and would increase only slightly from the No Action Alternative. The increase in PTEAs and associated stressors would not occur within the APE at JEB Little Creek. Therefore, there would be no significant impact on cultural resources with implementation of Alternative 2.

4.4.4.4 Summary

There are no NRHP-listed or -eligible architectural or archaeological resources within the APE of training activities conducted at JEB Little Creek. Under the No Action Alternative, existing training activities would continue, and there would be no change to cultural resources. Under Alternatives 1 and 2, USFF training would increase only slightly from the No Action Alternative. Therefore, there would be no significant impact on cultural resources with implementation of any of the alternatives. In accordance with NHPA Section 106, the Navy has determined that there would be no effect on historic properties at JEB Little Creek with implementation of any of the alternatives. In a memorandum to the Navy dated July 7, 2017, the Virginia Department of Historic Resources concurred with the Navy's determination (Appendix A, Agency Correspondence).

4.4.5 Joint Expeditionary Base Fort Story

The PTEAs applicable to cultural resources at JEB Fort Story that contribute to the physical disturbance stressor include beach landings, personnel movement, explosives on land, and vehicle movement and that contribute to the noise stressor include vehicle movement, explosives on land, weapons firing – non-lethal training ammunition, and weapons firing – blank-fire (Table 4.4-2). The APE for direct impacts (effects) at JEB Fort Story is defined as the training location areas identified in Table 4.4-2, where existing and planned training activities will be conducted that have the potential to affect historic properties; the APE for indirect impacts (effects) is the JEB Fort Story installation boundary (Figure 4.4-1).

Table 4.4-2. Joint Expeditionary Base Fort Story Cultural Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*
Land – Beaches/ Dunes	Beach Landings	amphibious and small vessels	5	379 landings	379 landings	3	165 landings	165 landings			
	Personnel Movement	N/A	468	6,262 people		79	2,268 people				
	Vehicle Movement	tactical and non-tactical vehicles	412	4,735 hours	4,735 hours	79	3,171 hours	3,171 hours			
	Weapons Firing – Blank-Fire	small caliber	28		1,400 rounds	76		22,952 rounds			
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	28		2,800 rounds	76		15,200 rounds			
Land – Non- Beaches/ Dunes	Personnel Movement	N/A	346	5,150 people		480	10,560 people		56	784 people	
	Explosives on Land	demolition materials and charge	108	• 80 events (average 8 detonations/event with maximum NEW of 1.25 pounds) • 28 events (1 detonation/event with maximum NEW of 1.25 pounds)	• 80 events (average 8 detonations/event with maximum NEW of 1.25 pounds) • 28 events (1 detonation/event with maximum NEW of 1.25 pounds)	556	• 240 events (average 9 detonations/event with maximum NEW of 0.2 pounds) • 240 events (average 13 detonations/event with maximum NEW of 1.25 pounds) • 76 events (1 detonation/event with maximum NEW of 1.25 pounds)	• 240 events (average 9 detonations/event with maximum NEW of 0.2 pounds) • 240 events (average 13 detonations/event with maximum NEW of 1.25 pounds) • 76 events (1 detonation/event with maximum NEW of 1.25 pounds)	56	• 56 events (1 detonation/event maximum NEW 1.25 pounds)	• 56 events (1 detonation/event maximum NEW 1.25 pounds)
	Vehicle Movement	tactical and non-tactical vehicles	362	9,587 hours	9,587 hours	240	60 hours	60 hours	56	3,640 hours	3,640 hours
	Weapons Firing – Blank-Fire	small caliber	192		4,868 rounds	480		5,280 rounds	56		2,912 rounds
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	84		8,400 rounds				56		5,600 rounds

Key: NEW = net explosive weight; No. = number; NA = not applicable.

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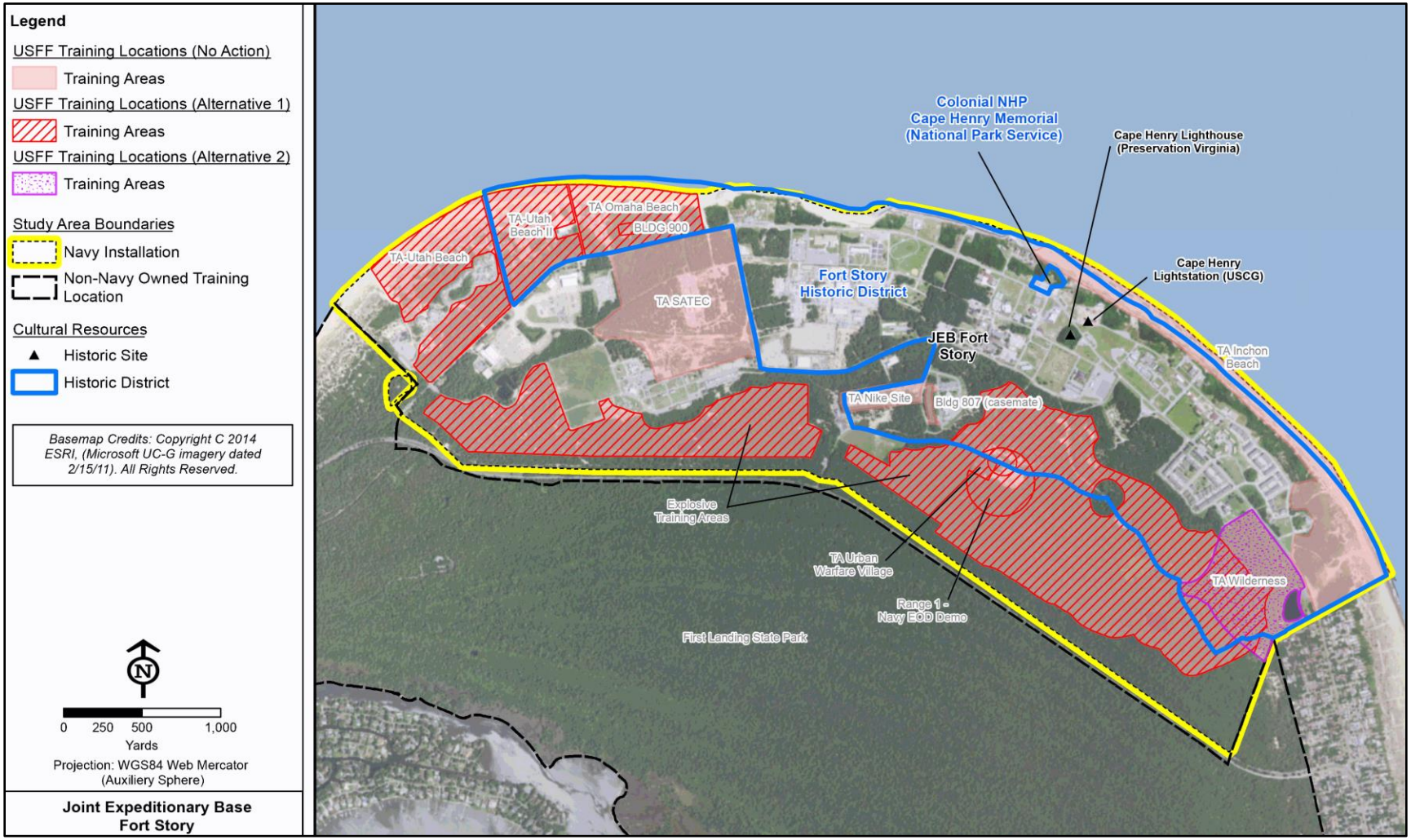

Figure 4.4-1. JEB Fort Story – Historic Districts and Training Location Areas

There is one NRHP-eligible historic district, three individually listed or eligible historic buildings/structures, including one National Historic Landmark, and five eligible or potentially eligible archaeological sites within JEB Fort Story. The Cape Henry Memorial component of the Colonial National Historical Park is Located on a parcel of land at JEB Fort Story, but it is owned by the National Park Service and not used for training. The Fort Story Historic District is located within the training area, and includes Buildings 900 and 807 that are contributing resources (Figure 4.4-1; Table 4.4-3; Appendix A, Agency Correspondence). There is no current or planned training that occurs in, or in the immediate vicinity of the buildings, nor are there any physical changes proposed to any of the historic buildings for current and proposed training. Of the six eligible or potentially eligible archaeological sites, one is located within in a specific training site area (TA Inchon Beach). Table 4.4-3 lists the NRHP-eligible cultural resources at JEB Fort Story and the training site APE in which they occur.

Table 4.4-3. National Register of Historic Places-Eligible Cultural Resources at JEB Fort Story

Resource Number	*Resource Type*	*Description*	*Training Location APE*	*National Register Status*
	Fort Story Historic District	85 contributing buildings and structures and two archaeological sites	All explosive training areas, Bldg 807, Range 1 – Navy EOD Demo, TA Inchon Beach, TA Omaha Beach, Bldg 900, TA Utah Beaches I and II, TA Wilderness	Eligible
	Seashore State Park Historic District	Seashore State Park	JEB Fort Story	
	National Historic Park	Cape Henry Memorial, Colonial National Historical Park	JEB Fort Story	Listed
	Historic Building	"Old" Cape Henry Lighthouse	JEB Fort Story	NHL
	Historic Building	"New" Cape Henry Lighthouse	JEB Fort Story	Listed
	Historic Structure	Cape Henry Memorial	JEB Fort Story	Eligible
	Historic Archaeological Site	20	JEB Fort Story	Potentially Eligible
44VB0061	Prehistoric/Ethnographic Archaeological Site	artifact scatter, about 200 feet along shoreline	TA Inchon Beach	Potentially Eligible
44VB0332	Historic Archaeological Site	concrete gun mount	JEB Fort Story	Eligible (FSHD)
44VB0333	Historic Archaeological Site	railway portion	JEB Fort Story	Potentially Eligible
44VB0334	Historic Archaeological Site	brick and mortar feature	JEB Fort Story	Potentially Eligible
44VB0336	Historic Archaeological Site	circular concrete gun emplacement site	JEB Fort Story	Eligible (FSHD)

Key: APE = area of potential effect; EOD = Explosive Ordnance Disposal; FSHD = Fort Story Historic District; NHL = National Historic Landmark.

4.4.5.1 No Action Alternative

4.4.5.1.1 Architectural Resources

Physical Disturbance

There are no NRHP-listed or -eligible architectural resources in the beach areas where existing beach landing training activities are conducted at JEB Fort Story, although the Fort Story Historic District (Table 4.4-3) encompasses many of the beach areas at the installation (Figure 4.4-1). These training activities do not have any adverse effect on any of the NRHP-listed or -eligible architectural resources at JEB Fort Story.

No personnel movement stressors applicable to architectural resources occur during existing training activities at JEB Fort Story. Table 4.4-3 lists the NRHP-listed or -eligible architectural resources where existing personnel movement training activities are conducted. Personnel movement (as defined in Table 2-1) training activities are not anticipated to have any adverse effect on any of the NRHP-listed or -eligible architectural resources at JEB Fort Story.

EOD training drills, as described in Table 2-4 and Table 4.4-2 are conducted at all of the explosives training areas at JEB Fort Story, which are located at safe distances from occupied buildings. Detonations are conducted within designated bermed areas (Figure 4.4-2). There are no NRHP-listed or -eligible architectural resources within the explosive arc of the explosives training areas at JEB Fort Story where existing explosives training activities are conducted. Therefore, explosives training activities are not anticipated to have any adverse effect on any of the NRHP-listed or -eligible architectural resources at JEB Fort Story.

Figure 4.4-2. Joint Expeditionary Base Fort Story Explosive Ordnance Disposal Range 1

Table 4.4-3 lists the NRHP-listed or -eligible architectural resources where existing vehicle movement training activities are conducted. Vehicle movement training activities within the built environment at JEB Fort Story will be limited to existing roads and trails. Therefore, vehicle movement training activities are not anticipated to have any adverse effect on any of the NRHP-listed or -eligible architectural resources at JEB Fort Story, including the contributing resources of the Fort Story Historic District.

Noise

As described in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct impacts on any NRHP-listed or -eligible architectural and archaeological resources at JEB Fort Story are expected to result from the noise and vibration generated by existing and proposed beach landings, explosives on land, vehicle movement, and weapons firing training activities.

With the long history of military activities at JEB Fort Story, noise associated with training activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for listing. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources, including the Fort Story Historic District, are expected to result from the noise generated by existing beach landing, explosives on land, vehicle movement, and weapons firing training activities.

Therefore, no adverse effect on any cultural resources, direct and indirect, result from the noise and vibration generated by existing beach landing, explosives on land, vehicle movement, and weapons firing training activities.

4.4.5.1.2 Archaeological Resources

Physical Disturbance

There is one archaeological site located in TA Inchon (Table 4.4-3) that is potentially eligible for the NRHP in the beach areas where existing beach landing, personnel movement, and vehicle movement training activities are conducted at JEB Fort Story. The training areas at JEB Fort Story, including the beach and dune areas, are also identified by the Navy as having moderate to low probability to contain undiscovered intact archaeological resources (Figure 4.4-1). The subsurface disturbance potential of these existing training activities with physical disturbance potential will not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy adheres to the NHPA compliance procedures outlined in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), and avoids any potential adverse effects to undiscovered archaeological resources. With adherence to the NHPA compliance procedures outlined in Section 4.4.3.1, beach landings, personnel movement, and vehicle movement training activities do not have any adverse effect on the potentially eligible archaeological site in TA Inchon or any of the archaeological sites that are contributing resources of the Fort Story Historic District.

There are no NRHP-eligible archaeological resources within the explosive arc of the explosives training areas at JEB Fort Story where existing explosives training activities are conducted. The small amounts of dirt and debris that may fall in areas not previously surveyed for archaeological resources is not expected to result in adverse effects to any undiscovered significant archaeological resources. Therefore, explosives training activities are not anticipated to have any adverse effect on any of the NRHP-eligible archaeological resources at JEB Fort Story.

4.4.5.2 Alternative 1

4.4.5.2.1 Architectural Resources

Physical Disturbance

Under Alternative 1, USFF Beach Landing training would increase marginally from the No Action Alternative. There are no NRHP-listed or -eligible architectural resources in the beach areas where

existing and proposed increased beach landing training activities would be conducted at JEB Fort Story, although the Fort Story Historic District (Table 4.4-3) encompasses many of the beach areas at the installation (Figure 4.4-1). Therefore, these training activities are not anticipated to have any adverse effect on any of the NRHP-listed or -eligible architectural resources at JEB Fort Story.

Under Alternative 1, USFF personnel movement and vehicle movement training on beaches/dunes would incrementally increase from the No Action Alternative. No personnel or vehicle movement stressors applicable to architectural resources would occur during existing and proposed increased training activities at JEB Fort Story. Table 4.4-3 lists the NRHP-listed or -eligible architectural resources where existing personnel and vehicle movement training activities are conducted. Due to the nature of the personnel movement and vehicle movement training activities, they are not anticipated to have any adverse effect on any of the NRHP-listed or -eligible architectural resources at JEB Fort Story.

Under Alternative 1, EOD training drills, as described in Table 2-4 and Table 4.4-2 would increase by 556 events from the No Action Alternative (Table 4.4-2). There are no NRHP-listed or -eligible architectural resources within the explosive arc of the explosives training areas at JEB Fort Story where existing explosives training activities are conducted. Therefore, explosives training activities are not anticipated to have any adverse effect on any of the NRHP-listed or -eligible architectural resources at JEB Fort Story.

Noise

As described in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct impacts on any NRHP-listed or -eligible architectural and archaeological resources at JEB Fort Story are expected to result from the noise and vibration generated by the existing and proposed marginal increase in noise-generating training activities, including explosives training, weapons firing, vehicle movement, and beach landing.

With the long history of military activities at JEB Fort Story, noise associated with training activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for listing. While the increased training activities may be audibly noticeable, the resulting discernible effect would not be so great as to impair the integrity of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources, including the Fort Story Historic District, are expected to result from the noise generated by the existing and proposed marginal increase in training activities.

Therefore, no adverse effect on any cultural resources, direct and indirect, are expected to result from the noise and vibration generated by the incremental increases in explosives training, weapons firing, vehicle movement, and beach landing training activities proposed under Alternative 1.

4.4.5.2.2 Archaeological Resources

Physical Disturbance

There is one archaeological site located in TA Inchon (Table 4.4-3) that is potentially eligible for the NRHP in the training areas where existing and proposed increased beach landing, personnel movement, and vehicle movement training activities would be conducted at JEB Fort Story. The training areas at JEB Fort Story, including beach and dune areas, are also identified by the Navy as having moderate to low probability to contain undiscovered intact archaeological resources (Figure 4.4-1). The subsurface

disturbance potential of these existing and proposed training activities will not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy would adhere to the NHPA compliance procedures outlined in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), and avoid any potential adverse effects to undiscovered archaeological resources.

With adherence to the NHPA compliance procedures outlined in Section 4.4.3.1, beach landing, personnel movement, and vehicle movement training activities are not anticipated to have any adverse effect on the potentially eligible archaeological site in TA Inchon or any of the contributing resources of the Fort Story Historic District.

There are no NRHP-eligible archaeological resources within the explosive arc of the explosives training areas at JEB Fort Story where existing explosives training activities are conducted. Therefore, explosives training activities are not anticipated to have any adverse effect on any of the NRHP-eligible archaeological resources at JEB Fort Story.

4.4.5.3 Alternative 2

Alternative 2 includes some training events that are the same as those under Alternative 1 at this location. As noted in Table 4.4-2, no additional training would occur for some PTEAs. Impacts associated with those Alternative 1 PTEAs are discussed below along with the new Alternative 2 PTEAs.

4.4.5.3.1 Architectural Resources

Physical Disturbance

Under Alternative 2, USFF Beach Landing training would be the same as described for Alternative 1 at this location and would increase marginally from the No Action Alternative. There are no NRHP-listed or -eligible architectural resources in the beach areas where existing and proposed increased beach landing training activities would be conducted at JEB Fort Story, although the Fort Story Historic District (Table 4.4-3) encompasses many of the beach areas at the installation (Figure 4.4-1). Therefore, these training activities are not anticipated to have any adverse effect on any of the NRHP-listed or -eligible architectural resources at JEB Fort Story.

Under Alternative 2, USFF personnel movement and vehicle movement training would incrementally increase at the non-beaches/dunes locations from Alternative 1 and the No Action Alternative. No personnel movement or vehicle movement stressors applicable to architectural resources would occur during existing and proposed increased training activities at JEB Fort Story. Table 4.4-3 lists the NRHP-listed or -eligible architectural resources where existing personnel movement training activities are conducted. Due to the nature of personnel movement and vehicle movement training activities, they are not anticipated to have any adverse effect on any of the NRHP-listed or -eligible architectural resources at JEB Fort Story, including the contributing resources of the Fort Story Historic District.

Under Alternative 2, EOD training drills, as described in Table 2-4 and Table 4.4-2 would incrementally increase from Alternative 1 and the No Action Alternative (Table 4.4-2). There are no NRHP-listed or -eligible architectural resources within the explosive arc of the explosives training areas at JEB Fort Story where existing explosives training activities are conducted. Therefore, explosives training activities

are not anticipated to have any adverse effect on any of the NRHP-listed or -eligible architectural resources at JEB Fort Story, including the Fort Story Historic District.

Noise

As described in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct impacts on any NRHP-listed or -eligible architectural and archaeological resources at JEB Fort Story are expected to result from the noise and vibration generated by the existing and proposed incremental increases in noise-generating training activities, including explosives training, weapons firing, vehicle movement, beach landing.

With the long history of military activities at JEB Fort Story, noise associated with training activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for listing. While the increased noise-generating training activities may be audibly noticeable, the resulting discernible effect would not be so great as to impair the integrity of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources, including the Fort Story Historic District, are expected to result from the noise generated by the existing and proposed marginal increase in beach landing training activities.

No adverse effect on any cultural resources, direct and indirect, are expected to result from the noise and vibration generated by explosives training, weapons firing, vehicle movement, and beach landing training activities proposed under Alternative 2.

4.4.5.3.2 Archaeological Resources

Physical Disturbance

There is one archaeological site located in TA Inchon (Table 4.4-3) that is potentially eligible for the NRHP in the beach areas where existing and the proposed Alternative 2 incremental increases in personnel movement and vehicle movement training activities would be conducted at JEB Fort Story. The training areas at JEB Fort Story, including the beach and dune areas, are also identified by the Navy as having moderate to low probability to contain undiscovered intact archaeological resources (Figure 4.4-1). The subsurface disturbance potential of these existing and proposed training activities will not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy would adhere to the NHPA compliance procedures outlined in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources) and avoid any potential adverse effects to undiscovered archaeological resources.

With adherence to the NHPA compliance procedures outlined in Section 4.4.3.1, personnel movement and vehicle movement training activities proposed under Alternative 2 are not anticipated to have any adverse effect on the potentially eligible archaeological site in TA Inchon or any of the contributing resources of the Fort Story Historic District.

There are no NRHP-eligible archaeological resources within the explosive arc of the explosives training areas at JEB Fort Story where explosives training activities would be conducted under Alternative 2. Therefore, explosives training activities would not be expected to have any adverse effect on any of the NRHP-eligible archaeological resources at JEB Fort Story.

4.4.5.4 Summary

Existing training activities with a potential ground disturbance component conducted at JEB Fort Story include beach landings, personnel and vehicle movement, and explosives detonation (Table 4.4-2). NRHP-eligible cultural resources within the APE of these existing training activities include portions of the Fort Story Historic District and a potentially eligible archaeological site in TA Inchon (Table 4.4-3). The subsurface disturbance potential of these existing training activities will not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. Therefore, the existing and proposed training activities under Alternatives 1 and 2 and the No Action Alternative are not anticipated to have any adverse effect on the potentially eligible archaeological site in TA Inchon or any of the contributing resources of the historic district.

Training activities with a potential ground disturbance component will also be conducted in areas identified by the Navy as having moderate to low probability to contain undiscovered intact archaeological resources (Figure 4.4-1). Training activities with potential for ground disturbance for each training location are presented in Table 4.4-2. As stated above, the subsurface disturbance potential of these existing training activities will not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy would manage these resources in accordance with the NHPA and other federal and state laws, Navy, and DoD regulations and instructions, and DoD American Indian and Alaska Native Policy.

All of the archaeological sites and all of the historic properties that are wholly or partially within JEB Fort Story would be subject to increased noise events from various training activities (Table 4.4-2) under Alternatives 1 and 2. As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), and above, no direct or indirect adverse effects on the historic districts or archaeological sites are expected to result from the noise and vibration generated by existing and proposed increases in noise-generating training activities.

Alternatives 1 and 2 would increase the tempo of existing training activities and add training activities described in Table 4.4-2 to those already conducted under the No Action Alternative. As under the No Action Alternative, no significant impacts to cultural resources would occur with implementation of Alternative 1 or Alternative 2. Therefore, there would be no significant impact on cultural resources with implementation of any of the alternatives, including the No Action Alternative. In accordance with NHPA Section 106, the Navy has determined that there would be no adverse effects on historic properties by USFF training at JEB Fort Story with implementation of any of the alternatives. In a memorandum to the Navy dated July 7, 2017, the Virginia Department of Historic Resources concurred with the Navy's determination that there would be no adverse effects on historic properties (Appendix A).

4.4.6 Dam Neck Annex and Camp Pendleton

The PTEAs applicable to cultural resources at Dam Neck Annex and Camp Pendleton that contribute to the physical disturbance stressor include beach landings, personnel movement, and vehicle movement and that contribute to the noise stressor include beach landings, vehicle movement, weapons firing – non-lethal training ammunition, and weapons firing – blank-fire (Table 4.4-4). The APE for direct impacts (effects) at Dam Neck Annex and Camp Pendleton is defined as the training location areas identified in Table 4.4-4, where existing and planned training activities will be conducted that have the potential to affect historic properties; the APE for indirect impacts (effects) is the installation boundary of Dam Neck Annex and Camp Pendleton (Figure 4.4-3).

Table 4.4-4. Dam Neck Annex and Camp Pendleton Cultural Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*
Land – Beaches/ Dunes	Beach Landings	amphibious	22	380 landings	380 landings						
	Personnel Movement	NA	103	1,454 people		76	1,368 people				
	Vehicle Movement	tactical and non-tactical vehicles	64	3,715 hours	3,781 hours	76	291 hours	291 hours			
	Weapons Firing – Blank-Fire	small caliber				76		7,600 rounds			
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun				76		30,400 rounds			
Land – Non- Beaches/ Dunes	Personnel Movement	NA	28	560 people							
	Weapons Firing – Blank-Fire	small caliber	28		1,400 rounds						

Key: NEW = net explosive weight; No. = number; NA = not applicable.

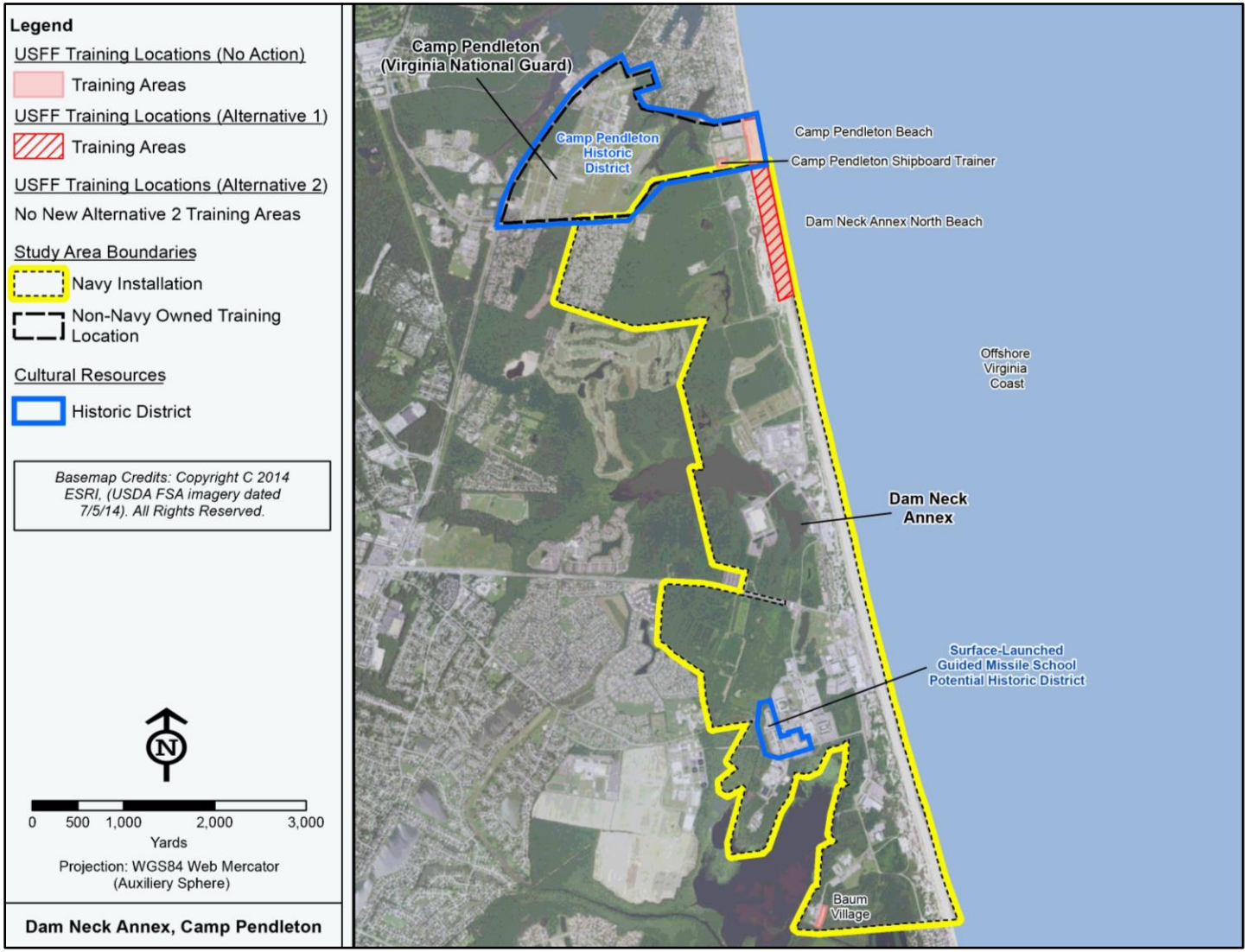

Figure 4.4-3. Dam Neck Annex and Camp Pendleton – Training Location Areas and National Register of Historic Places-Eligible Cultural Resources

There are four NRHP-eligible cultural resources within the Dam Neck Annex and Camp Pendleton training areas, of which the Camp Pendleton Historic District is in the APE of training activities conducted at the installation (Figure 4.4-3). Table 4.4-5 lists the NRHP-eligible cultural resources at Dam Neck Annex and Camp Pendleton and the training site APE in which they occur.

Table 4.4-5. National Register of Historic Places-Eligible Cultural Resources at Dam Neck Annex and Camp Pendleton

Resource Number	*Resource Type*	*Description*	*Training Location*	*National Register Status*
44VB0308	Prehistoric/Ethnographic Archaeological Site	Late Woodland	None	NREC
44VB0343	Historic Archaeological Site	19th Century, 20th Century	None	Potentially Eligible
	Camp Pendleton Historic District	121 contributing buildings and structures and 8 contributing sites (including 6 cultural landscapes)	Camp Pendleton Beach; Camp Pendleton Shipboard Trainer	Eligible
	Surface-Launched Guided Missile School Potential Historic District	3 contributing buildings	None	Potentially Eligible

Key: NREC = Contributing Element of a National Register Eligible Historic District.

4.4.6.1 No Action Alternative

4.4.6.1.1 Architectural Resources

Physical Disturbance

Under the No Action Alternative, 380 beach landings during 22 training events, 1,454 personnel during 103 training events, and 64 events of vehicle movement of tactical and non-tactical vehicles for a total 3,781 hours (Table 4.4-4) will continue to be conducted on the installation beaches. Some of the beach landing training, personnel movement, and vehicle movement events take place on the 600 feet of beachfront within the Camp Pendleton Historic District, identified as a contributing element (cultural landscape) to the District (Table 4.4-4; Figure 4.4-3). Beach landing training will utilize amphibious assault craft from sea to shore, drive up on the beach, turn the craft parallel or perpendicular to the surf, and then head back out to sea. Ground disturbance associated with beach landings, personnel movement training, and vehicle movement will continue to be temporary, leaving no lasting modification to the beach or backbeach dunes. Therefore, these activities are not anticipated to have any adverse effect on the Camp Pendleton Historic District or its contributing elements, including the 600-foot beachfront cultural landscape.

Noise

As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct impacts on the historic districts or architectural resources are expected to result from the noise and vibration generated by existing noise-generating training activities, including beach landings, vehicle movement, and weapons firing training.

With the long history of military activities at Dam Neck Annex and Camp Pendleton, noise associated with training activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for listing. Noise associated with existing beach landings, vehicle movement, and weapons firing training is in character with the historical use and setting of the Camp Pendleton Historic District. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources, including the Camp Pendleton Historic District and its contributing elements, are expected to result from the noise and vibration generated by existing and proposed beach landing training activities.

Therefore, no adverse effect on any cultural resources, direct and indirect, are expected to result from the noise and vibration generated by existing beach landings, vehicle movement, and weapons firing training activities under the No Action Alternative.

4.4.6.1.2 Archaeological Resources

Physical Disturbance

No beach landing, personnel movement, or vehicle movement stressors applicable to archaeological resources occur at Dam Neck Annex and Camp Pendleton. There are no archaeological resources in the APE where these training activities are currently, and will be, conducted under the No Action Alternative. The subsurface disturbance potential of these existing training activities will not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. Therefore, existing beach landing, personnel movement, or vehicle movement training activities do not have any adverse effects on the archaeological resources at Dam Neck Annex and Camp Pendleton.

Noise

No weapons firing stressors applicable to archaeological resources occur at Dam Neck Annex and Camp Pendleton. There are no archaeological resources in the APE where these training activities are currently, and will be, conducted. As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no adverse effect on the archaeological sites are expected to result from the noise and vibration generated by existing noise-generating training activities, including vehicle movement.

4.4.6.2 Alternative 1

4.4.6.2.1 Architectural Resources

Physical Disturbance

Under Alternative 1, USFF beach landings training would be the same as under the No Action Alternative at this location (Table 4.4-4) and, as a result, there would be no significant impacts on cultural resources.

Under Alternative 1, USFF personnel movement and vehicle movement training on beaches/dunes and land would incrementally increase from the No Action Alternative by 76 events (Table 4.4-4). Some of the personnel movement and vehicle movement training activities take place on the 600 feet of beachfront within the Camp Pendleton Historic District, identified as a contributing element (cultural landscape) to the District (Table 4.4-4; Figure 4.4-3). Ground disturbance associated with existing and increased personnel movement would continue to be temporary, leaving no lasting modification to the beach or other landscapes. Therefore, proposed increased personnel movement and vehicle movement

training activities under Alternative 1 are not anticipated to have any adverse effect on the Camp Pendleton Historic District or its contributing elements, including the 600-foot beachfront cultural landscape.

Noise

Alternative 1 would result in an increase in noise associated with vehicle movement and weapons firing (blanks and non-lethal training ammunition) from 76 additional training events, as compared to the No Action Alternative (Table 4.4-4). As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct impacts on the historic districts or architectural resources are expected to result from noise and vibration generated from vehicle movement and weapons firing (blanks and non-lethal training ammunition) under Alternative 1.

With the long history of military activities at Camp Pendleton, noise associated with training activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for listing. Noise associated with vehicle movement training activities is in character with the historical use and setting of the Camp Pendleton Historic District. While the increased weapons firing and vehicle movement training activities may be audibly noticeable, the resulting discernible effect would not be so great as to impair the integrity of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources, including the Camp Pendleton Historic District and its contributing elements, are expected to result from the noise and vibration generated by increase in weapons firing and vehicle movement training activities under Alternative 1.

Therefore, no adverse effect on any cultural resources, direct and indirect, are expected to result from the noise and vibration generated by proposed increase in weapons firing and vehicle movement training activities under Alternative 1.

4.4.6.2.2 Archaeological Resources

Physical Disturbance

No personnel movement or vehicle movement stressors applicable to archaeological resources would occur at Dam Neck Annex and Camp Pendleton. There are no archaeological resources in the APE where these training activities are currently, and would be, conducted. The subsurface disturbance potential of these existing training activities will not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. Therefore, there would be no significant impacts on archaeological resources.

Noise

Alternative 1 would result in an increase in noise associated with vehicle movement and weapons firing (blanks and non-lethal training ammunition) from 76 additional training events, as compared to the No Action Alternative (Table 4.4-4). As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no adverse effect on the archaeological sites are expected to result from the noise and vibration generated by noise-generating training activities, including vehicle movement and weapons firing training activities under Alternative 1.

4.4.6.3 Alternative 2

Alternative 2 training events are the same as those under Alternative 1 at this location; as noted in Table 4.4-4, no additional training would occur. Impacts under Alternative 2 would be the same as under Alternative 1 and are discussed below.

4.4.6.3.1 Architectural Resources

Physical Disturbance

Under Alternative 2, USFF beach landings training would be the same as under the No Action Alternative at this location (Table 4.4-4) and, as a result, there would be no significant impacts on cultural resources.

Under Alternative 2, USFF personnel movement and vehicle movement training on beaches/dunes and land would incrementally increase from the No Action Alternative by 76 events (Table 4.4-4). Some of the personnel movement and vehicle movement training activities take place on the 600 feet of beachfront within the Camp Pendleton Historic District, identified as a contributing element (cultural landscape) to the District (Table 4.4-4; Figure 4.4-3). Ground disturbance associated with existing and increased personnel movement would continue to be temporary, leaving no lasting modification to the beach or other landscapes. Therefore, proposed increased personnel movement and vehicle movement training activities under Alternative 2 as compared to the No Action Alternative are not anticipated to have any adverse effect on the Camp Pendleton Historic District or its contributing elements, including the 600-foot beachfront cultural landscape.

Noise

Alternative 2 would result in an increase in noise associated with vehicle movement and weapons firing (blanks and non-lethal training ammunition) from 76 additional training events, as compared to the No Action Alternative (Table 4.4-4). As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), under Alternative 2 no direct impacts on the historic districts or architectural resources are expected to result from the noise and vibration generated by noise-generating training activities, including vehicle movement and weapons firing (blanks and non-lethal training ammunition).

With the long history of military activities at Camp Pendleton, noise associated with training activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for listing. Noise associated with existing and proposed vehicle movement training activities is in character with the historical use and setting of the Camp Pendleton Historic District. While the increased weapons firing and vehicle movement training activities may be audibly noticeable, the resulting discernible effect would not be so great as to impair the integrity of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources, including the Camp Pendleton Historic District and its contributing elements, are expected to result from the noise and vibration generated by weapons firing and vehicle movement training activities under Alternative 2.

Therefore, no adverse effect on any cultural resources, direct and indirect, are expected to result from the noise and vibration generated by proposed increase in weapons firing and vehicle movement training activities under Alternative 2.

4.4.6.3.2 Archaeological Resources

Physical Disturbance

No beach landing, personnel movement, or vehicle movement stressors applicable to archaeological resources occur at Dam Neck Annex and Camp Pendleton. There are no archaeological resources in the APE where these training activities are currently, and will be, conducted. The subsurface disturbance potential of proposed increased levels of these existing training activities will not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. Therefore, existing and proposed beach increased landing, personnel movement, or vehicle movement training activities will not have any adverse effects on the archaeological resources at Dam Neck Annex and Camp Pendleton.

Noise

Alternative 2 would result in an increase in noise associated with vehicle movement and weapons firing (blanks and non-lethal training ammunition) from 76 additional training events, as compared to the No Action Alternative (Table 4.4-4). As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no adverse effect on the archaeological sites are expected to result from the noise and vibration generated by noise-generating training activities, including vehicle movement and weapons firing training activities, under Alternative 2.

4.4.6.4 Summary

Training activities that have a potential ground disturbance component are conducted on the installation beaches, some of which are within the boundary of the Camp Pendleton Historic District, including the 600 feet of beachfront identified as a contributing element (cultural landscape) to the District (Table 4.4-4; Figure 4.4-3). Ground disturbance associated with training activities on the beaches under the No Action Alternative and Alternatives 1 and 2 would continue to be temporary, leaving no lasting modification to the beach or other significant landscapes. The subsurface disturbance potential of these existing training activities would not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training (Figure 4.4-3).

Noise associated with beach landing, vehicle movement and weapons firing training activities under Alternatives 1 and 2 and the No Action Alternative is in character with the historical use and setting of Dam Neck Annex and Camp Pendleton, including the Camp Pendleton Historic District. While the noise from increased training activities under Alternatives 1 and 2 may be audibly noticeable, the resulting discernible effect would not be so great as to impair the integrity of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no adverse effect, direct or indirect, on any historic properties, including the Camp Pendleton Historic District and its contributing elements (e.g., the Rifle Range and Beach contributing landscapes), are expected to result from the noise and vibration generated by existing (No Action Alternative) and proposed (Alternatives 1 and 2) training activities.

Alternatives 1 and 2 would increase the tempo of existing training activities and add training activities described in Table 4.4-4 to those already conducted under the No Action Alternative. As under the No Action Alternative, no significant impacts to cultural resources would occur with implementation of Alternative 1 or Alternative 2. Therefore, there would be no significant impact on cultural resources with implementation of any of the alternatives, including the No Action Alternative. In accordance with NHPA Section 106, the Navy has determined that there would be no adverse effects to historic properties by USFF training at Dam Neck Annex and Camp Pendleton with implementation of any of the alternatives.

In a memorandum to the Navy dated July 7, 2017, the Virginia Department of Historic Resources concurred with the Navy's determination that there would be no adverse effects to historic properties (Appendix A, Agency Correspondence).

4.4.7 Naval Auxiliary Landing Field Fentress

The PTEAs applicable to cultural resources at NALF Fentress that contribute to the physical disturbance stressor include personnel movement and vehicle movement and that contribute to the noise stressor include vehicle movement, equipment use, weapons firing – non-lethal training ammunition, and weapons firing – blank-fire (Table 4.4-6). The APE for direct impacts (effects) at NALF Fentress is defined as the training location areas identified in Table 4.4-6, where existing and planned training activities will be conducted that have the potential to affect historic properties; the APE for indirect impacts (effects) is the NALF Fentress installation boundary.

There are 23 NRHP-eligible or potentially eligible archaeological sites within the NALF Fentress installation. None of these sites are in the APE of training activities conducted at the installation that have a potential ground disturbance component, and all training activities will be conducted on paved runways, taxiways, or previously modified airfield environment surfaces (Table 4.4-6; Figure 2-8).

4.4.7.1 No Action Alternative

4.4.7.1.1 Architectural Resources

Physical Disturbance

Under the No Action Alternative, 1,800 personnel, 4,500 hours of vehicle movement, 4,500 rounds of weapons firing –blanks, and 9,000 rounds of weapons firing – non-lethal training ammunition during 90 training events (Table 4.4-4) will continue to be conducted on the non-beaches/dunes portion of the installation.

No personnel movement or vehicle movement physical disturbance stressors applicable to cultural resources occur at NALF Fentress. There are no NRHP-listed or -eligible architectural resources within the APE of these existing personnel movement training activities conducted at the installation and, as a result, there are no significant impacts on cultural resources.

Noise

No vehicle movement or weapons firing (blanks and Non-Lethal Training Ammunition) training noise stressors applicable to architectural resources occur at NALF Fentress. There are no NRHP-listed or -eligible architectural resources within the APE of these existing vehicle movement and weapons firing training activities conducted at the installation under the No Action Alternative and, as a result, there are no significant impacts on architectural resources.

4.4.7.1.2 Archaeological Resources

Physical Disturbance

No personnel movement stressors applicable to cultural resources occur at NALF Fentress. There are no NRHP-listed or -eligible archaeological resources within the APE of personnel movement training activities conducted at the installation under the No Action Alternative. As a result, there are no significant impacts on cultural resources.

Table 4.4-6. NALF Fentress Cultural Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*
Land – Non- Beaches/ Dunes	Equipment Use	diesel generators							4		6,300 hours
	Personnel Movement	NA	90	1,800 people					4	1,493 people	
	Vehicle Movement	tactical and non-tactical vehicles	90	4,500 hours	4,500 hours				4	1,072 hours	1,072 hours
	Weapons Firing – Blanks	small arms	90		4,500 rounds				4		12,800 rounds
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	90		9,000 rounds						

Key: NEW = net explosive weight; No. = number; NA = not applicable.

Noise

As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct impacts on any NRHP-listed or -eligible archaeological resources are expected to result from the noise and vibration generated by existing noise-generating training activities, including vehicle movement and weapons firing, under the No Action Alternative.

With the extensive history of military activities at NALF Fentress, noise associated with training activities has long been an element of the setting of the NRHP-listed or -eligible archaeological resources, including when they were evaluated and determined eligible for listing. Therefore, no indirect impacts on NRHP-listed or -eligible archaeological resources are expected to result from the noise generated by existing vehicle movement and weapons firing training activities.

Therefore, no adverse effect on any cultural resources, direct and indirect, are expected to result from the noise and vibration generated by existing vehicle movement and weapons firing training activities under the No Action Alternative.

4.4.7.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.4.7.3 Alternative 2

Under Alternative 2, the weapons firing – non-lethal training ammunition training events are the same as those under Alternative 1 and the No Action Alternative. However, equipment use, personnel movement, vehicle movement, and weapons firing – blank-fire training on land would incrementally increase from Alternative 1 and the No Action Alternative by four events (Table 4.4-4).

4.4.7.3.1 Architectural Resources

Physical Disturbance

Under Alternative 2, USFF personnel movement and vehicle movement training would incrementally increase from the No Action Alternative by four events. No personnel movement or vehicle movement stressors applicable to cultural resources would occur at NALF Fentress. There are no NRHP-listed or -eligible architectural resources within the APE of the existing and proposed increased personnel movement and vehicle movement training activities at the installation and, as a result, there would be no significant impacts on cultural resources as a result of implementation of Alternative 2.

Noise

Under Alternative 2, use of diesel generators equipment would be introduced four times per year (Table 4.4-6), and there would be incremental increases to vehicle movement and weapons firing (blanks and non-lethal training ammunition) training.

No equipment use, vehicle movement, or weapons firing noise stressors applicable to architectural resources would occur at NALF Fentress. There are no NRHP-listed or -eligible architectural resources within the APE of these training activities conducted at the installation under Alternative 2. As a result, there would be no significant impacts on architectural resources.

4.4.7.3.2 Archaeological Resources

Physical Disturbance

Under Alternative 2, USFF personnel movement training would incrementally increase from the Alternative 1 and No Action Alternative by four events. No personnel movement stressors applicable to cultural resources would occur at NALF Fentress. There are no NRHP-listed or -eligible archaeological resources within the APE of the existing and proposed increased personnel movement training activities at the installation under Alternative 2. As a result, there would be no significant impacts on cultural resources.

Noise

As described in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct impacts on any NRHP-listed or -eligible archaeological resources at NALF Fentress are expected to result from the noise and vibration generated by proposed diesel generator use and the incremental increases to vehicle movement and weapons firing (blanks and non-lethal training ammunition) training activities of Alternative 2.

With the extensive history of military activities at NALF Fentress, noise associated with training activities has long been an element of the setting of the NRHP-listed or -eligible archaeological resources, including when they were evaluated and determined eligible for listing. Therefore, no indirect impacts on NRHP-listed or -eligible archaeological resources are expected to result from the noise generated by proposed diesel generator use and the incremental increases to vehicle movement and weapons firing training activates of Alternative 2.

Therefore, no adverse effect on any cultural resources, direct and indirect, are expected to result from the noise and vibration generated by noise-generating training activities of Alternative 2.

4.4.7.4 Summary

Under the No Action Alternative and Alternative 1, training activities would be the same as existing conditions. Under Alternative 2, the weapons firing (non-lethal training ammunition) training events are the same as those under Alternative 1 and the No Action Alternative. However, equipment use, personnel movement, vehicle movement, and weapons firing – blanks training on land would incrementally increase from Alternative 1 and the No Action Alternative by four events (Table 4.4-4).

There are no NRHP-listed or -eligible architectural or archaeological resources within the APE of training activities at NALF Fentress that have a potential ground disturbance component under Alternative 1 and 2 and the No Action Alternative. As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no adverse effect on significant cultural resources are expected to result from the noise and vibration generated by training vehicle movement and weapons firing training activities under Alternative 1 and 2 and the No Action Alternative. Therefore, there would be no significant impact on cultural resources with implementation of any of the alternatives, including No Action Alternative. In accordance with NHPA Section 106, the Navy has determined that there would be no adverse effects on historic properties at NALF Fentress with implementation of any of the alternatives. In a memorandum to the Navy dated July 7, 2017, the Virginia Department of Historic Resources concurred with the Navy's determination that there would be no adverse effects on historic properties (Appendix A, Agency Correspondence).

4.4.8 Northwest Annex

The PTEAs applicable to cultural resources at Northwest Annex that contribute to the physical disturbance stressor include personnel movement and vehicle movement and that contribute to the noise stressor include vehicle movement (Table 4.4-8). The APE for direct impacts (effects) at Northwest Annex is defined as the training location areas identified in Table 4.4-8, where existing and planned training activities will be conducted that have the potential to affect historic properties; the APE for indirect impacts (effects) is the Northwest Annex installation boundary.

There are 17 NRHP-eligible or potentially eligible archaeological sites within Northwest Annex, including 2 sites with human remains recommended for avoidance. As demonstrated in Table 4.4-7, none of the NRHP-eligible cultural resources at Northwest Annex are within the APE of any of the training sites (see Figure 2-10).

Table 4.4-7. National Register of Historic Places-Eligible Cultural Resources at Northwest Annex

Resource Number	*Resource Type*	*Description*	*Training Location APE*	*National Register Status*
44CS0196	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st half	None	Potentially Eligible
44CS0198	Historic Archaeological Site	19th Century: 2nd half, 20th Century: 1st quarter	None	Potentially Eligible
44CS0199	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st half	None	Potentially Eligible
44CS0201	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st half,	None	Potentially Eligible
44CS0203	Multicomponent	19th Century: 4th quarter, 20th Century: 1st half,	None	Potentially Eligible
44CS0205	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st half	None	Potentially Eligible
44CS0208	Historic Archaeological Site	No data	None	Potentially Eligible
44CS0214	Historic Archaeological Site	18th Century: 4th quarter, 19th Century: 2nd half	None	Potentially Eligible
44CS0217	Historic Archaeological Site	18th Century: 2nd half, 19th Century: 1st quarter,	None	Potentially Eligible
44CS0221	Historic Archaeological Site	18th Century: 2nd half, 19th Century, 20th Century	None	Potentially Eligible
44CS0222	Historic Archaeological Site	18th Century, 19th Century, 20th Century	None	Potentially Eligible
44CS0225	Historic Archaeological Site	No data	None	Potentially Eligible, Avoidance
44CS0226	Historic Archaeological Site	20th Century: 1st quarter	None	Potentially Eligible, Avoidance
44CS0227	Historic Archaeological Site	Historic/Unknown	None	Potentially Eligible
44CS0232	Historic Archaeological Site	19th Century: 4th quarter, 20th Century: 1st quart	None	Potentially Eligible
44CS0241	Prehistoric/Ethnographic Archaeological Site	Woodland	None	Potentially Eligible
44CS0242	Historic Archaeological Site	18th Century, 19th Century: 1st quarter	None	Eligible

Table 4.4-8. Northwest Annex Cultural Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*
Land – Non- Beaches/ Dunes	Personnel Movement	NA	170	1,190 people							
	Vehicle Movement	tactical and non-tactical vehicles	170	510 hours	510 hours						

Key: NEW = net explosive weight; No. = number; NA = not applicable.

4.4.8.1 No Action Alternative

Physical Disturbance

There are no NRHP-listed or -eligible architectural or archaeological resources within the APE of any of the training locations at Northwest Annex. Furthermore, none of the personnel movement and vehicle movement training will be conducted within areas that require Phase 1 survey. Therefore, no impacts to cultural resources occur associated from existing personnel movement and vehicle movement training activities with implementation of the No Action Alternative.

Noise

There are no NRHP-listed or -eligible architectural or archaeological resources within the APE of any of the training locations at Northwest Annex. No adverse effects on NRHP-listed or -eligible architectural or archaeological resources are expected to result from the noise and vibration generated by existing and proposed vehicle movement training activities. Therefore, no significant impacts to cultural resources occur from noise associated with existing vehicle movement with implementation of the No Action Alternative.

4.4.8.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.4.8.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and Alternative 1 and, therefore, no significant impacts would occur.

4.4.8.4 Summary

Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative. There are no NRHP-listed or -eligible architectural or archaeological resources within the APE of any of the training locations at Northwest Annex for Alternatives 1 and 2 and the No Action Alternative, and none of the training will be conducted within areas that require Phase 1 survey. Furthermore, no adverse effects on significant cultural resources are expected to result from the noise and vibration generated by existing and proposed vehicle movement training activities.

Therefore, there would be no significant impact on cultural resources with implementation of any of the alternatives, including No Action. In accordance with NHPA Section 106, the Navy has determined that there would be no effect on historic properties at Northwest Annex with implementation of any of the alternatives. In a memorandum to the Navy dated July 7, 2017, the Virginia Department of Historic Resources concurred with the Navy's determination (Appendix A, Agency Correspondence).

4.4.9 St. Juliens Creek Annex

The PTEAs applicable to cultural resources at St. Juliens Creek Annex that contribute to the physical disturbance stressor include personnel movement and vehicle movement and that contribute to the noise stressor include vehicle movement, equipment use, and weapons firing – blank-fire (Table 4.4-9). The APE for direct impacts (effects) at St. Juliens Creek Annex is defined as the training location areas identified in Table 4.4-9, where existing and planned training activities will be conducted that have the potential to affect historic properties; the APE for indirect impacts (effects) is the St. Juliens Creek Annex installation boundary (Figure 4.4-4).

Table 4.4-9. St. Juliens Creek Annex Cultural Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*
Land – Non- Beaches/ Dunes	Equipment Use	diesel generator	17		21,948 hours						
	Personnel Movement	NA	17	4,843 people					28	392 people	
	Vehicle Movement	tactical and non-tactical vehicles	16	4,527 hours	4,527 hours				28	1,890 hours	1,890 hours
	Weapons Firing – Blank-Fire	small arms	11		35,200 rounds						

Key: NEW = net explosive weight; No. = number; NA = not applicable.

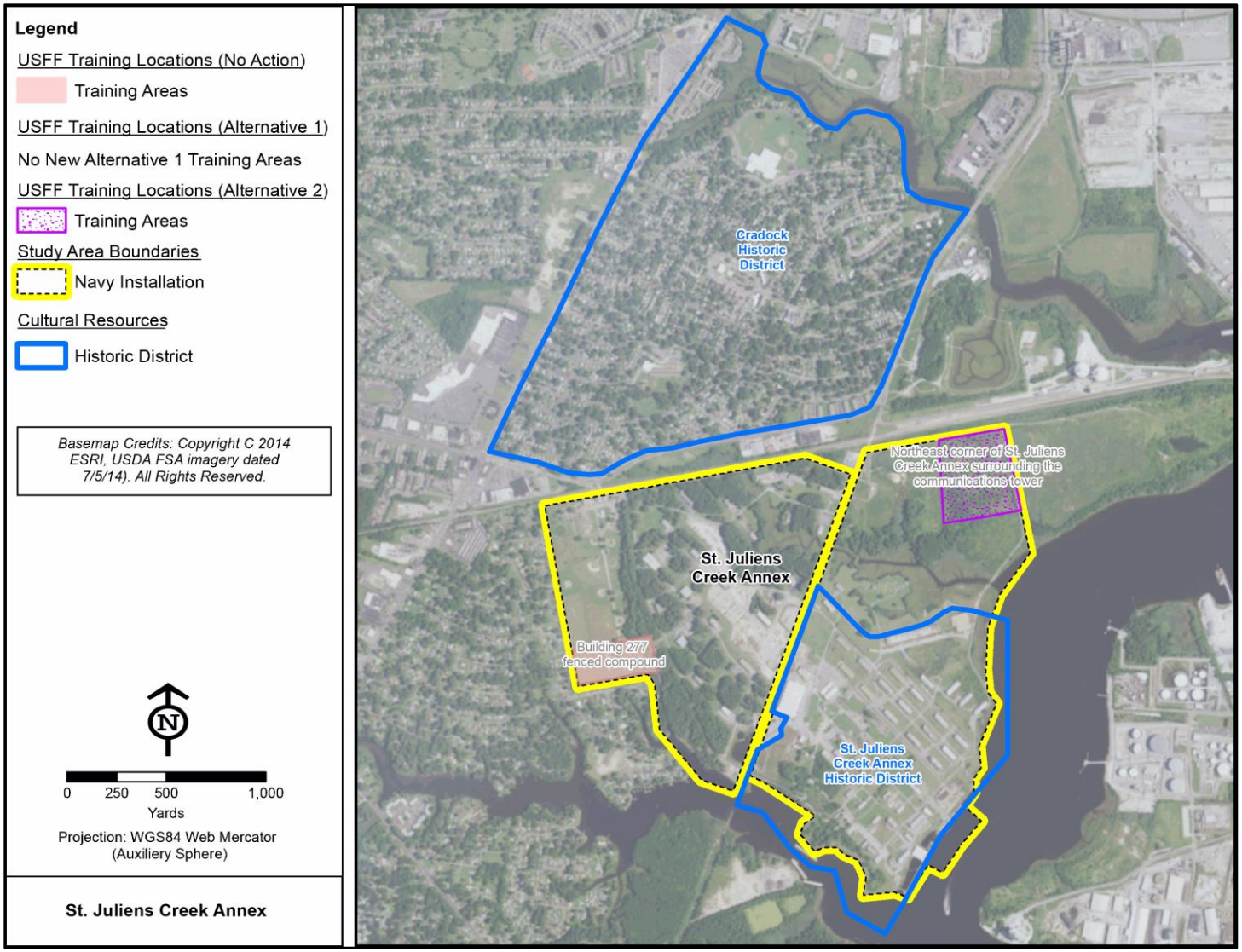

Figure 4.4-4. St. Juliens Creek Annex – Training Location Areas and National Register of Historic Places-Eligible Cultural Resources

There is one NRHP-eligible historic district and three potentially eligible archaeological sites at St. Juliens Creek Annex. Table 4.4-10 lists the NRHP-eligible cultural resources at St. Juliens Creek Annex and the training site APE in which they occur, none of the archaeological sites are within the training areas (see Figure 4.4-4).

The Cradock Historic District in the city of Portsmouth is located approximately 300 meters northwest of the St. Juliens Creek Annex training area. The NRHP-eligible Cradock Historic District is outside the APE of the USFF training activities considered in this EA and, therefore, would not be impacted by any of the alternatives.

Table 4.4-10. National Register of Historic Places-Eligible Cultural Resources at St. Juliens Creek Annex

Resource Number	*Resource Type*	*Description*	*Training Location APE*	*National Register Status*
	St. Juliens Creek Annex Historic District	43 contributing buildings and structures	St. Juliens Creek Annex	Potentially Eligible
44PM0048	Historic Archaeological Site	18th Century: 4th quarter, 19th Century: 1st quarter	None	Potentially Eligible
44PM0049	Historic Archaeological Site	18th Century: 4th quarter, 19th Century: 1st quarter	None	Potentially Eligible
44PM0050	Multicomponent Archaeological Site	Woodland	None	Potentially Eligible

4.4.9.1 No Action Alternative

4.4.9.1.1 Architectural Resources

Physical Disturbance

Under the No Action Alternative, 17 events of personnel movement training activities for a total 4,843 people are conducted at St. Juliens Creek Annex. Personnel movement consists of pedestrian activities only. No personnel movement or vehicle movement stressors applicable to cultural resources occur at St. Juliens Creek Annex. There are no NRHP-listed or -eligible architectural resources within the APE of the existing personnel movement and vehicle movement training activities conducted at St. Juliens Creek Annex under the No Action Alternative and, as a result, there are no significant impacts on cultural resources.

Noise

As described in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct impacts on any NRHP-listed or -eligible architectural and archaeological resources at St. Juliens Creek Annex, including the St. Juliens Creek Annex Historic District, are expected to result from the noise and vibration generated by continued diesel generator use, vehicle movement, and weapons firing of blanks training.

With the extensive history of military activities at St. Juliens Creek Annex, noise associated with military activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for NRHP listing. Noise associated with the existing noise-generating training activities is in character with the historical use and setting of the St. Juliens Creek Annex Historic District. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources are expected to result from the noise generated by continued diesel generator use, vehicle movement, and weapons firing training.

Therefore, no adverse effect on any cultural resources, direct and indirect, are expected to result from the noise and vibration generated by continued diesel generator use, vehicle movement, and weapons firing training under the No Action Alternative.

4.4.9.1.2 Archaeological Resources

Noise

As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct or indirect adverse effect on the archaeological sites are expected to result from the noise and vibration generated by existing noise-generating training activities, including vehicle movement and weapons firing, under the No Action Alternative.

4.4.9.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, as discussed in Section 4.4.9.1 (No Action Alternative), no significant impacts would occur.

4.4.9.3 Alternative 2

Under Alternative 2, USFF training equipment use and weapons firing – blank-fire activities would be the same as under Alternative 1 and the No Action Alternative at this location and, therefore, no significant impacts would occur. However, personnel movement and vehicle movement would incrementally increase from Alternative 1 and the No Action Alternative by 28 events (Table 4.4-9). Impacts associated with personnel movement and vehicle movement are discussed further below.

4.4.9.3.1 Architectural Resources

Physical Disturbance

Under Alternative 2, personnel movement and vehicle movement of tactical and non-tactical vehicles training activities at St. Juliens Creek Annex would increase incrementally.

No personnel movement or vehicle movement stressors applicable to cultural resources would occur at St. Juliens Creek Annex under Alternative 2. There are no NRHP-listed or -eligible architectural resources within the APE of the existing and proposed increased personnel movement and vehicle movement training activities at St. Juliens Creek Annex and, as a result, there would be no significant impacts on cultural resources with implementation of Alternative 2.

Noise

As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct impacts on the historic districts or architectural resources are expected to result

from the noise and vibration generated by existing and the proposed increased noise-generating training activities, including vehicle movement under Alternative 2.

With the long history of military activities at St. Juliens Creek Annex, noise associated with military activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for listing. Noise associated with existing and proposed vehicle movement training activities is in character with the historical use and setting of the St. Juliens Creek Annex Historic District. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources, including the St. Juliens Creek Annex Historic District and its contributing elements, are expected to result from the noise and vibration generated by existing and proposed vehicle movement training activities.

Therefore, no adverse effect on the historic districts or architectural resources, direct and indirect, are expected to result from the noise and vibration generated by the proposed increased vehicle movement training activities under Alternative 2.

4.4.9.3.2 Archaeological Resources

Noise

As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct or indirect adverse effect on the archaeological sites are expected to result from the noise and vibration generated by the proposed increased noise-generating training activities, including vehicle movement, under Alternative 2.

4.4.9.4 Summary

PTEAs at St. Juliens Creek Annex would be the same under the No Action Alternative and Alternative 1 and would include equipment use, personnel movement, vehicle movement, and weapons firing (blank-fire) on land. Under Alternative 2, USFF training equipment use and weapons firing – blank-fire activities would be the same as under Alternative 1 and the No Action Alternative, while personnel movement and vehicle movement would incrementally increase by 29 as compared to Alternative 1 and the No Action Alternative (Table 4.4-9).

There are no NRHP-listed or -eligible architectural or archaeological resources within the APE of existing and proposed training activities conducted at St. Juliens Creek Annex that have a potential ground disturbance component. As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct or indirect adverse effect on significant cultural resources are expected to result from the noise and vibration generated by existing and proposed training vehicle movement and weapons firing training activities under Alternative 1 and 2 and the No Action Alternative.

Under Alternative 1, USFF training activities would be the same as under the No Action Alternative. Therefore, there would be no impact on cultural resources with implementation of Alternative 1. Under Alternative 2, there would be increases in USFF vehicle movement and personnel movement detonation training activities. However, with no NRHP-listed or -eligible architectural or archaeological resources within the APE, there would be no impact on cultural resources with implementation of Alternative 2. Therefore, there would be no impact on cultural resources with implementation of any of the alternatives, including No Action.

In accordance with NHPA Section 106, the Navy has determined that there would be no adverse effects on historic properties by USFF training at St. Juliens Creek Annex with implementation of any of the alternatives. In a memorandum to the Navy dated July 7, 2017, the Virginia Department of Historic Resources concurred with the Navy's determination that there would be no adverse effects on historic properties (Appendix A, Agency Correspondence).

4.4.10 Naval Weapons Station Yorktown

The PTEAs applicable to cultural resources at NWS Yorktown that contribute to the physical disturbance stressor include explosives on land, personnel movement, and vehicle movement and that contribute to the noise stressor include vehicle movement, equipment use, explosives on land, weapons firing – non-lethal training ammunition, and weapons firing – blank-fire (Table 4.4-11). The APE for direct impacts (effects) at NWS Yorktown is defined as the training location areas identified in Table 4.4-11, where existing and planned training activities will be conducted that have the potential to affect historic properties; the APE for indirect impacts (effects) is the NWS Yorktown installation boundary (Figure 4.4-5).

There are four NRHP-listed or -eligible Historic Districts and 142 eligible (14) or potentially eligible (128) archaeological sites within NWS Yorktown. Table 4.4-12 lists the NRHP-eligible cultural resources at NWS Yorktown and the training site APE in which they occur. Of the four historic districts, the Colonial National Parkway is adjacent to the Home Station Training Lanes training site (Figure 4.4-5). A portion of the Yorktown EOD Demolition Range training site has not been surveyed for archaeological resources.

4.4.10.1 No Action Alternative

4.4.10.1.1 Architectural Resources

Physical Disturbance

Under the No Action Alternative, personnel movement, consisting of 104 events and 1,560 total people (Table 2-9 and Table 4.4-11) is conducted at the Yorktown EOD Demolition Range. Personnel movement consists of pedestrian activities only. No personnel movement stressors applicable to architectural resources occur at NWS Yorktown. There are no NRHP-listed or -eligible architectural resources within the Yorktown EOD Demolition Range where existing personnel movement training activities are conducted. Therefore, personnel movement training activities will not have any adverse effect on any of the NRHP-listed or -eligible architectural resources at NWS Yorktown.

Under the No Action Alternative, 228 events of vehicle movement training activities with tactical and non-tactical vehicles for a total 27,192 hours are conducted within three TAs at NWS Yorktown—the TA A (Driving Course), Home Station Training Lanes, and Yorktown EOD Demolition Range. NRHP-eligible cultural resources within the APE of existing vehicle movement training activities conducted at NWS Yorktown include only a portion of the Skiffes Creek Annex Potential Historic District in TA A (Driving Course). However, by implementing the procedures of the Navy's regional Integrated Cultural Resources Management Plan, these training activities have not had, and are not anticipated to have, any impact on any of the contributing resources of the Historic District (Figure 4.4-5).

EOD training drills, as described in Table 2-9 and Table 4.4-11 are conducted at Yorktown EOD Demolition Range within a bermed detonation area, similar to the depiction in Figure 4.4-2, which is located at safe distances from occupied buildings. There are no NRHP-listed or -eligible architectural resources within the explosive arc of the Yorktown EOD Demolition Range where existing explosives training activities are conducted. Therefore, explosives training activities are not anticipated to have any direct impacts on any of the NRHP-listed or -eligible architectural resources at NWS Yorktown.

Table 4.4-11. Naval Weapons Station Yorktown Cultural Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*
Land – Non- Beaches/ Dunes	Equipment Use	diesel generators	8		2,016 hours						
	Explosives on Land	demolition materials and charge	104	104 events (average 13 detonations/event with maximum NEW of 25 pounds)	104 events (average 13 detonations/event with maximum NEW of 25 pounds)						
	Personnel Movement	NA	104	1,560 people							
	Vehicle Movement	tactical and non-tactical vehicles	228	27,192 hours	27,192 hours						
	Weapons Firing – Blanks	small arms	162		29,452 rounds						
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	50		5,000 rounds						

Key: NEW = net explosive weight; No. = number; NA = not applicable.

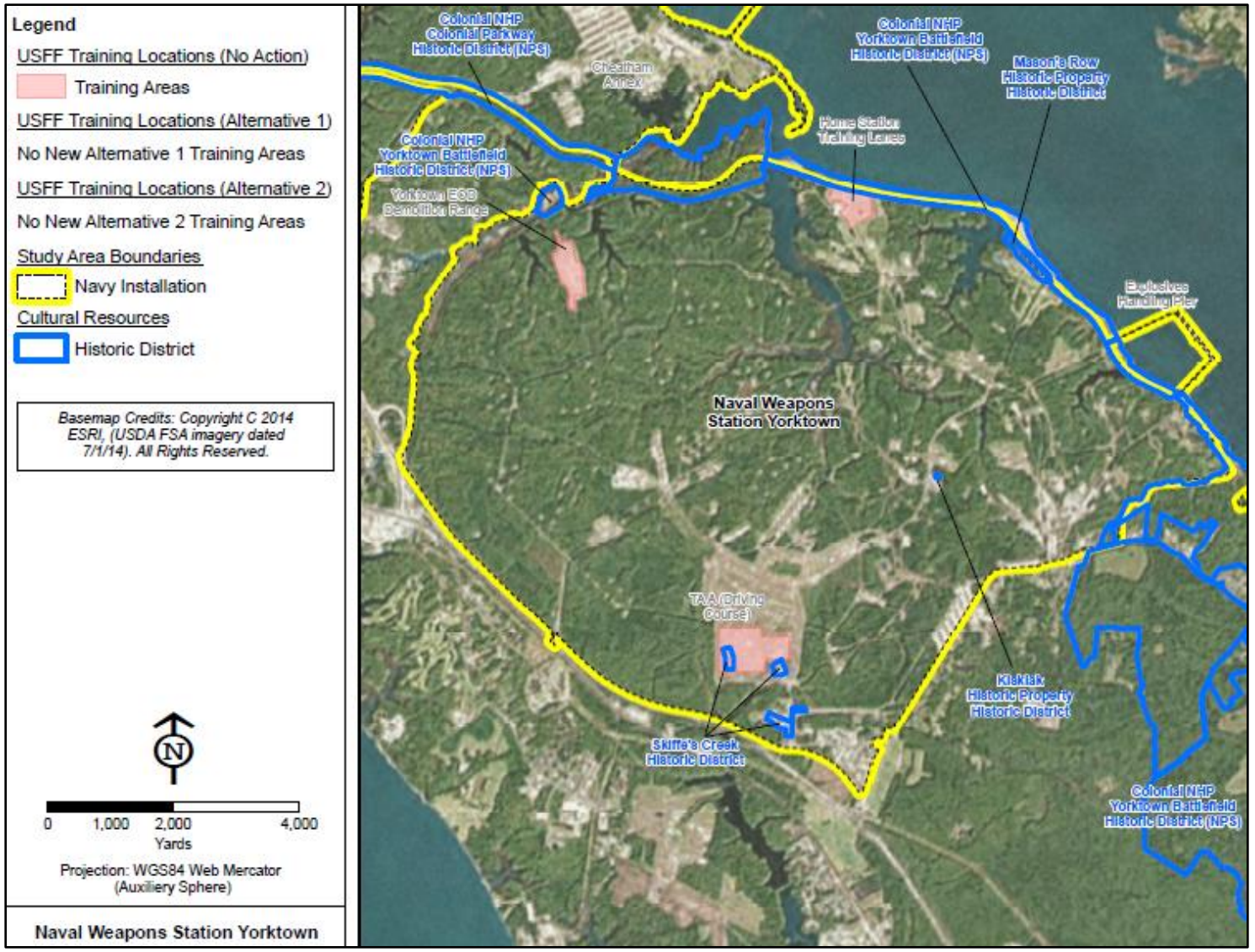

Figure 4.4-5. NWS Yorktown – Training Location Areas and National Register of Historic Places-Eligible Cultural Resources

Table 4.4-12. National Register of Historic Places-Eligible Cultural Resources at NWS Yorktown

Resource Number	*Resource Type*	*Description*	*Training Location APE*	*National Register Status*
	Kiskiack Property Historic District	Lee House and 265 surrounding acres	None	Listed
	Mason's Row Historic District	9 contributing buildings	None	Eligible
	Skiffes Creek Annex Potential Historic District	No Data	Landing Zone Pinto	Potentially Eligible
	Colonial Parkway (Colonial National Historic Park)	Three-lane roadway and crafted landscape	None	National Historic Park
44JC0397	Historic Archaeological Site		None	Potentially Eligible
44JC0879	Historic Archaeological Site		None	Potentially Eligible
44JC0880	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44JC1070	Historic Archaeological Site		None	Potentially Eligible
44JC1073	Multicomponent Archaeological Site		None	Potentially Eligible
44JC1074	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44NN0066	Historic Archaeological Site		None	Potentially Eligible
44NN0067	Historic Archaeological Site		None	Potentially Eligible
44NN0322	Multicomponent Archaeological Site	Confidential	None	Potentially Eligible
44YO0002	Multicomponent Archaeological Site		None	Eligible
44YO0031	Historic Archaeological Site		None	Potentially Eligible
44YO0032	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0033	Historic Archaeological Site		None	Potentially Eligible
44YO0034	Historic Archaeological Site		None	Eligible
44YO0036	Historic Archaeological Site		None	Potentially Eligible
44YO0064	Historic Archaeological Site	18th Century	None	Potentially Eligible
44YO0318	Historic Archaeological Site		None	Potentially Eligible
44YO0319	Historic Archaeological Site		None	Potentially Eligible
44YO0321	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0322	Historic Archaeological Site		None	Potentially Eligible

Table 4.4-12. National Register of Historic Places-Eligible Cultural Resources at NWS Yorktown [Continued]

Resource Number	*Resource Type*	*Description*	*Training Location APE*	*National Register Status*
44YO0323	Historic Archaeological Site		None	Potentially Eligible
44YO0324	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0325	Historic Archaeological Site	18th Century	None	Potentially Eligible
44YO0332	Historic Archaeological Site	18th Century	None	Potentially Eligible
44YO0333	Historic Archaeological Site	18th Century	None	Potentially Eligible
44YO0334	Historic Archaeological Site	18th Century	None	Potentially Eligible
44YO0335	Undetermined		None	Potentially Eligible
44YO0370	Historic Archaeological Site	18th Century	None	Potentially Eligible
44YO0372	Historic Archaeological Site	18th Century	None	Potentially Eligible
44YO0385	Historic Archaeological Site	18th Century, 19th Century	None	Potentially Eligible
44YO0407	Historic Archaeological Site		None	Potentially Eligible
44YO0414	Historic Archaeological Site	19th Century: 3rd quarter	None	Eligible
44YO0418	Historic Archaeological Site		None	Potentially Eligible
44YO0419	Historic Archaeological Site		None	Potentially Eligible
44YO0422	Historic Archaeological Site		None	Potentially Eligible
44YO0504	Historic Archaeological Site		None	Potentially Eligible
44YO0549	Historic Archaeological Site		None	Potentially Eligible
44YO0550	Historic Archaeological Site		None	Potentially Eligible
44YO0551	Historic Archaeological Site		None	Potentially Eligible
44YO0552	Historic Archaeological Site		None	Potentially Eligible
44YO0554	Historic Archaeological Site		None	Potentially Eligible
44YO0555	Historic Archaeological Site		None	Potentially Eligible

Table 4.4-12. National Register of Historic Places-Eligible Cultural Resources at NWS Yorktown [Continued]

Resource Number	*Resource Type*	*Description*	*Training Location APE*	*National Register Status*
44YO0558	Multicomponent Archaeological Site	18th Century: 2nd half, 19th Century, Woodland	None	Potentially Eligible
44YO0626	Multicomponent Archaeological Site	Prehistoric/Unknown	None	Potentially Eligible
44YO0628	Historic Archaeological Site	18th Century: 4th quarter, 19th Century: 1st quarter	None	Potentially Eligible
44YO0629	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0634	Historic Archaeological Site	18th Century: 2nd quarter, 19th Century: 1st quarter	None	Potentially Eligible
44YO0635	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0637	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0640	Prehistoric/Ethnographic Archaeological Site	Prehistoric/Unknown	None	Potentially Eligible
44YO0641	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0642	Multicomponent Archaeological Site	18th Century, 19th Century: 1st quarter, Woodland	None	Potentially Eligible
44YO0643	Multicomponent Archaeological Site		None	Eligible
44YO0644	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0645	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0648	Multicomponent Archaeological Site	18th Century: 4th quarter, Woodland	None	Potentially Eligible
44YO0650	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0653	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0654	Historic Archaeological Site		None	Potentially Eligible
44YO0655	Historic Archaeological Site		None	Potentially Eligible
44YO0657	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0658	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0661	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible

Table 4.4-12. National Register of Historic Places-Eligible Cultural Resources at NWS Yorktown [Continued]

Resource Number	*Resource Type*	*Description*	*Training Location APE*	*National Register Status*
44YO0666	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0670	Historic Archaeological Site		None	Potentially Eligible
44YO0676	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0679	Historic Archaeological Site		None	Potentially Eligible
44YO0680	Historic Archaeological Site		None	Potentially Eligible
44YO0682	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0683	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0685	Historic Archaeological Site	19th Century: 2nd/3rd quarter	None	Potentially Eligible
44YO0687	Prehistoric/Ethnographic Archaeological Site		None	Eligible
44YO0691	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0692	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0693	Multicomponent Archaeological Site		None	Eligible
44YO0694	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0695	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0696	Multicomponent Archaeological Site	Prehistoric/Unknown	None	Potentially Eligible
44YO0698	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0700	Historic Archaeological Site		None	Potentially Eligible
44YO0701	Historic Archaeological Site		None	Potentially Eligible
44YO0703	Historic Archaeological Site		None	Potentially Eligible
44YO0798	Prehistoric/Ethnographic Archaeological Site		None	Eligible
44YO0799	Multicomponent Archaeological Site		None	Eligible
44YO0800	Prehistoric/Ethnographic Archaeological Site		None	Eligible

Table 4.4-12. National Register of Historic Places-Eligible Cultural Resources at NWS Yorktown [Continued]

Resource Number	*Resource Type*	*Description*	*Training Location APE*	*National Register Status*
44YO0801	Multicomponent Archaeological Site		None	Eligible
44YO0802	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0805	Historic Archaeological Site		None	Potentially Eligible
44YO0807	Multicomponent Archaeological Site		None	Eligible
44YO0812	Historic Archaeological Site		None	Potentially Eligible
44YO0814	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0818	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0822	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0824	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0827	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0829	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0831	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0832	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0835	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0837	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0844	Historic Archaeological Site		None	Potentially Eligible
44YO0845	Historic Archaeological Site		None	Eligible
44YO0847	Historic Archaeological Site		None	Potentially Eligible
44YO0850	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0854	Historic Archaeological Site		None	Potentially Eligible
44YO0857	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0861	Historic Archaeological Site		None	Potentially Eligible
44YO0863	Multicomponent Archaeological Site		None	Potentially Eligible

Table 4.4-12. National Register of Historic Places-Eligible Cultural Resources at NWS Yorktown [Continued]

Resource Number	*Resource Type*	*Description*	*Training Location APE*	*National Register Status*
44YO0864	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0865	Historic Archaeological Site		None	Potentially Eligible
44YO0869	Historic Archaeological Site		None	Potentially Eligible
44YO0870	Historic Archaeological Site		None	Potentially Eligible
44YO0878	Historic Archaeological Site		None	Potentially Eligible
44YO0882	Historic Archaeological Site		None	Eligible
44YO0883	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0884	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0885	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0890	Historic Archaeological Site		None	Potentially Eligible
44YO0895	Historic Archaeological Site		None	Potentially Eligible
44YO0896	Historic Archaeological Site		None	Eligible
44YO0899	Historic Archaeological Site		None	Potentially Eligible
44YO0905	Historic Archaeological Site		None	Potentially Eligible
44YO0911	Historic Archaeological Site		None	Potentially Eligible
44YO0914	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0919	Historic Archaeological Site		None	Potentially Eligible
44YO0932	Historic Archaeological Site		None	Potentially Eligible
44YO0933	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0937	Historic Archaeological Site		None	Potentially Eligible
44YO0938	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0940	Historic Archaeological Site		None	Potentially Eligible
44YO0944	Historic Archaeological Site		None	Potentially Eligible

Table 4.4-12. National Register of Historic Places-Eligible Cultural Resources at NWS Yorktown [Continued]

Resource Number	*Resource Type*	*Description*	*Training Location APE*	*National Register Status*
44YO0951	Multicomponent Archaeological Site		None	Potentially Eligible
44YO0954	Historic Archaeological Site		None	Potentially Eligible
44YO0958	Historic Archaeological Site		None	Potentially Eligible
44YO0963	Historic Archaeological Site		None	Potentially Eligible
44YO0974	Historic Archaeological Site		None	Potentially Eligible
44YO0976	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO0980	Historic Archaeological Site		None	Eligible
44YO0984	Historic Archaeological Site		None	Potentially Eligible
44YO0991	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible
44YO1025	Prehistoric/Ethnographic Archaeological Site		None	Potentially Eligible

Noise

Under the No Action Alternative, noise-generating training activities include, use of diesel generators, vehicle movement, and explosives training activities. Use of diesel generator equipment occurs eight times per year for a total of 2,016 hours at the Home Station Training Lanes, adjacent to the Colonial Parkway, a contributing resource to the Colonial National Historic Park. In addition, weapons firing of blanks training (162 events, 29,452 rounds) and weapons firing of non-lethal training ammunition (paintball guns, 50 events, 5,000 rounds) occur at NWS Yorktown Home Station Training Lanes and Yorktown EOD Demolition Range (Table 2-9 and Table 4.4-11).

As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct impacts on any NRHP-listed or -eligible architectural resources at NWS Yorktown including the Colonial National Historic Park, are expected to result from the noise and vibration of continued noise-generating training activities including use of diesel generators, vehicle movement, and explosives training.

With the extensive history of military activities and earlier industrial activities at NWS Yorktown, noise associated with military activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for listing. While diesel generator use during training activities and explosives training may be audibly noticeable, the resulting discernible effect is not so great as to impair the integrity of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Likewise, the noise from vehicle movement training activities may be audibly noticeable, but it is extremely unlikely to be

discernible from the vehicular traffic noise generated by the Colonial Parkway, and is not expected to result in any adverse effect to the NRHP-listed resource.

Pursuant to NHPA Section 106 consultation in 2011 among the Navy, the VA Department of Historic Resources, and the National Park Service, regarding weapons firing of blanks training at Home Station Training Lanes resulted in an agreement that there would be no adverse effects to the Colonial National Historic Park if the Navy notified the Park in advance of scheduled weapons firing training (Navy, 2011b). Therefore, no indirect impacts on NRHP-listed or -eligible architectural resources, including the Colonial Parkway, are expected to result from the noise generated by existing and proposed weapons firing training activities.

Therefore, no indirect impacts on NRHP-listed or -eligible architectural resources, including the Colonial Parkway, are expected to result from the noise and vibration generated by continued noise-generating training activities.

Therefore, no adverse effect on any historic properties, direct and indirect, are expected to result from the noise and vibration generated by existing and proposed weapons firing training activities.

4.4.10.1.2 Archaeological Resources

Physical Disturbance

There are no NRHP-eligible archaeological resources within the explosive arc of the Yorktown EOD Demolition Range where existing explosives training activities, personnel movement, and vehicle movement are conducted under the No Action Alternative. Therefore, explosives training, personnel movement, and vehicle movement activities are not anticipated to have any direct adverse effect on any of the NRHP-eligible archaeological resources at NWS Yorktown. However, the Yorktown EOD Demolition Range, where personnel movement and explosives training are conducted, and the training areas where vehicle movement training activities are conducted, have not been subject to archaeological survey and is identified by the Navy as having potential to contain undiscovered intact archaeological resources (Figure 4.4-5). The subsurface disturbance potential of these existing explosives detonation training activities will not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. In addition, vehicle movement training activities occur on existing unpaved roads that have been compacted due to repeated use. Therefore the subsurface disturbance potential is extremely low and will not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy adheres to the NHPA compliance procedures outlined in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), and avoid any potential adverse effects to archaeological resources at NWS Yorktown.

Noise

As described in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no direct impacts on any NRHP-listed or -eligible archaeological resources at NWS Yorktown including the Colonial National Historic Park, are expected to result from the noise and vibration from noise-generating training activities including use of diesel generators, vehicle movement, and explosives training activities.

With the extensive history of military activities and earlier industrial activities at NWS Yorktown, noise associated with military activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for listing. While use of diesel generators, vehicle movement, and explosives detonation training activities may be audibly noticeable, the resulting discernible effect is not so great as to impair the integrity of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Therefore, no indirect impacts on NRHP-listed or -eligible archaeological resources are expected to result from the noise from noise-generating training activities, including use of diesel generators, vehicle movement, and explosives training activities.

Therefore, no adverse effect on any cultural resources, direct and indirect, are expected to result from the noise and vibration from noise-generating training activities, including use of diesel generators, vehicle movement, and explosives training activities.

4.4.10.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.4.10.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.4.10.4 Summary

PTEAs at Naval Weapons Station Yorktown would be the same under the No Action Alternative and Alternatives 1 and would include equipment use, explosives on land, personnel movement, vehicle movement, and weapons firing (blank-fire and non-lethal training ammunition) on land. Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative.

NRHP-eligible cultural resources within the APE of existing training activities conducted at NWS Yorktown with a potential ground disturbance component includes only a portion of the Skiffes Creek Annex Potential Historic District in Training Area A (Driving Course). Training activities at this area consist of vehicle movement; however, these training activities have not had, and are not anticipated to have, any impact on any of the contributing resources of the historic district (Figure 4.4-5) under Alternatives 1 and 2 and the No Action Alternative.

Training activities with a potential ground disturbance component (explosives detonation and vehicle and personnel movements) under Alternatives 1 and 2 and the No Action Alternative would also be conducted in areas identified by the Navy as having the potential to contain undiscovered intact archaeological resources (Figure 4.4-5). The subsurface disturbance potential of these existing training activities would not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy would adhere to the NHPA compliance procedures outlined in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), and avoid any potential adverse effects to archaeological resources at NWS Yorktown.

As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no adverse effect on the historic districts, archaeological sites or National Historic Park contributing elements are expected to result from the noise and vibration generated by existing and proposed noise-generating training activities (equipment use; vehicle movement; weapons firing; and

explosives detonation on land) under Alternatives 1 and 2 and the No Action Alternative. While these training activities may be audibly or/and visibly noticeable, the resulting discernible effect would not be so great as to impair the integrity of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Weapons firing training will continue to be conducted in accordance with the NHPA Section 106 agreement executed among the Navy, the Virginia Department of Historic Resources, and the National Park Service, regarding weapons firing of blanks training at Home Station Training Lanes. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources, including the Colonial Parkway, are expected to result from the noise generated by continued training activities at NWS Yorktown.

Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative. Therefore, there would be no significant impact on cultural resources with implementation of any of the alternatives, including No Action. In accordance with NHPA Section 106, the Navy has determined that there would be no adverse effects on historic properties by USFF training at NWS Yorktown with implementation of any of the alternatives. In a memorandum to the Navy dated July 7, 2017, the Virginia Department of Historic Resources concurred with the Navy's determination that there would be no adverse effects on historic properties (Appendix A, Agency Correspondence).

4.4.11 Cheatham Annex

The PTEAs applicable to cultural resources at Cheatham Annex that contribute to the physical disturbance stressor include personnel movement and vehicle movement and that contribute to the noise stressor include underwater movement, vehicle movement, equipment use, weapons firing – blank-fire (Table 4.4-13). The APE for direct impacts (effects) at Cheatham Annex is defined as the training location areas identified in Table 4.4-13, where existing and planned training activities will be conducted that have the potential to affect historic properties; the APE for indirect impacts (effects) is the Cheatham Annex installation boundary (Figure 4.4-6).

NRHP-eligible cultural resources at Cheatham Annex consist of an element of the Colonial National Historic Park and 26 archaeological sites. One site has been determined to be eligible for the NRHP, and 25 sites are potentially eligible (Navy, 2012b). Table 4.4-14 lists the NRHP-eligible cultural resources at Cheatham Annex, and the training site APE in which they occur. There are six archaeological sites within the APE of the "Cheatham Annex Barracks; all Cheatham Annex Field Training Zones" training sites; the remaining 20 sites are not within the APE of any of the Cheatham Annex training locations.

The Colonial Parkway, which is an element of the Colonial National Historic Park, passes along the southern boundary of Cheatham Annex (Figure 4.4-6). The Colonial Parkway, and its meticulously crafted landscape, does not occur within any of the training sites of Cheatham Annex.

4.4.11.1 No Action Alternative

4.4.11.1.1 Architectural Resources

Physical Disturbance

No personnel movement (on foot) or vehicle movement (tactical and non-tactical vehicles) physical disturbance stressors applicable to architectural resources occur during existing training activities at all of the Cheatham Annex training areas. Therefore, existing personnel movement and vehicle movement training activities do not have direct adverse effects on any NRHP-listed or -eligible architectural resources.

Table 4.4-13. Cheatham Annex Cultural Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*
Land – Non- Beaches/ Dunes	Equipment Use	diesel generator	99		74,380 hours						
	Personnel Movement	NA	32	11,585 people							
	Vehicle Movement	tactical and non-tactical vehicles	62	8,683 hours	8,683 hours						
	Weapons Firing – Blanks	small arms	28		82,400 rounds						
Water and Adjacent Shoreline	Personnel Movement	NA	1	24 people							
	Underwater Movement	remotely operated vehicles	1		8 hours						

Key: No. = number; NA = not applicable.

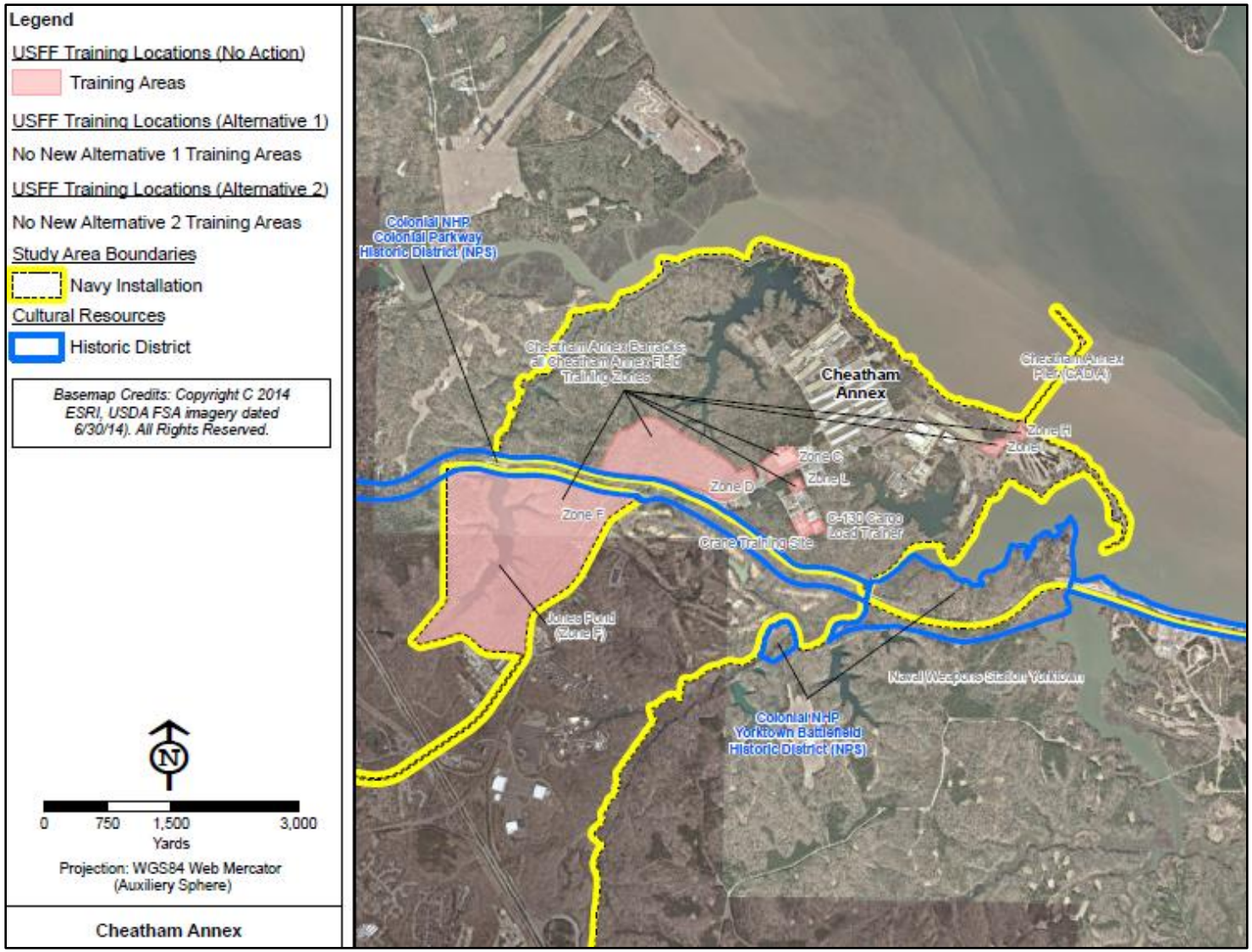

Figure 4.4-6. Cheatham Annex – Training Location Areas and National Register of Historic Places-Eligible Cultural Resources

Table 4.4-14. National Register of Historic Places-Eligible Cultural Resources at Cheatham Annex

Resource Number	*Resource Type*	*Description*	*Training Location APE*	*National Register Status*
N.A.	Historic Archaeological Site	20th Century	In None; Adjacent to Cheatham Annex Field TAs C and D	Potentially Eligible
N.A.	Historic Archaeological Site	20th Century	TA D	Potentially Eligible
N.A.	Colonial Parkway (Colonial National Historic Park)	Three-lane roadway and crafted landscape	In None; Adjacent to Cheatham Annex Field TAs D and F	National Historic Park
44YO0054	Historic Archaeological Site	19th Century: 3rd quarter	Cheatham Annex Barracks; all Cheatham Annex Field Training Zones	Potentially Eligible
44YO0059	Multicomponent Archaeological Site	18th Century	None	Potentially Eligible
44YO0096	Prehistoric/Ethnographic Archaeological Site	Prehistoric/Unknown	None	Potentially Eligible
44YO0121	Multicomponent Archaeological Site	44YO0059, 44YO00315, 44YO0314	None	Potentially Eligible
44YO0122	Historic Archaeological Site	19th Century: 2nd half	None	Potentially Eligible
44YO0188	Historic Archaeological Site	Historic/Unknown	None	Potentially Eligible
44YO0207	Historic Archaeological Site	Historic/Unknown	None	Potentially Eligible
44YO0460	Multicomponent Archaeological Site	18th Century, Middle Woodland	None	Potentially Eligible
44YO0461	Historic Archaeological Site	19th Century	None	Potentially Eligible
44YO0462	Prehistoric/Ethnographic Archaeological Site	Prehistoric/Unknown	None	Potentially Eligible
44YO0463	Prehistoric/Ethnographic Archaeological Site	Prehistoric/Unknown	None	Potentially Eligible
44YO0464	Historic Archaeological Site	17th Century	Cheatham Annex Barracks; all Cheatham Annex Field Training Zones	Potentially Eligible
44YO0597	Prehistoric/Ethnographic Archaeological Site	Prehistoric/Unknown	Cheatham Annex Barracks; all Cheatham Annex Field Training Zones	Potentially Eligible
44YO0598	Historic Archaeological Site	17th Century, 18th Century,	Cheatham Annex Barracks; all	Potentially Eligible

Table 4.4-14. National Register of Historic Places-Eligible Cultural Resources at Cheatham Annex [Continued]

Resource Number	*Resource Type*	*Description*	*Training Location APE*	*National Register Status*
		19th Century: 1st quarter	Cheatham Annex Field Training Zones	
44YO0600	Historic Archaeological Site	17th Century, 18th Century, 19th Century, 20th Century	Cheatham Annex Barracks; all Cheatham Annex Field Training Zones	Potentially Eligible
44YO0601	Prehistoric/Ethnographic Archaeological Site	Woodland	Cheatham Annex Barracks; all Cheatham Annex Field Training Zones	Potentially Eligible
44YO0604	Multicomponent Archaeological Site	Historic/Unknown, Woodland	None	Potentially Eligible
44YO0605	Multicomponent Archaeological Site	17th Century, 18th Century, Woodland	None	Potentially Eligible
44YO0606	Multicomponent Archaeological Site	19th Century: 4th quarter, 20th Century, Woodland	None	Potentially Eligible
44YO0615	Multicomponent Archaeological Site	20th Century, Woodland	None	Potentially Eligible
44YO0617	Multicomponent Archaeological Site	18th Century, Woodland	None	Potentially Eligible
44YO0618	Multicomponent Archaeological Site	19th Century, Woodland	None	Potentially Eligible
44YO0620	Multicomponent Archaeological Site	Woodland	None	Potentially Eligible
44YO0621	Multicomponent Archaeological Site	20th Century, Woodland	None	Potentially Eligible
44YO1060	Multicomponent Archaeological Site	Late Woodland	None	Eligible

Key: No Data; TA = Training Area.

Noise

Under the No Action Alternative, use of diesel generators equipment and weapons firing of blanks training occurs at all Cheatham Annex training areas.

Two of Cheatham Annex training areas (Training Areas D and F) where diesel generators are used are adjacent to the Colonial Parkway, a contributing resource to the Colonial National Historic Park. No direct impacts on any NRHP-listed or -eligible architectural and archaeological resources within the Cheatham Annex APE, including the Colonial National Historic Park, are expected to result from the noise and vibration generated by continued diesel generator use.

Weapons firing of blanks during training will not be concentrated at ranges, but could occur almost anywhere within those training areas. No direct adverse effects on NRHP-listed or -eligible architectural resources are expected to result from the noise and vibration generated by continued weapons firing training activities.

The Colonial Parkway, which is an element of the Colonial National Historic Park, passes along the southern boundary of the main portion of Cheatham Annex, and along the northern boundary of Training Area F. With the extensive history of military activities, and earlier industrial activities at Cheatham Annex, noise associated with military activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for listing. Weapons firing – blank-fire training could occur almost anywhere within the training areas and, as a result, the potential for the acoustic effects to be discernable, particularly from the vehicular traffic noise generated by the Colonial Parkway is reduced. Diesel generator use during training activities may also be audibly noticeable, but any resulting discernible effect of weapons firing or diesel generator use is not so great as to impair the integrity of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Therefore, no significant indirect impacts on NRHP-listed or -eligible architectural resources, including the Colonial Parkway, are expected to result from the noise generated by continued diesel generator use and weapons firing training activities.

Therefore, no adverse effect on any cultural resources, direct and indirect, are expected to result from the noise and vibration generated by continued diesel generator use and weapons firing training at Cheatham Annex under the No Action Alternative.

4.4.11.1.2 Archaeological Resources

Physical Disturbance

There are seven NRHP-eligible archaeological sites within the APE of the Cheatham Annex Barracks; all Cheatham Annex Field Training Zones training locations (Table 4.4-14). Five of the sites are in Zone F, and two are in Zone D where existing personnel movement and vehicle movement training activities with potential ground disturbance components are conducted (Table 4.4-13). However, these training activities are conducted on the existing roads and trails, not in the immediate vicinity of the archaeological sites. Therefore, these training activities are not anticipated to have any adverse impact on any of the known archaeological sites.

The existing personnel movement and vehicle movement training activities will also be conducted in areas identified by the Navy as having the potential to contain undiscovered intact archaeological resources (Figure 4.4-6). These existing training activities are restricted to the existing roads and trails, and the subsurface disturbance potential of these training activities will not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy adheres to the NHPA compliance procedures outlined in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), and avoid any potential adverse effects to archaeological resources at Cheatham Annex.

Noise

As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no adverse effect on NRHP-listed or -eligible archaeological resources are expected to result from the noise and vibration from noise-generating training activities, including existing equipment use, vehicle movement, weapons firing, and underwater vessel movement.

With the extensive history of military activities, and earlier industrial activities at Cheatham Annex, noise associated with military activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for listing. While noise from existing equipment use, vehicle movement, weapons firing, and underwater vessel movement training activities may be audibly noticeable, it is extremely unlikely to be discernible from the vehicular traffic noise generated by the Colonial Parkway. Any resulting discernible effect is not so great as to impair the integrity of the potentially affected archaeological resources such that they would no longer meet the NRHP criteria for listing. Therefore, no indirect impacts on NRHP-listed or -eligible archaeological resources are expected to result from the noise generated by continued equipment use, vehicle movement, weapons firing, and underwater vessel movement training activities.

Therefore, no adverse effect on any cultural resources, direct and indirect, are expected to result from the noise and vibration from existing noise-generating training activities, including equipment use, vehicle movement, weapons firing, and underwater vessel movement training at Cheatham Annex under the No Action Alternative.

4.4.11.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.4.11.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.4.11.4 Summary

PTEAs at Cheatham Annex would be the same under the No Action Alternative and Alternatives 1 and 2 would include equipment use, personnel movement, vehicle movement, and weapons firing – blank-fire on land; and personnel movement and underwater movement in the water and adjacent shoreline. Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative.

There are seven archaeological sites within the APE of the “Cheatham Annex Barracks; all Cheatham Annex Field Training Zones” training locations (Table 4.4-14). Existing training activities with a potential ground disturbance component conducted in these training locations include personnel and vehicle movement (Table 4.4-13). However, these training activities are limited to existing roadways and trails, are not conducted in the immediate vicinity of the archaeological sites, and are not anticipated to have any adverse impact on any of the known archaeological sites.

Personnel and vehicle movement training activities with a potential ground disturbance component will also continue to be conducted in areas identified by the Navy as having the potential to contain undiscovered intact archaeological resources (Figure 4.4-6). The subsurface disturbance potential of these existing training activities will not exceed pre-military plow zone depth in any areas that have not

been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy would manage these resources in accordance with the NHPA and other federal and state laws, Navy, and DoD regulations and instructions, and DoD American Indian and Alaska Native Policy.

There are no NRHP-listed or -eligible architectural or archaeological resources in the APE where underwater vessel movement training is currently, and would be, conducted. Underwater vessel movement training activities are not anticipated to have any adverse effect on cultural resources.

No adverse effect on the Colonial Parkway (Colonial National Historic Park) or archaeological sites are expected to result from the noise and vibration generated by existing and proposed noise-generating training activities (equipment use; vehicle [land] movement; weapons firing; and underwater vessel [water] movement). With the extensive history of military activities and earlier industrial activities at Cheatham Annex, noise associated with military activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources. While existing training activities may be audibly noticeable, the resulting discernible effects are, and will not be, so great as to impair the integrity of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources, including the Colonial Parkway, are expected to result from the noise generated by continued training activities at Cheatham Annex.

Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative. Therefore, there would be no significant impact on cultural resources with implementation of any of the alternatives, including No Action. In accordance with NHPA Section 106, the Navy has determined that there would be no adverse effects on historic properties by USFF training at Cheatham Annex with implementation of any of the alternatives. In a memorandum to the Navy dated July 7, 2017, the Virginia Department of Historic Resources concurred with the Navy's determination that there would be no adverse effects on historic properties (Appendix A, Agency Correspondence).

4.4.12 First Landing State Park

The PTEA applicable to cultural resources at the First Landing State Park that contribute to the physical disturbance stressor include personnel movement (Table 4.4-15). The APE for First Landing State Park is defined as the training location areas identified in Table 4.4-15, where existing and planned training activities will be conducted that have the potential to affect historic properties (Figure 4.4-7).

Table 4.4-15. First Landing State Park Cultural Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Physical Disturbance*	*No. of Events*	*Physical Disturbance*	*No. of Events*	*Physical Disturbance*
Land – Non- Beaches/ Dunes	Personnel Movement	NA	12	592 people				

Key: No. = number; NA = not applicable.

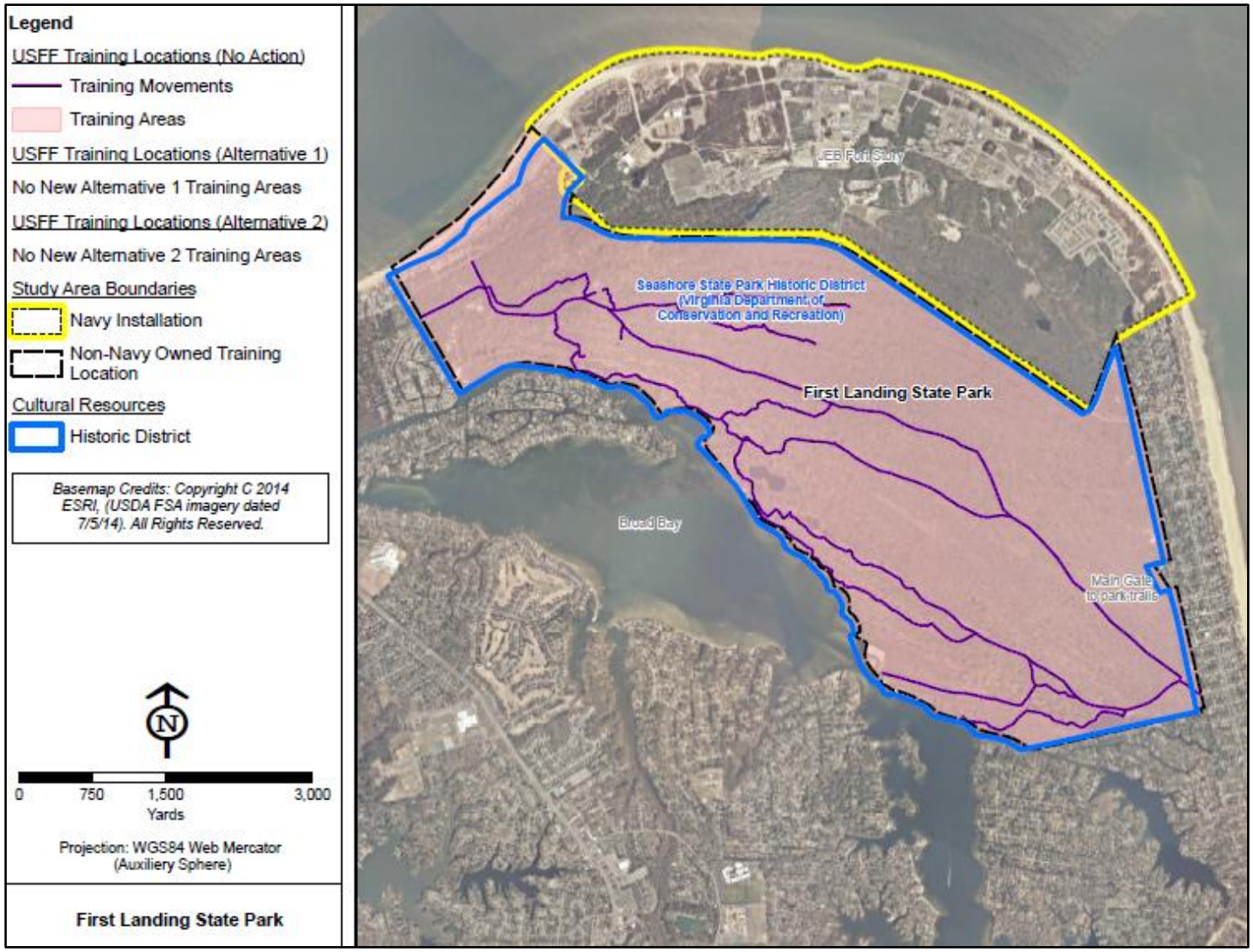

Figure 4.4-7. First Landing State Park – Training Location Areas and National Register of Historic Places-Eligible Cultural Resources

4.4.12.1 No Action Alternative

4.4.12.1.1 Archaeological Resources

Physical Disturbance

Under the No Action Alternative, personnel movement, consisting of 12 total events and 592 total people (Table 4.4-15) are conducted at First Landing State Park (Table 2-11). Personnel movement consists of pedestrian activities only. Existing personnel movement training activities consist of vehicular access to the Main Gate (to access park trails), and walking/jogging on the paved park trails (Table 4.4-15; Figure 4.4-7). These training activities have a very low potential for ground disturbance. However, these training activities have not had, and are not anticipated to have, any adverse physical impact on the Circulation System or the Trail System—the contributing resources of the historic district of which the Main Gate and trails are elements, respectively. Therefore, no significant impacts to cultural resources occur with implementation of the No Action Alternative.

4.4.12.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.4.12.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.4.12.4 Summary

PTEAs at First Landing State Park would be the same under the No Action Alternative and Alternatives 1 and 2 and would include personnel movement on land, consisting of 12 total events and 592 total people (Table 4.4-15). Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative.

Existing personnel movement training activities have a very low potential for ground disturbance (Table 4.4-15; Figure 4.4-7). However, these training activities have not had, and are not anticipated to have, any adverse physical impact on the Circulation System or the Trail System – the contributing resources of the historic district of which the Main Gate and trails are elements, respectively.

Therefore, there would be no significant impact on cultural resources with implementation of any of the alternatives, including No Action. In accordance with NHPA Section 106, the Navy has determined that there would be no adverse effects on historic properties by USFF training at First Landing State Park with implementation of any of the alternatives. In a memorandum to the Navy dated July 7, 2017, the Virginia Department of Historic Resources concurred with the Navy's determination that there would be no adverse effects on historic properties (Appendix A, Agency Correspondence).

4.4.13 Southern Branch of the Elizabeth River

The PTEAs applicable to cultural resources at the Southern Branch of the Elizabeth River that contribute to the physical disturbance stressor include personnel and vessels nosing into the shoreline and that contribute to the noise stressor include vessel movement and weapons firing – blank-fire (Table 4.4-16). The APE is defined as the boundary of the Atlantic Intracoastal Waterway where existing and planned

training activities identified in Table 4.4-16 will be conducted that have the potential to affect historic properties (Figure 4.4-8).

4.4.13.1 No Action Alternative

4.4.13.1.1 Architectural Resources

Physical Disturbance

Existing Southern Branch of the Elizabeth River training activities include 30 events of personnel movement (total 2,160 people) (Table 4.4-16) in the water and at the shoreline. Training activities will interact with the waterway shoreline when the training vessel noses into the shoreline and ground forces are deployed into shallow water during insertion and extraction exercises (Table 2-12). This activity can occur at any suitable undeveloped location (i.e., not rocky) along the route depicted on Figure 4.4-8. Personnel movement consists of pedestrian activities in shallow water only, and not on dry land.

No personnel movement stressors applicable to architectural resources occur during existing Southern Branch of the Elizabeth River training activities. Therefore, existing personnel movement training activities do not have adverse effects on any NRHP-listed or -eligible architectural resources under the No Action Alternative.

Noise

Existing Southern Branch of the Elizabeth River vessel movement training activities include 30 events of small vessel navigation along the route depicted on Figure 4.4-8. As discussed in Section 4.4.2 (Methodology), no adverse effect on NRHP-listed or -eligible architectural or archaeological resources are expected to result from the noise and vibration generated by existing vessel movement training activities.

As a navigable route without many of the hazards of open sea travel, the Southern Branch of the Elizabeth River has a good deal of commercial activity, and is also used extensively by recreational boaters. Noise from the daily shipping and boating along the route has long been an element of the setting of any NRHP-listed or -eligible architectural and archaeological resources along its shores, including when they were evaluated and determined eligible for listing. While noise from vessel movement training activities may be audibly noticeable, it is extremely unlikely to be discernible from the commercial and recreational vessel traffic. Any resulting discernible effect is not so great as to impair the integrity of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources are expected to result from the noise generated by continued USFF vessel movement training activities.

Under the No Action Alternative, weapons firing – blank-fire training (30 events, 144,000 rounds) is conducted at the southeastern end of the route depicted on Figure 4.4-8. There are no previously identified NRHP-eligible or -listed architectural or archaeological resources within the APE of the location where existing and proposed weapons firing training activities occur at the southeastern end of the Atlantic Intracoastal Waterway route (Figure 4.4-8). However, the weapons firing training site is approximately 0.3 mile south of the Camp E.W. Young Historic District, 1 mile northwest of the Albemarle & Chesapeake Canal historic site, and 1.5 miles northwest of the Great Bridge Battlefield historic area and the archaeological site associated with the battle – 44CS0022.

Table 4.4-16. Southern Branch of the Elizabeth River Cultural Resources Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*	*No. of Events*	*Physical Disturbance*	*Noise*
Water and Adjacent Shoreline	Personnel Movement	NA	30	2,160 people							
	Vessel Movement	small vessels	30	30 nearshore activities	1,980 hours						
	Weapons Firing - Blanks	small caliber	30		144,000 rounds						

Key: No. = number.

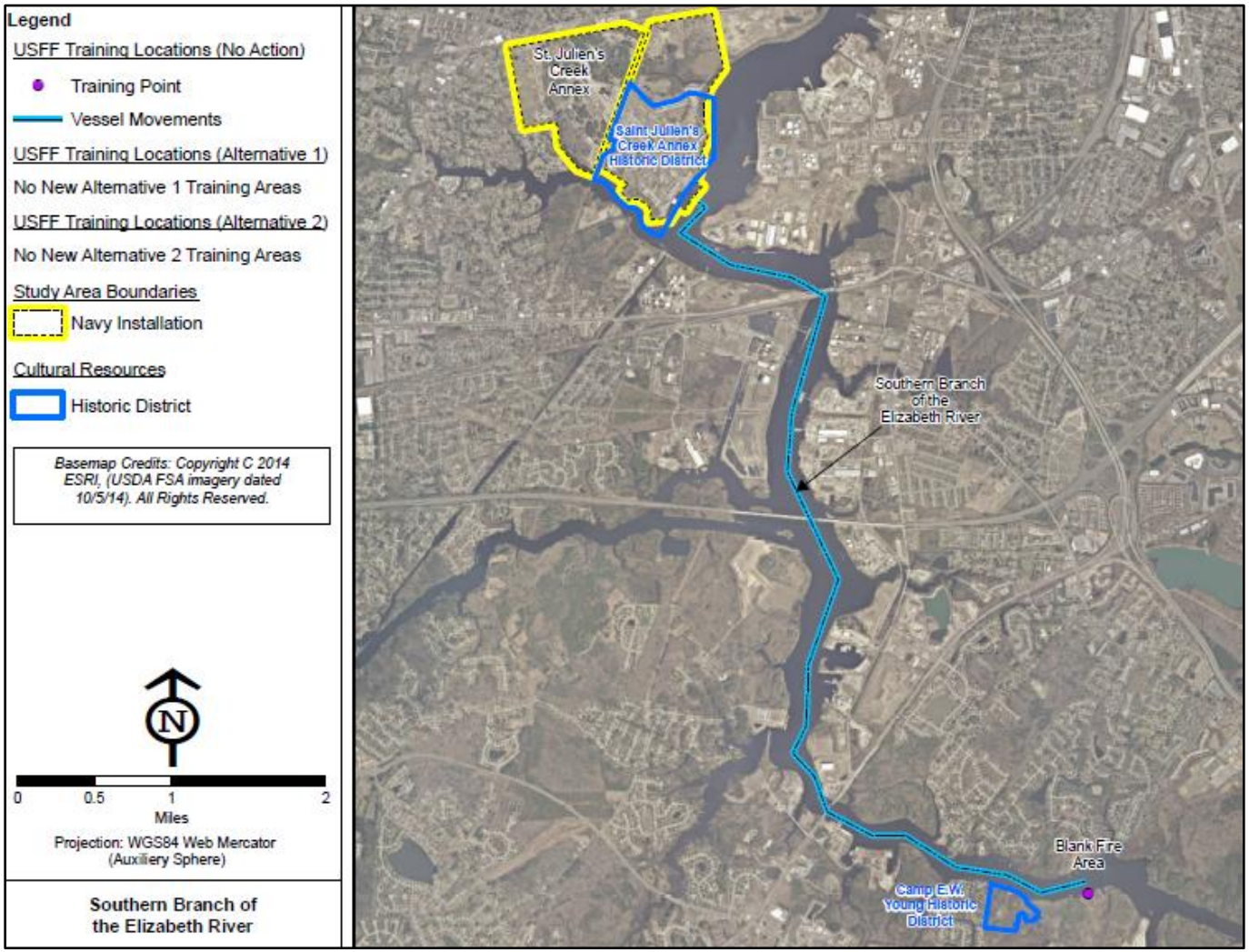

Figure 4.4-8. Southern Branch of the Elizabeth River – Training Location Areas and National Register of Historic Places-Eligible Cultural Resources

As discussed in Section 4.4.3.1 (Impacts Common to All Locations Under All Alternatives, Architectural Resources), no adverse effect on NRHP-listed or -eligible architectural or archaeological resources are expected to result from the noise and vibration generated by existing weapons firing training activities.

While noise from weapons firing training activities may be audibly noticeable, it is unlikely any discernible effect would be so great as to impair the integrity of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources are expected to result from the noise generated by continued USFF weapons firing training activities.

4.4.13.1.2 Archaeological Resources

Physical Disturbance

No personnel movement stressors applicable to archaeological resources occur along the Southern Branch of the Elizabeth River route during existing training activities. There are no previously identified NRHP-eligible or -listed cultural resources within the APE of the Atlantic Intracoastal Waterway where existing blank-fire weapons training occur. The vessel route terminus is approximately 1 mile northwest of the Albemarle & Chesapeake Canal historic site and 1.5 miles northwest of the Great Bridge Battlefield historic area and the archaeological site associated with the battle – 44CS0022. Therefore, existing personnel movement training activities do not have adverse effects on any NRHP-listed or -eligible archaeological resources.

Existing Southern Branch of the Elizabeth River vessel movement training activities include 30 events of small vessel movement along the route depicted on Figure 4.4-8. Training activities will interact with the seafloor or river bottoms when nosing into the shoreline while deploying ground forces into shallow water during insertion and extraction exercises (Table 2-12). This activity can occur at any suitable undeveloped location (i.e., not rocky) along the route depicted on Figure 4.4-8.

No previously identified NRHP-eligible or -listed submerged architectural or archaeological properties are present within the vicinity of the vessel movement routes that may be used during the course of existing and proposed training activities in the Atlantic Intracoastal Waterway. Therefore, no significant impacts to Atlantic Intracoastal Waterway seafloor or river bottoms cultural resources occur with implementation of the No Action Alternative.

4.4.13.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, as discussed in Section 4.4.13.1 (No Action Alternative), no significant impacts would occur.

4.4.13.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, therefore, as discussed in Section 4.4.13.1 (No Action Alternative), no significant impacts would occur.

4.4.13.4 Summary

PTEAs at Southern Branch of the Elizabeth River would be the same under the No Action Alternative and Alternatives 1 and would include personnel movement, vessel movement, and weapons firing of blanks

in the water and adjacent shoreline, consisting of 30 total events (Table 4.4-15). Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative.

Existing training activities with a potential ground disturbance component conducted in the Southern Branch of the Elizabeth River training locations include personnel movement and river bottoms (vessels nosing into the shoreline) (Table 4.4-13). However, these training activities are not conducted in the immediate vicinity of any NRHP-listed or -eligible architectural or archaeological resources, and these training activities are not anticipated to have any adverse impact on cultural resources.

There are no NRHP-listed or -eligible architectural or archaeological resources in the APE where underwater vessel movement training is currently, and will be, conducted. Underwater vessel movement training activities are not anticipated to have any adverse effect on cultural resources.

Existing Southern Branch of the Elizabeth River training activities with a potential noise disturbance component include noise from small vessels and weapons firing of blanks. As discussed in Section 4.4.2 (Methodology), no adverse effects on NRHP-listed or -eligible architectural or archaeological resources are expected to result from the noise and vibration generated by existing and proposed noise-generating training activities.

With the extensive history of military activities and earlier industrial activities, noise associated with military activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources. Noise from the daily shipping and boating along the route has long been an element of the setting of any NRHP-listed or -eligible architectural and archaeological resources along its shores, including when they were evaluated and determined eligible for listing. While noise from vessel movement and weapons firing training activities may be audibly noticeable, it is unlikely any discernible effect would be so great as to impair the integrity of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources are expected to result from the noise generated by continued USFF Atlantic Intracoastal Waterway training activities.

Therefore, there would be no significant impact on cultural resources with implementation of any of the alternatives, including No Action. In accordance with NHPA Section 106, the Navy has determined that there would be no adverse effects on historic properties by the Southern Branch of the Elizabeth River training with implementation of any of the alternatives. In a memorandum to the Navy dated July 7, 2017, the Virginia Department of Historic Resources concurred with the Navy's determination that there would be no adverse effects on historic properties (Appendix A, Agency Correspondence).

4.4.14 Cultural Resources Summary

The stressors applicable to cultural resources are physical disturbance associated with beach landings, personnel movement, vehicle movement, explosives on land; and noise associated with equipment use, vehicle movement, vessel movement, explosives on land, weapons firing – non-lethal training ammunition, and weapons firing – blank-fire.

4.4.14.1 No Action Alternative Cultural Resources Summary

Under the No Action Alternative, analysis of potential impacts to cultural resources by existing training activities with a potential ground disturbance component resulted in identification of no significant impacts to NRHP-listed or -eligible architectural or archaeological resources at any the VACAPES training installations. However, training activities with a potential ground disturbance component will also

continue to be conducted in areas identified by the Navy as having the potential to contain undiscovered intact archaeological resources. The subsurface disturbance potential of these existing training activities does not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy would manage these resources in accordance with the NHPA and other federal and state laws, Navy, and DoD regulations and instructions, and DoD American Indian and Alaska Native Policy. Therefore, training activities with a potential ground disturbance component are not anticipated to have any adverse effect on cultural resources.

Analysis of potential impacts to cultural resources by existing training activities with a potential noise-induced impact also resulted in identification of no significant impacts to NRHP-listed or -eligible architectural or archaeological resources at any the VACAPES inland training installations. Significant resources include the Camp Pendleton Historic District, Fort Story Historic District, the St. Juliens Creek Annex Historic District, and the Colonial Parkway (a contributing resource to the Colonial National Historic Park). As discussed in Section 4.4.2 (Methodology), no direct adverse impacts on NRHP-listed or -eligible architectural or archaeological resources are expected to result from the noise and vibration generated by existing any of the training activities (equipment use, vehicle movement, vessel movement, explosives on land, weapons firing – non-lethal training ammunition, and weapons firing – blank-fire). With the extensive history of military activities, and earlier industrial activities at all of the training installations, noise associated with military activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for listing. While noise from the existing training activities may be audibly noticeable, the resulting discernible effect has not been, and would not be, so great as to impair the integrity of any of the potentially affected resources such that they would no longer meet the NRHP criteria for listing. Therefore, no adverse effect on any historic properties, direct and indirect, are expected to result from the noise and vibration generated by existing training activities. Thus, there would be no significant impact on any significant cultural resources with implementation of the No Action Alternative.

In accordance with NHPA Section 106, the Navy has determined that there would be no adverse effects on historic properties by USFF training at all of the VACAPES inland training installations with implementation of the No Action Alternative. In a memorandum to the Navy dated July 7, 2017, the Virginia Department of Historic Resources concurred with the Navy's determination that there would be no adverse effects on historic properties (Appendix A, Agency Correspondence).

4.4.14.2 Alternative 1 Cultural Resources Summary

Under Alternative 1, Navy training at JEB Little Creek, JEB Fort Story, and Dam Neck Annex and Camp Pendleton, with few exceptions, would increase in tempo over the training activities that are already conducted at the installations. Given the nature of the impact stressors for cultural resources and their proximity to known NRHP-listed or -eligible cultural resources or sensitive areas, the incremental increases in training activities would not introduce any significant impacts to the cultural resources in the respective APE. Therefore, there would be no significant impact on cultural resources with implementation of Alternative 1.

In accordance with NHPA Section 106, the Navy has determined that there would be no adverse effects on historic properties by USFF training with implementation of Alternative 1, and the Virginia Department of Historic Resources concurred with this determination (Appendix A).

4.4.14.3 Alternative 2 Cultural Resources Summary

Similar to Alternative 1, the marginal increases in training-related impact stressors for cultural resources under Alternative 2 would not result in any impacts to the cultural resources in the APE. Therefore, there would be no significant impact on cultural resources with implementation of Alternative 2. In accordance with NHPA Section 106, the Navy has determined that there would be no adverse effects on historic properties with implementation of Alternative 2, and the Virginia Department of Historic Resources concurred with this determination (Appendix A, Agency Correspondence).

4.5 Ambient Noise

4.5.1 Overview

Noise impacts are considered in terms of context and intensity. Noise levels under each action alternative are compared to noise levels under baseline conditions to assess impacts. Methods used to assess impacts, including computer noise modeling and impact assessment processes, are discussed in Section 4.5.2 (Methodology). Discussion in Section 4.5.3 (Impacts Common to All Locations Under All Alternatives), covers noise sources which occur at multiple training locations at which that noise source is applicable. In Section 4.5.4 (JEB Base Little Creek) through Section 4.5.13 (Southern Branch of the Elizabeth River), noise levels, frequency of occurrence, and time-of-day of occurrence are described for each training location. The context and intensity of noise impacts under the No Action Alternative, Alternative 1, and Alternative 2 is assessed relative to noise levels above which certain impacts (e.g., speech interference) occur.

4.5.2 Methodology

Computer noise models were used to calculate noise levels associated with munitions activity. The models draw from a library of actual noise measurements and apply field-tested algorithms to generate calculated noise levels in specific locations exposed to specific types of operations. The use of computer noise models allows comparison of existing and proposed operations types and tempos prior to actually implementing operational changes.

To avoid overly scripted training, the specifics of many of the training events considered (e.g., location of blank munitions firing) are varied from one training event to the next. In cases where variability exists between iterations of the same training event, noise levels are described for the closest possible training event to noise-sensitive locations.

Munitions and Equipment

In accordance with standard DoD practice, munitions noise levels were calculated using the Small Arms Range Noise Assessment Model, Version 2.6, and the Blast Noise Version 2 (BNOISE2™) large arms noise assessment model (U.S. Army, 2007). The noise level generated by small arms fire depends on the direction in which the weapon is pointed with higher noise levels being projected forward of the firing position than are projected to the side or rear of the firing position. For this analysis, noise levels are reported for a location at 90 degrees from the direction of firing reflecting the fact that blank munitions would normally be fired toward the interior of the training area. In instances where SARNAM and BNOISE2 reference noise datasets do not include noise levels for the subject munition, similar munitions types were selected as surrogates. In cases where no similar munition type exists in the reference noise dataset, noise levels measured during other environmental analysis actions are referenced.

The U.S. Army has special expertise in munitions noise and has published recommendations relating to compatibility of noise-sensitive land uses (e.g., residences, campgrounds, recreational areas) with small arms and large arms munitions noise (U.S. Army, 2007). According to Army Regulation 200-1, noise-sensitive land uses are normally not recommended in locations where small-arms noise levels occur regularly (i.e., on a daily or near-daily basis) at between 87 and 104 dB, unweighted peak noise level (dBP). Areas affected by this range of noise levels on a regular basis are referred to as Noise Zone 2 (Table 4.5-1). Residences are not considered compatible at regularly-occurring peak small arms noise levels greater than 104 dBP, and areas regularly exposed to these noise levels are referred to as Noise Zone 3. The land use compatibility levels designated in Army Regulation 200-1 were designated based on human experiences. Noise levels between 87 and 104 dBP have some potential for disruption of common activities while noise levels exceeding 104 dBP have a greater potential for disturbance. This EA provides the distance from potential firing points at which peak noise levels drop below noise levels stated in Army Regulation 200-1. Many of the small-arms training events discussed in this EA involve firing blank rounds from any location within defined training areas (Section 2.2, No Action Alternative, to Section 2.4, Alternative 2). Firing of rounds at the closest point in the training area to a noise-sensitive location would result in the highest possible peak noise level at that noise-sensitive location. However, under the Proposed Action most rounds would not be fired from the closest possible point. Rounds fired from greater distances would generate lower sound levels at the noise-sensitive location. Therefore, the EA provides a conservative analysis of small arms noise impacts to residences. Army Regulation 200-1 is written primarily for application to established munitions training ranges where weapons firing is a daily or near-daily event. The fact that peak noise level s specified in Army Regulation 200-1 would be exceeded only infrequently is a factor to consider in the assessment of impacts associated with this pattern of small arms noise. In this environmental analysis, peak noise levels exceeding 87 and 104 dBP are used as indicators of potential for disturbance at noise-sensitive locations.

Table 4.5-1. Small Arms Noise Zones

Noise Zone	*Small Arms Peak Noise Level*
Noise Zone 1	<87 dBP
Noise Zone 2	87 to 104 dBP
Noise Zone 3	>104 dBP

Key: dBP = decibel peak

In addition to noise from small arms, noise from explosive detonation is also addressed. According to Army Regulation 200-1, peak large arms noise levels between 115 dBP and 130 dBP yield a “moderate” risk of noise complaints, and noise levels in excess of 130 dBP yield a “high” risk of complaints. At peak noise levels above 140 dBP, there is some risk of permanent physiological damage to unprotected human ears and structural damage claims.

Table 4.5-2. Risk of Noise Complaints and Other Impacts

Risk of Complaints / Physiological Damage	*Explosives Peak Noise Level*
Low	<115 dBP
Moderate	115 to 130 dBP
High	>130 dBP
Risk of permanent physiological damage to unprotected human ears	>140 dBP

Key: dBP = decibel peak

Impacts associated with use of equipment are assessed based on known characteristics of the equipment (e.g., noise intensity generated) as well as the time and place in which it would be used. Equipment use in this EA includes the operation of diesel generators. Noise created by a generator in a location where machinery is already used is less likely to create noise concerns than a generator operating in an environment in which machinery is rarely used.

Surface and Underwater Vessels and Ground Vehicles

Measured noise levels are presented for operations at various distances from a listener. Noise levels associated with vehicle operations are presented in the context of existing noise generated by vehicles and other noise sources in the area. The operations of LCAC amphibious craft are more than 10 dB louder than the operations of other Navy tactical vehicles. As noted in Section 3.5.1.1.2 (Ground Vehicles and Surface Vessels), LCAC generate approximately 92 dB at a distance of 300 feet when operating at high power. Other Navy tactical vehicles generate 85 dB at a distance of 50 feet (see Table 3.5-5, *Ground Vehicle Noise Levels*). Assuming 6 dB reduction in noise level per doubling of distance, these vehicles generate approximately 70 dB Lmax at a distance of 300 feet. Because LCAC are substantially louder than other vehicles, particular attention is provided to the description of their operations and associated noise.

Impacts from underwater noise produced by surface vessels were analyzed qualitatively, using typical sound levels produced by these types of vessels in comparison to the affected environment. Note that surface vessels are only present in the study area along the Southern Branch of the Elizabeth River.

Due to the substantial similarity in sounds produced by surface craft and underwater vessels (non-impulsive broadband sounds produced mainly by propeller cavitation) (Richardson et al., 1995), underwater vessel noise was analyzed using the same methodology as underwater noise from surface vessels.

Personnel Movement

Personnel movement would not generate noise levels of concern and was not analyzed in detail.

4.5.3 Impacts Common to All Locations Under All Alternatives

Some noise impacts are common across all or most of the training locations. These common elements are discussed in this section. Impacts specific to each training location are discussed further under each training location (Section 4.5.4, JEB Little Creek, through Section 4.5.14, Ambient Noise Summary). When considering impacts, it is important to consider the context in which the noise occurs. As discussed in Section 3.5 (Ambient Noise), the existing noise environment includes several intermittent (e.g., military vehicles) and relatively continuous (e.g., civilian vehicle traffic) noise sources. Military aviation, which is not one of the PTEAs analyzed in this EA, tends to be a dominant noise source that "drowns out" noise from other sources when and where it occurs.

Munitions and Equipment

Large arms (e.g., explosives and small arms munition noise is present at several of the training locations (JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton, NALF Fentress, St. Juliens Creek Annex, NWS Yorktown, Cheatham Annex, and the Southern Branch of the Elizabeth River) and would increase in intensity or frequency under the action alternatives. Impacts associated with these noises depend on the types of munitions, the frequency and time-of-day of use, and the distances to noise-sensitive locations. Therefore, the details of munitions noise impacts will be presented in Section 4.5.4

(JEB Little Creek) through Section 4.5.13 (Southern Branch of the Elizabeth River) below for each training location.

Noise resulting from equipment use would typically occur at distances of greater than 600 feet from the installation boundary, resulting in off-station noise levels below 60 dBA. This noise level, which is approximately equivalent to the ambient noise level at a busy military facility, could be audible but would not be disturbing in most situations. Equipment noise will be considered for each training location in the context of the local noise environment.

4.5.4 Joint Expeditionary Base Little Creek

The PTEAs applicable to ambient noise at JEB Little Creek that contribute to the noise stressor include beach landings, explosives on land, vehicle movement, and weapons firing – blank-fire (Table 4.5-3).

Table 4.5-3. Joint Expeditionary Base Little Creek Ambient Noise Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Noise*	*No. of Events*	*Noise*	*No. of Events*	*Noise*
Land – Beaches/ Dunes	Beach Landings	amphibious and small vessels	50	348 landings				
	Explosives on Land	demolition materials and charge			2	2 events (2 detonations with a maximum NEW of 1.25 pounds)		
	Vehicle Movement	tactical and non-tactical vehicles	815	3,560 hours	2	1 hour		
Land– Non-Beaches/ Dunes	Weapons Firing – Blank-fire	small caliber	6	595,400 rounds				

4.5.4.1 No Action Alternative

Approximately 348 beach landings occur on beach/dune training areas at JEB Little Creek. These beach landings primarily include LCAC amphibious craft as the platform. The LCAC amphibious craft parking area is 1,400 feet from residences in East Beach. A berm constructed by the Navy along the southern and western perimeter of the parking area blocks direct transmission of sound and reduces noise sound levels at the residences by roughly 11 dB. LCAC amphibious craft crews are required to train for night operations and about 11 percent of operations are conducted between 10:00 p.m. and 7:00 a.m. when noise is more likely to be of concern. LCAC amphibious craft engine runs and taxiing are conducted at high engine power setting so that pilots can maintain positive control of the craft at all times while it is on its air cushion. Assault Craft Unit Four conducts about two sorties per day on average with each sortie requiring about 1.5 hours of taxiing, fueling, and engine tests. In addition, the unit conducts

maintenance-related engine runs which require an average of one hour and which take place less than once per day on average. LCAC operating at high power in the parking area generate up to approximately 67 dB Lmax at the closest residence. Normal conversations are held at approximately 60 dB and, during high-power LCAC operations in the closest parking spots, people conversing outdoors at the closest residence may need to raise their voices to be consistently understood. Noise levels are not sufficiently high to result in activity interference for people indoors. While this noise level has the potential to be moderately disruptive at times, the presence of the berm surrounding the LCAC parking area greatly reduces noise levels and the potential for activity interference. LCAC operations in the LCAC parking lot have been ongoing for several years and are not proposed to change in any way under the No Action Alternative.

Operations of LCAC amphibious craft and other vehicles in the Anzio Beach TAs occur 2,000 feet from the closest residence, and the berm surrounding the LCAC amphibious craft parking area is located between the TAs and the closest residence. Training events that could involve LCAC amphibious craft occur approximately twice per day on average. At the closest noise-sensitive location, LCAC amphibious craft noise levels generated in the Anzio Beach TAs are lower (approximately 64 dB Lmax) than LCAC noise generated in the LCAC parking area (approximately 67 dB Lmax). There are fewer training events in TA Anzio Beach (less than one per day on average), and less time is spent per training event with engines at high power (7.5 minutes on average) than is spent at high power in the parking area (90 minutes per sortie). LCAC training in TA Anzio Beach results in minimal additional potential for noise disruptions at the closest noise-sensitive location.

Vehicle movement occurs on beach/dune training areas along the northern shoreline of JEB Little Creek. This activity occurs throughout the year in support of up to 815 training events. Individual training events involve tactical and non-tactical vehicles (see Appendix D, Platform Glossary, for typical vehicle types) operating for as long as 2.5 hours. Noise levels generated by vehicles other than amphibious craft are comparable to noise levels generated by civilian vehicles of similar size and horsepower (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). Vehicle traffic noise is a normal part of baseline conditions on and surrounding JEB Little Creek. Continuation of vehicle operations under the No Action Alternative would not change the existing noise environment. Impacts would be negligible even for those training events in TAs located near noise-sensitive locations.

Six training events include the use of blank fire on non-beach/dune training areas. A cumulative total of up to 595,400 blank small arms rounds (including 7.62 mm, .50 caliber, and 5.56 mm) are fired annually at TAs Signal Point Field, Iwo Jima Field, and Rodriguez Field with 10 percent of rounds being fired between 10:00 p.m. and 7:00 a.m.

Under the No Action Alternative, training using blank-fire is currently conducted at JEB Little Creek. The Lake Whitehurst Fishing Station and Boat Ramp, which is located across Route 60 from TA Iwo Jima, closed in 2009 and there are no plans for the facility to re-open (VDGIF, 2017). The closest inhabited noise-sensitive location to TA Iwo Jima is residences approximately 1,600 feet away. Residences in East Beach are located about 1,900 feet from TA Signal Point. Training area Rodriguez Field is 1,800 feet from the Morale, Welfare, and Recreation (MWR) Recreational Vehicle Park. Noise levels at these locations associated with blank rounds firing in the JEB Little Creek TAs could exceed 87 dBP but do not exceed 104 dBP. Blank weapons firing noise exceeding 87 dBP on a daily basis is considered generally incompatible with noise-sensitive land uses per Army Regulation 200-1. However, although temporary disturbances due to noise may occur during training events, only six weapons – blank-fire training events occur per year. Noise events are relatively infrequent, occurring once every other month on

average, and no significant noise impacts will occur as a result of the continuation of this ongoing training.

Although noise levels associated with certain training events at JEB Little Creek under the No Action Alternative have the potential to be disturbing at noise-sensitive locations, noise events are relatively infrequent and impacts associated with the continuation of current training are not significant.

4.5.4.2 Alternative 1

Under Alternative 1, beach landings and weapons firing – blank-fire would be the same as under the No Action Alternative at this location and, as a result, there would be no significant impacts on the affected noise environment from beach landings and weapons firing – blank-fire.

Training with explosives on land is currently conducted by non-USFF commands. Two new training events would occur under Alternative 1 as compared to the No Action Alternative within the same training area as existing operations.

Under Alternative 1, explosives training on land would be conducted at a designated training location in the Normandy Dunes approximately 3,700 feet from the closest residence and 150 feet from the shoreline. Explosives noise levels decrease with increasing distance from the explosion. The proposed detonations, which would occur at night, would generate noise levels above 115 dBP but less than 130 dBP at the closest residence resulting in a moderate risk of noise complaints (see Section 4.5.2, Methodology, for information on noise metrics used in this EA). Noise complaints are an indicator of annoyance and interference with activities such as conversation and sleeping. In accordance with safety regulations, Navy personnel would confirm that areas exposed to hazardous conditions (e.g., noise levels exceeding 140 dBP, debris/fragment risk) are cleared of personnel not appropriately protected. Boaters that happen to be in the area during detonations, but outside of the area exposed to hazardous conditions (including noise at greater than 140 dBP) could experience noise levels as high as 139 dBP. As noted in Section 3.5.3.1 (JEB Little Creek, Airborne Noise), the EOD pit at TA Normandy Dune is currently used by non-USFF EOD units on an occasional basis for detonations of explosive charges. The addition of explosives training events at the EOD pit could result in temporary disturbances, but disturbances would be momentary and limited to two additional training events per year.

Under Alternative 1, two additional training events would occur with vehicle movement on beach/dune training areas along the northern shoreline of JEB Little Creek for one hour each as compared to the No Action Alternative. Vehicle training events involve tactical and non-tactical vehicles (see Appendix D, Platform Glossary, for typical vehicle types) that generate noise levels similar to those generated by civilian vehicles of comparable size and horsepower. Vehicle traffic noise is a normal part of baseline conditions on and surrounding JEB Little Creek, and, in this context, vehicle operations near noise-sensitive locations would result in minimal impacts as compared to the No Action Alternative. During times with typical ambient noise levels, vehicle training noise would not be audible at the closest residence to the TAs in which additional vehicle training would occur.

Alternative 1 would add two explosives events per year at a location currently being used for explosives training and a small number of vehicle training events (two events per year for a one hour duration) in training areas in locations distant from the closest residence (greater than 2,000 yards away). These actions would generate noise levels that are the same as existing explosives and vehicle training noise levels and would not result in significant noise impacts.

4.5.4.3 Alternative 2

Alternative 2 training events are the same as those under Alternative 1 at this location; as noted in Table 4.5-3, no additional training would occur. Impacts under Alternative 2 would be the same as under Alternative 1 and are discussed below (previous analysis is repeated for the reader's convenience).

Under Alternative 2, beach landings and weapons firing – blank-fire would be the same as under the No Action Alternative and, as a result, beach landings would not cause significant impacts from noise on recreational activities.

As is noted in Section 3.5.3 (JEB Little Creek), training with explosives on land is currently conducted at the EOD pit by non-USFF commands. The two new explosives training events that would occur under Alternatives 1 and 2 would occur within the same training area as existing operations. Noise levels decrease with increasing distance from the detonation point, and would have decreased to between 115 and 130 dBP at the closest residence 3,700 feet away (see Section 4.5.2, Methodology, for standards applicable to each noise metric). This noise level has been found to result in a moderate risk of noise complaints, with complaints being an indicator of annoyance and activity interference caused by noise. In accordance with safety regulations, Navy personnel would confirm that portions of the publically-accessible lower Chesapeake Bay that would be exposed to hazardous noise levels (i.e., greater than 140 dBP) are clear of people that are not adequately protected. Although the addition of explosives training events per year could result in temporary disturbances, the disturbances would be momentary and limited to two additional training events per year.

Two additional training events would occur with vehicle movement on beach/dune training areas along the northern shoreline of JEB Little Creek as compared to the No Action Alternative. Operations of vehicles generate noise levels similar to civilian vehicles of comparable size and horsepower. Roadways on and near JEB Little Creek are used heavily by civilian vehicles under baseline conditions. The addition of two vehicle training events per year would result in no changes to noise environment.

Because the two alternatives are identical in all aspects, noise impacts under Alternative 2 would be the same as under Alternative 1 at this location. Noise impacts under Alternative 2 would be not significant.

4.5.4.4 Summary

Noise levels generated by LCAC amphibious craft operations under the No Action Alternative and action alternatives may be disturbing at times, but the presence of a berm surrounding the LCAC parking area greatly reduces noise levels experienced at nearby noise-sensitive locations. The operations of tactical vehicles other than LCAC amphibious craft under the No Action Alternative and Alternatives 1 and 2 generate elevated noise levels comparable to civilian vehicles of similar size and horsepower. Vehicle traffic noise is a normal part of baseline conditions on and surrounding JEB Little Creek. Continuation of vehicle operations under the No Action Alternative and addition of two vehicle training events per year under the action alternatives would not change the existing noise environment.

Under Alternatives 1 and 2, an additional two detonations per year as compared to the No Action Alternative would be conducted in the EOD pit in Normandy Beach TA and would generate noise levels associated with a moderate risk of complaints (between 115 and 130 dBP) at the closest residence. These events would be very infrequent and would generate noise levels of the same or lower levels than those generated by detonations in the EOD pit currently.

Firing of blank small arms rounds under the No Action Alternative and action alternatives generates noise levels with some potential to be disturbing (between 87 and 104 dBP) at the closest residences to the training area in which the weapons – blank-fire is conducted.

There would be no additional training activity under Alternative 2 as compared to Alternative 1. Neither the continuation of ongoing training under the No Action Alternative nor the small number of additional training events under Alternatives 1 or 2 result in noise impacts that would be considered significant; there would be no significant impacts on the affected noise environment under the No Action, Alternative 1, or Alternative 2.

4.5.5 Joint Expeditionary Base Fort Story

The PTEA applicable to ambient noise at JEB Fort Story that contribute to the noise stressor includes beach landings, vehicle movement, explosives on land, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.5-4).

4.5.5.1 No Action Alternative

Approximately 379 beach landings occur on beach/dune training areas at JEB Fort Story. These beach landings primarily include LCAC amphibious craft as the platform. Noise generated by LCAC amphibious craft operations in the Utah Beach training areas has the potential to be disruptive at the First Landing State Park campground approximately 1,100 feet away (see Figure 2-5). An LCAC amphibious craft operating at the closest point in the Utah Beach training areas could generate maximum noise levels as high 81 dBA in the campground. However, most LCAC amphibious craft training is conducted at locations in the training area that are much further away generating lower noise levels. During training events, up to six LCAC amphibious craft make approaches to the training areas spending an average of 7.5 minutes at the beach conducting arrivals and departures.

There are 34 training events that could involve LCAC amphibious craft in the Utah Beach training areas per year and roughly 10 percent (3 per year) occur between the hours of 10:00 p.m. and 7:00 a.m. when noise is particularly likely to be disruptive to noise-sensitive receptors. Although individual LCAC amphibious craft operations noise may be disturbing to campers and other people nearby (which could include boaters off-shore), the training events occur less than once per week on average. The Virginia Department of Conservation and Recreation (VADCR) provides notice on the First Landing State Park website that the park is near a military training center that operates year-round in any weather at any time of day or night; park guests may experience unusual sights and loudness. The First Landing State Park website further notes that training usually ends by 10 p.m. and that these military activities pose no risk to park guests (VADCR, 2016).

The operations of other vehicle types in the JEB Fort Story training areas generate only localized increases in noise levels (see Table 3.5-5 and Table 3.5-6 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels) and do not measurably increase overall noise levels in areas where LCAC amphibious craft also operate. In recent years, no noise complaints have been received regarding vehicle operations at JEB Fort Story.

Table 4.5-4. Joint Expeditionary Base Fort Story Ambient Noise Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Noise*	*No. of Events*	*Noise*	*No. of Events*	*Noise*
Land – Beaches/ Dunes	Beach Landings	amphibious and small vessels	85	379 landings	3	165 landings		
	Vehicle Movement	tactical and non-tactical vehicles	412	4,735 hours	79	3,171 hours		
	Weapons Firing – Blank-Fire	small caliber	28	1,400 rounds	76	22,952 rounds		
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun (and shotgun slugs)	28	2,800 rounds	76	15,200 rounds		
Land – Non-Beaches/ Dunes	Explosives on Land	demolition materials and charge	108	• 80 events (average 8 detonations/event with maximum NEW of 1.25 pounds) • 28 events (1 detonation/event with maximum NEW of 1.25 pounds)	556	• 240 events (average 9 detonations/event with maximum NEW of 0.2 pounds) • 240 events (average 13 detonations/event with maximum NEW of 1.25 pounds) • 76 events (1 detonation/event with maximum NEW of 1.25 pounds)	56	• 56 events (1 detonation/event maximum NEW 1.25 pounds)
	Vehicle Movement	tactical and non-tactical vehicles	362	9,587 hours	240	60 hours	56	3,640 hours
	Weapons Firing – Blank-Fire	small caliber	192	4,868 rounds	480	5,280 rounds	56	2,912 rounds

Table 4.5-3. Joint Expeditionary Base Fort Story Ambient Noise Stressors [Continued]

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Noise*	*No. of Events*	*Noise*	*No. of Events*	*Noise*
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	84	8,400 rounds			56	5,600 rounds

Navy EOD training includes detonations on land and occurs throughout the year with a maximum NEW of 1.25-pound. EOD training occurs at JEB Fort Story in non-beach/dune areas. EOD training with explosive charges is conducted at EOD Range 1. As discussed in Section 3.5.4.1 (JEB Fort Story, Airborne Noise), EOD Range 1 is about 2,500 feet from the closest noise-sensitive location (hiking trails on First Landing State Park) and about 4,800 feet from the closest residences (which are east of the installation). Training events involving charges up to 1.25 pounds NEW are conducted entirely during daytime hours. About 40 percent of EOD training involving detonation of charges up to 1.25 pounds NEW occur between 10:00 p.m. and 7:00 a.m. Detonations of 1.25- pound charges expose the closest noise-sensitive locations (i.e., hiking trails on First Landing State Park and residences to the east of JEB Fort Story) to noise levels between 115 and 130 dBP (Figure 4.5-1). Peak noise levels in this range are associated with a moderate risk of complaints. When they occur, complaints are typically triggered by interference of noise with activities such as conversation. Although noise associated with detonations has the potential to be disturbing at times, no noise complaints have been received in recent years regarding explosives training. Explosives noise at levels that could pose a risk to hearing (i.e., greater than 140 dBP) remain within the boundaries of the installation.

Vehicle movement occurs on beach/dune (412 events per year) and non-beach/dune (362 events per year) training areas within JEB Fort Story. This activity occurs throughout the year in support of training events. Training events involving tactical and non-tactical vehicles (i.e., not amphibious craft) last for as long as four hours. Noise levels generated are comparable to civilian vehicles of similar size and horsepower (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). Civilian traffic noise generated along roadways on and near JEB Fort Story is a normal part of baseline conditions. Therefore, continuation of vehicle operations under the No Action Alternative would not change the existing noise environment even where it occurs in training areas near noise-sensitive locations.

The majority of training events using blank-fire occurs in non-beach/dune training areas. Noise levels associated with blank 5.56 mm rounds do not exceed 87 dBP at the closest off-installation noise-sensitive locations (i.e., First Landing State Park campground and trails), which is farther than 750 feet from training areas in which blank-fire training is conducted (see Table 3.5-1 in Section 3.5.1.1.1, Munitions and Equipment).

Approximately 11,200 non-lethal training ammunition rounds are expended as part of 112 training events each year within the boundaries of JEB Fort Story. The majority of these rounds are expended in non-beach/dune training areas.

EOD training with shotgun slugs (non-lethal training ammunition) is conducted in the explosives training areas up to 80 times per year, and an additional 28 shotgun training events are conducted in EOD Range 1. Each training event involves the firing of up to two shotgun rounds. The EOD training in the explosives training areas is conducted entirely during the daytime, but 40 percent of the training events conducted in EOD Range 1 occur between 10:00 p.m. and 7:00 a.m. As shown in Table 3.5-1 in Section 3.5.1.1.1 (Munitions and Equipment), a 12 gauge shotgun blast generates 104 dBP at a distance of 840 feet and 87 dBP at a distance of 2,830 feet. Training events are typically conducted toward the interior of the installation such that events within 840 feet of noise-sensitive locations are very rare and events within 2,830 feet are rare. The First Landing State Park campground, the closest noise-sensitive location to the explosive training areas, is located approximately 370 feet from the explosive training areas and occasionally experiences noise exceeding 104 but not 140 dBP. EOD Range 1 is about 2,500 feet from the closest noise-sensitive location (a portion of a hiking trail on First Landing State Park).

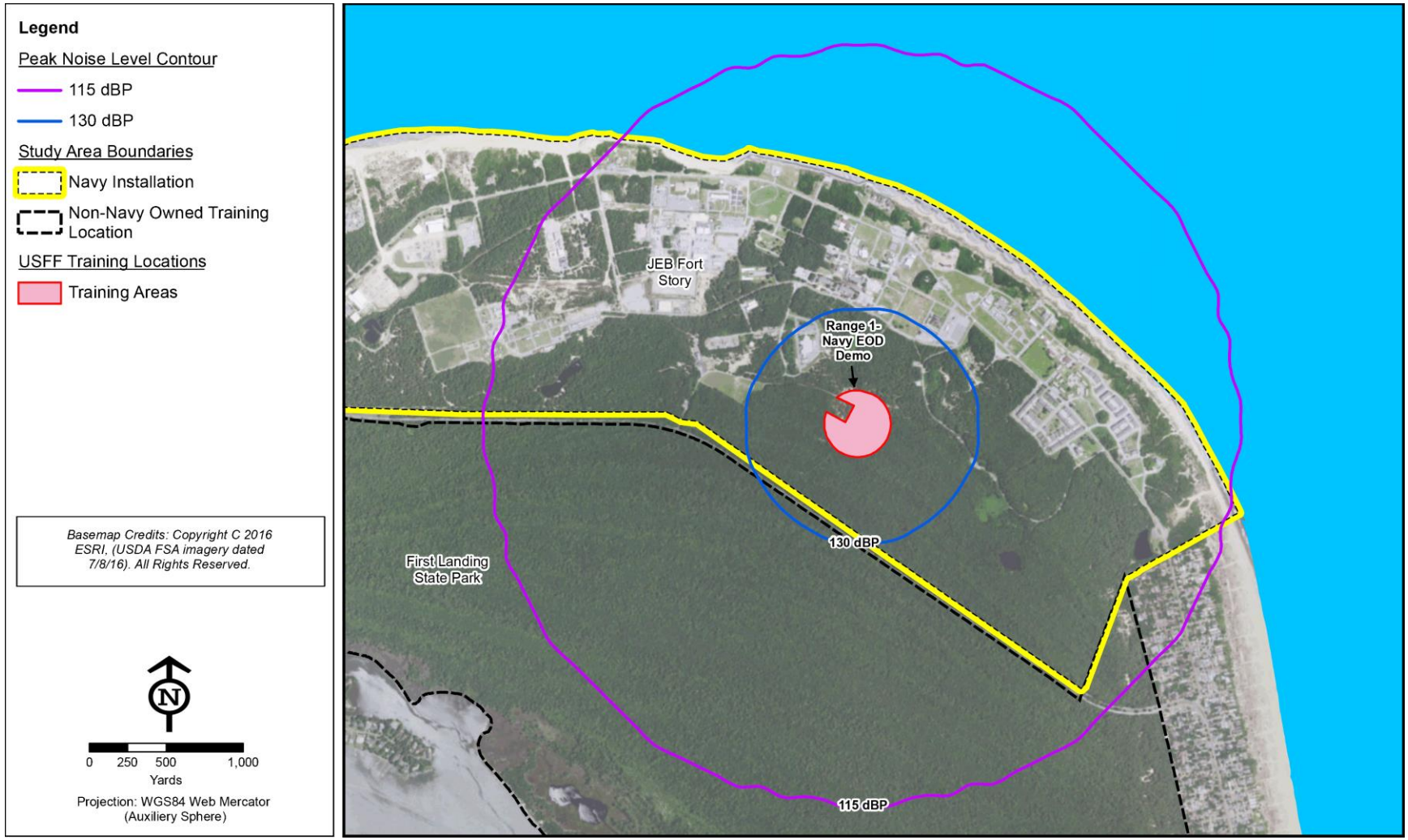

Figure 4.5-1. EOD Range 1 Peak Noise Level

The hiking trail experiences noise levels between 87 and 104 dBP generated by firing of shotgun rounds at EOD Range 1. Because the trail is not normally used at night, late-night training events at EOD Range 1 would not typically affect hikers. According to Army Regulation 200-1, noise-sensitive land uses are not normally recommended where small arms noise levels are regularly between 87 dBP and 104 dBP (i.e., Noise Zone 2) and are not recommended where noise levels regularly exceed 104 dBP (i.e., Noise Zone 3). However, due to the spatially distributed nature of training at JEB Fort Story, noise levels exceeding 87 dBP or 104 dBP are relatively rare, and no noise complaints have been received in recent years regarding shotgun training.

Paintball training (non-lethal training ammunition) generates relatively low noise levels that are not audible off-installation under normal conditions. Noise studies that reflect the use of non-lethal training ammunition/paintballs/marking cartridges are not readily available; however, in general, non-lethal training ammunition weapons use compressed gas as the ignition source and thus generate less noise than blank or live-fire weapons.

Although noise levels generated by beach landings, blank weapons firing, non-lethal training ammunition firing, and explosives under the No Action Alternative have some potential to be disturbing at noise-sensitive locations, training events would be distributed in training areas within JEB Fort Story such that loud noise events at noise-sensitive locations are relatively infrequent. Impacts associated with the continuation of ongoing training are not significant.

4.5.5.2 Alternative 1

Under Alternative 1, approximately 165 additional beach landings would occur at JEB Fort Story as compared to the No Action Alternative. These beach landings primarily include LCAC amphibious craft as the platform. On average, one additional event per year would occur between 10:00 p.m. and 7:00 a.m., and the other two additional events per year would occur during 7:00 a.m. to 10:00 p.m. when people are less sensitive to noise. As described in Section 4.5.5.1 (No Action Alternative), LCAC amphibious craft operations noise has the potential to be disturbing to campers in nearby First Landing State Park campground, particularly when the noise occurs late at night. However, LCAC amphibious craft operations are generally conducted in portions of the training area that are relatively far from noise-sensitive locations (primarily greater than 2,000 yards from the beach landings), and no noise complaints have been received in recent years regarding vehicle noise at JEB Fort Story. In addition, the VADCR provides notice on the First Landing State Park website that the park is near a military training center that operates year-round in any weather at any time of day or night; park guests may experience unusual sights and loudness. The First Landing State Park website further notes that training usually ends by 10 p.m. and that these military activities pose no risk to park guests (VADCR, 2016). Alternative 1 would increase the frequency of occurrence of noise events relative to baseline conditions (which are the same as the No Action Alternative), but would not change the noise levels of individual noise events.

Explosives operations under Alternative 1 would increase more than five times over those discussed for the No Action Alternative. These events would be distributed throughout the year. As under the No Action Alternative, EOD training would occur at JEB Fort Story in non-beach/dune areas within the existing explosive training areas.

Under Alternative 1, the Navy would conduct an additional 240 training events per year in EOD Range 1 with each event involving an average of nine charges of up to 0.2-pound NEW and with about half of the

detonations occurring between 10:00 p.m. and 7:00 a.m. An additional 240 training events at EOD Range 1 would occur with each event involving an average of 13 charges of up to 1.25 pounds NEW. Training events with charges up to 1.25 pounds would not occur between 10:00 p.m. and 7:00 a.m. Detonation of individual 1.25-pound charges would generate the same sound levels generated by individual 1.25-pound NEW charges under the No Action Alternative. Noise levels at portions of the First Landing State Park trail system and at residences east of the installation (primarily greater than 1,000 yards away) would be between 115 and 130 dBP (see Figure 4.5-1). These noise levels associated with a moderate risk of complaints. Detonation of 0.2-pound NEW charges generates lower noise levels, affecting hiking trails on First Landing State Park but no residences at levels between 115 and 130 dBP. Peak noise levels between 115 and 130 dBP are associated with a moderate risk of complaints, which are typically triggered by noise interference with activities such as conversation. Explosive noise levels at off-installation locations would not exceed 140 dBP and, therefore, would not pose a risk to hearing.

Explosives training at Building 900 in the Omaha Beach training area would be conducted 76 times per year. These training events would take place only during daylight hours, and each event would include detonation of one 1.25-pound NEW. Building 900 is 4,100 feet from the closest installation boundary where it abuts the First Landing State Park campground. As shown in Figure 4.5-2, noise levels in portions of the campground and on certain hiking trails would exceed 115 dBP but not 130 dBP resulting in a moderate risk of complaints. Building 900 is about 890 feet from the shore. Boaters that happen to be immediately offshore of Building 900 could experience noise levels as high as 139 dBP. Open water is outside of the area affected by noise levels at or greater than 140 dBP, and, therefore, boaters' hearing would not be at risk.

Although detonations would become more frequent (556 total additional training events per year relative to the No Action Alternative) and would have the potential to be disturbing at times, disturbances would be momentary and noise events at EOD Range 1 would be no louder than ongoing detonations at EOD Range 1. Detonations at Building 900 would affect certain areas at elevated noise levels that are not affected by elevated noise levels by detonations at EOD Range 1, but these events would be relatively rare (76 training events per year) and would occur only during daylight hours. There would be no significant impacts associated with explosives training noise under Alternative 1.

Alternative 1 would include approximately 3,231 hours per year (3,171 in beaches/dunes and 60 hours in non-beaches/dune training areas) of vehicle movement associated with 319 events (79 events in beach/dune and 240 events in non-beach dune training areas) over the amount analyzed in the No Action Alternative. Each of the 319 additional tactical and non-tactical vehicles training events under Alternative 1 would involve vehicles running in the training area for as long as 30 minutes. The vehicles (see Appendix D, Platform Glossary, for typical vehicle types) generate noise levels that are comparable to civilian vehicles of similar size and horsepower (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). Under baseline conditions, civilian vehicle traffic on roadways on and near JEB Fort Story is a very common noise source throughout the affected environment. The addition of vehicle training events under Alternative 1 would not change the existing noise environment even where it occurs in training areas near noise-sensitive locations.

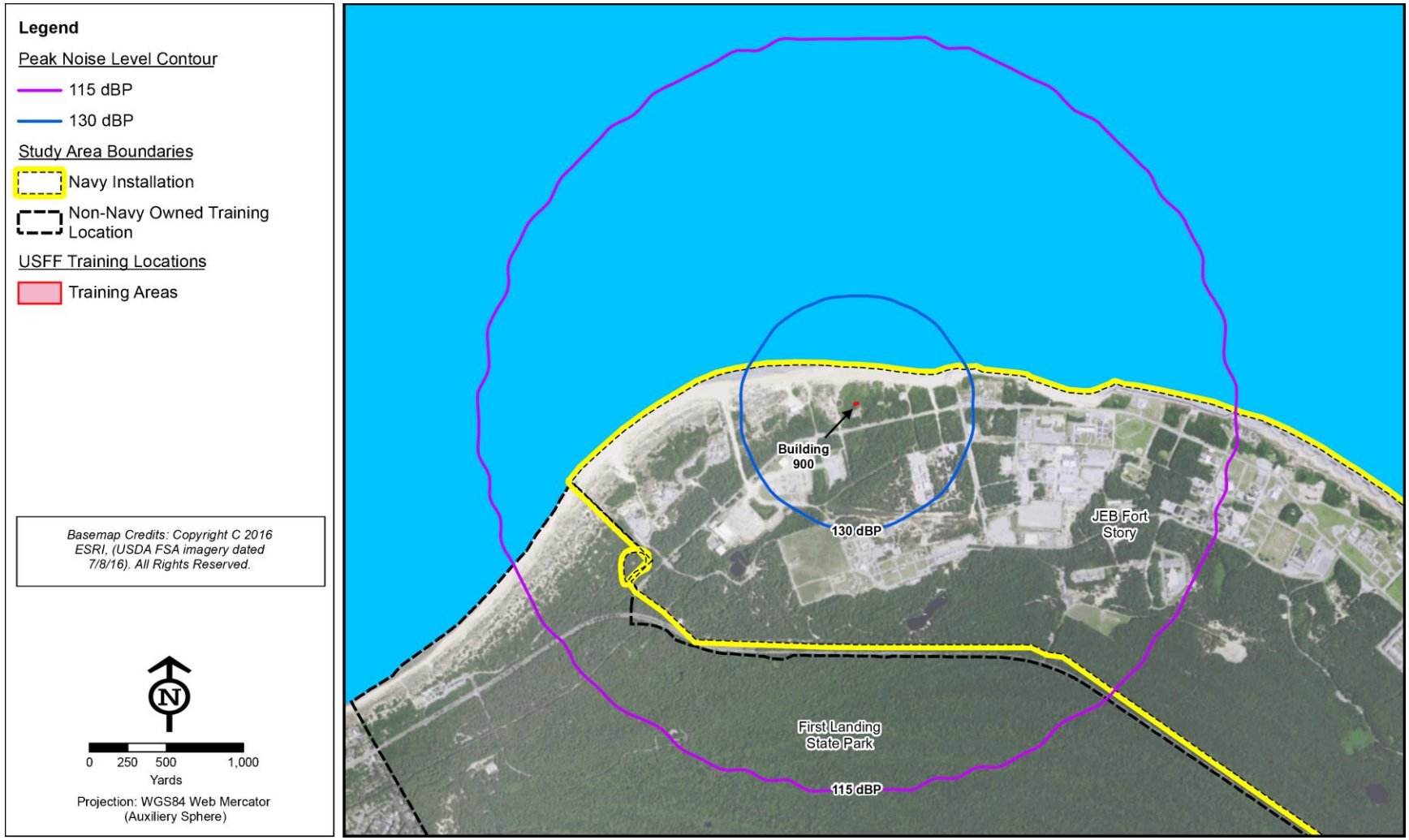

Figure 4.5-2. Building 900 Peak Noise Levels

Approximately 28,230 additional blank-fire rounds would be used under Alternative 1 as part of 556 additional training events per year. These additional rounds would be fired at multiple training areas within JEB Fort Story. Additional blank-fire (5.56 and 7.62 mm) in training area Omaha Beach (see Figure 2-5) would generate noise levels less than 87 dBP at First Landing State Park campground, which is 3,600 feet away (Table 3.5-5).

Shotgun rounds, which are sometimes used as part of EOD training, generate noise levels conservatively estimated to be 87 dBP at 2,830 feet and 104 dBP at 840 feet (Table 3.5-5). An additional 240 EOD training events would be conducted at EOD Range 1, another 240 events would be conducted in the explosives training areas, and 76 training additional events would be conducted at Building 900. The additional EOD training events in the explosive training areas and in EOD Range 1 would each involve firing of up to two shotgun rounds each, and the training events at Building 900 would include approximately 35 shotgun rounds each. The 240 additional EOD training events conducted in Range 1 and Building 900 would be entirely during daylight hours, but approximately 50 percent of the 240 proposed additional EOD training events in the explosives training areas would occur during 10:00 p.m. to 7:00 a.m. (i.e., 22 percent of total new events involving shotgun firing proposed under Alternative 1 would occur between 10:00 p.m. and 7:00 a.m.). Events conducted between 10:00 p.m. and 7:00 a.m. would be more likely to disturb campers and residents but would have no effects on the hiking trail, which is not normally used late at night. Firing of shotgun rounds at EOD Range 1 would result in portions of a hiking trail at First Landing State Park (which is 2,500 feet away) being exposed to noise levels between 87 and 104 dBP (Noise Zone 2), but all other noise-sensitive locations would be exposed to less than 87 dBP. Shotgun rounds fired as part of training at Building 900 would generate noise levels below 87 dBP at the closest noise-sensitive location (First Landing State Park campground), which is 4,700 feet away. The explosives training areas comprise 388 acres (1.6 square kilometers), which fill many of the undeveloped portions of JEB Fort Story. The noise level received at sensitive locations when a shotgun is fired depends on the location in the explosive training areas at which the firing occurs. Noise-sensitive portions of First Landing State Park (e.g., campground and hiking trails) and residences located east of the installation would be exposed to noise levels greater than 104 dBP (Noise Zone 3) when EOD training is conducted within 840 feet of those locations. The same noise-sensitive locations would be exposed to noise levels exceeding 87 dBP (Noise Zone 2) when shotguns are fired within a distance of 2,830 feet. According to Army Regulation 200-1, regularly occurring small-arms noise exceeding 87 dBP (i.e., many events on most days exceed this level) is normally not compatible with noise-sensitive land uses, and regularly occurring small-arms noise above 104 dBP is not compatible with sensitive land uses. However, most of the 388 acres that make up the explosives training areas are more than 840 feet or 2,830 feet from noise-sensitive locations. Therefore, most of the 240 EOD training events conducted per year in the explosives training areas are conducted at locations far enough from noise-sensitive locations that noise does not exceed 87 dBP at the noise-sensitive locations. Because of the spatially distributed nature of the EOD training, noise levels at the campground, hiking trail, and residences would exceed 87 or 104 dBP relatively infrequently. Given that high noise levels would be experienced only infrequently, the campground, hiking trail, and residences would not be considered incompatible land uses in accordance with Army Regulation 200-1. Noise generated by the firing could be disturbing, but would be relatively infrequent.

Implementation of Alternative 1 would more than double the total number of paintball rounds fired under the No Action Alternative (Table 4.5-4). However, the number of training events would be distributed throughout the year. All of the additional non-lethal training ammunition would be

expended in beach/dune training areas. Paintball training conducted in several training areas would not result in noise levels that would be considered disturbing. EOD teams use shotgun slugs fired from close range to disrupt simulated explosive devices. Each of the 240 EOD training events per year in the explosive training area would include a small number of live shotgun rounds (one to two rounds per event), which would generate similar noise levels to the blank shotgun rounds discussed in the weapons firing – blank-fire section above. Like blank training, EOD training with live shotgun rounds would be distributed throughout a large (388-acre) training area. Firing at locations that would result in noise levels exceeding 87 dBP or 104 dBP (Noise Zone 2) at noise-sensitive land uses would be relatively infrequent. Although noise levels could be disturbing at times, exposure would not be frequent enough for the campground, hiking trails, or residences to be considered incompatible land uses.

Noise impacts associated with additional beach landings, vehicle movement, blank weapons fire, non-lethal training ammunition use, and explosives use under Alternative 1 would not be significant.

4.5.5.3 Alternative 2

Training events in the beach/dune training areas at JEB Fort Story under Alternative 2 would be the same as Alternative 1, but training activities under Alternative 2 would increase in the non-beach/dune areas compared to Alternative 1, as noted in Table 4.5-4. Impacts associated with those Alternative 1 PTEAs are discussed below along with the new Alternative 2 PTEAs.

Under Alternative 2, beach landings would be the same as under Alternative 1 and approximately 165 additional beach landings would occur at JEB Fort Story as compared to the No Action Alternative. These beach landings primarily include LCAC amphibious craft as the platform. On average, one additional event per year would occur between 10:00 p.m. and 7:00 a.m., and the other two additional events per year would occur during 7:00 a.m. to 10:00 p.m. when people are less sensitive to noise. As described in Section 4.5.5.1 (No Action Alternative), LCAC amphibious craft operations noise has the potential to be disturbing to campers in nearby First Landing State Park campground (primarily greater than 2,000 yards from the beach landings), particularly when the noise occurs late at night. Noise generated by LCAC operations could also be annoying to boaters that happen to be in waters just offshore from the training area while training is under way. LCAC amphibious craft operations are generally conducted in portions of the training area that are relatively far from noise-sensitive locations, and no noise complaints have been received in recent years regarding vehicle noise at JEB Fort Story.

Alternative 2 would add 56 additional on-land detonations for EOD training on non-beach/dune training areas over the number in Alternative 1, resulting in 612 additional training events over the No Action Alternative. The detonations would occur throughout the year. The additional explosives training events per year would be conducted in EOD Range 1 with each event including a single 1.25-pound NEW detonation. All detonations would occur during daylight. Noise levels generated during each of these detonations would be the same as is generated during detonation of 1.25 pound NEW charges under the No Action Alternative. As is the case with ongoing detonations of 1.25pound NEW charges, the additional detonations of 1.25pound charges would result in portions of the First Landing State Park trail system and residences to the east of JEB Fort Story, which are the closest noise-sensitive locations (primarily greater than 1,000 yards away), being exposed to noise levels between 115 and 130 dBP (see Figure 4.5-1). Peak noise levels in this range are associated with a moderate risk of complaints. When they occur, complaints are typically triggered by noise interference with activities such as conversation. Additional detonations conducted under Alternative 2 would be equivalent in sound level to the detonations conducted under the No Action Alternative and Alternative 1, but would occur

approximately 10 percent more often than under Alternative 1. There would be no significant impacts associated with explosives training noise under Alternative 2.

Vehicle movement operations in non-beach/dune training areas would increase from the levels analyzed in Alternative 1 by 3,640 hours annually (Table 4.5-4). Alternative 2 would involve an increase of 6,871 hours over the No Action Alternative. Each of the 375 additional tactical and non-tactical vehicles training events under Alternative 2 would involve vehicles running in the training area for as long as 30 minutes. Appendix D (Platform Glossary) lists tactical and non-tactical vehicle types that could be involved in the training. The vehicles generate noise levels that are comparable to civilian vehicles of similar size and horsepower (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). Civilian vehicle traffic noise is a near-constant presence on and near JEB Fort Story, and the addition of vehicle training events under Alternative 2 would not change the existing noise environment. Noise impacts would not be significant.

Approximately 2,800 additional blank-fire rounds would be used under Alternative 2 relative to Alternative 1. These additional rounds would be fired as part of 56 training events per year at TA Wilderness. Alternative 2 includes approximately 31,028 additional blank rounds as compared to the No Action Alternative (Table 4.5-4). Weapons – blank-fire (5.56 mm) would be conducted in TA Wilderness as part of EOD training. Each of the 56 training events per year (i.e., about one per week on average) would include firing of approximately 50 rounds of blank 5.56 mm ammunition. Firing of blank rounds would be limited to daylight hours. TA Wilderness is 52 acres in size and extends from the eastern installation fenceline into the interior of the base by about 1,600 feet. The closest noise-sensitive location to the training area is residences which are located about 50 feet from the fenceline. The noise level received at the residences depends on the locations from which the rounds are fired. Firing of blank 5.56 mm rounds from within about 740 feet of the residences would result in noise levels exceeding 87 dBP (Noise Zone 2) at the residences, while firing of the same rounds within 120 feet of the residences would result in noise levels exceeding 104 dBP (Noise Zone 3) but not 140 dBP at the residences. According to Army Regulation 200-1, regularly-occurring small arms noise exceeding 87 dBP (i.e., many events on most days exceed this level) are normally not compatible with noise-sensitive land uses, and regularly-occurring small arms noise above 104 dBP are not compatible with sensitive land uses. If firing of blanks were spread evenly throughout the training area, about 10 percent of 5.56 mm rounds (about 290 per year) would be fired within 120 feet of the residences resulting in noise levels above 104 dBP and 40 percent of the rounds (about 1,130 per year) would be fired within 740 feet of the residences resulting in noise levels between 87 and 104 dBP. Blank weapons fire noise levels would not exceed 140 dBP at the residences, and risk of hearing loss would be minimal. TA Wilderness is currently vegetated with established tree growth throughout and, as a result, noise propagation would be impacted by the presence of established vegetation between the training event location and off-installation residences. In addition, while the potential impacts discussed assume a distribution throughout the training area, the majority of training would occur at the western boundary of the training area, which is the furthest distance from residences (approximately 1,500 feet away). Assuming these conditions, noise generated by the firing could be disturbing, but would be relatively infrequent, and would not be significant.

Under Alternative 2, non-lethal weapons training would increase over the level analyzed for Alternative 1 by approximately 5,712 rounds annually or a total of 20,912 rounds over the No Action Alternative. Paintball training would not result in noise levels that would be considered disturbing. Each of the 56 training events per year (i.e., about one per week on average) would include firing of approximately

two shotgun rounds. Firing of shotgun rounds would occur entirely in daylight hours. Residences immediately east of TA Wilderness would be exposed to noise levels exceeding 87 dBP when shotguns are fired within a distance of 2,830 feet (which encompasses the entire TA Wilderness) and would be exposed to noise levels exceeding than 104 dBP (Noise Zone 3) but not 140 dBP (i.e., minimal hearing loss risk) when shotgun rounds are fired within 840 feet of the residences. If firing of blanks were spread evenly throughout the training area, about 50 percent of the shotgun rounds (about 56 rounds per year) would be fired within 740 feet of the residences, resulting in noise levels exceeding 104 dBP (Noise Zone 3), and the remaining 50 percent (about 56 rounds per year) would be fired at distances resulting in noise levels between 87 and 104 dBP (Noise Zone 2) at the residences. Disturbing noise levels would occur infrequently as the number of shotgun rounds fired would be low—approximately 112 per year.

Noise impacts associated with additional beach landings, vehicle movement, blank weapons fire, non-lethal training ammunition use, and explosives use under Alternative 2 would not be significant.

4.5.5.4 Summary

Noise associated with the loudest surface vehicles operating on JEB Fort Story (i.e., LCAC amphibious craft) under the No Action Alternative is sufficiently loud to be disruptive in First Landing State Park campground, but no noise complaints have been received in recent years. Under Alternative 1, there would be an additional three training events per year that could involve LCAC amphibious craft. The noise levels generated by individual LCAC operations during these events would be the same as are generated by LCAC operations under the No Action Alternative. No additional LCAC amphibious craft operations would be conducted under Alternative 2.

The operations of other vehicle types in the JEB Fort Story training areas generate only localized increases in noise levels and do not measurably increase overall noise levels in areas where LCAC amphibious craft also operate. The operation of vehicles other than LCAC amphibious craft under Alternatives 1 and 2 would be conducted in an environment where civilian traffic noise is a very common part of the noise environment. The proposed increases in vehicle operations would not result in significant noise impacts.

Under Alternatives 1 and 2, the number of detonations conducted in EOD Range 1 would increase, but the maximum charge size would remain the same. Detonations would result in the trail system at First Landing State Park and residences east of the installation being exposed to noise levels between 115 and 130 dBP, which result in a moderate risk of noise complaints. Explosive charges detonated at Building 900 in Omaha training area under Alternative 1 or 2 would result in the campground at First Landing State Park being exposed to noise levels between 115 and 130 dBP. Explosives noise at levels that could pose a risk to hearing (i.e., greater than 140 dBP) would remain within the boundaries of the installation. Noise impacts associated with explosives training under Alternatives 1 and 2 would not be significant.

Under all alternatives, blank-fire and non-lethal ammunition firing would generate noise levels exceeding 87 dBP (Noise Zone 2) and less frequently exceeding 104 dBP (Noise Zone 3) at noise-sensitive locations including residences, a campground, and a hiking trail. Blank fire and non-lethal ammunition firing would not exceed 140 dBP at off-station locations, and hearing loss risk would be minimal. Although noise events could be disturbing, noise events exceeding 87 or 104 dBP would be relatively infrequent.

Neither the continuation of ongoing training under the No Action Alternative nor the additional training events under Alternatives 1 or 2 result in noise impacts that would be considered significant; therefore, there would be no significant impacts on the affected noise environment under the No Action, Alternative 1, or Alternative 2.

4.5.6 Dam Neck Annex and Camp Pendleton

The PTEAs applicable to ambient noise at Dam Neck Annex and Camp Pendleton that contribute to the noise stressor include beach landings, vehicle movement, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.5-5).

Table 4.5-5. Dam Neck Annex and Camp Pendleton Ambient Noise Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Noise*	*No. of Events*	*Noise*	*No. of Events*	*Noise*
Land – Beaches/ Dunes	Beach Landings	amphibious	22	380 landings				
	Vehicle Movement	tactical and non-tactical vehicles	64	3,715 hours	76	291 hours		
	Weapons Firing – Blank-Fire	small caliber			76	7,600 rounds		
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun			76	30,400 rounds		
Land – Non-Beaches/ Dunes	Weapons Firing – Blank-Fire	small caliber	28	1,400 rounds				

4.5.6.1 No Action Alternative

Approximately 380 beach landings occur on beach/dune training areas at Dam Neck Annex and Camp Pendleton. These beach landings primarily include LCAC amphibious craft as the platform. Conventional and LCAC amphibious craft landings take place at Camp Pendleton Beach and Dam Neck Annex North Beach at their current levels noted in Table 4.5-5. LCAC amphibious craft are the loudest vehicles involved in the amphibious training generating up to 86 dBA at the closest residences to the portion of Camp Pendleton Beach used for landings (approximately 600 feet away) (see Table 3.5-1). Conventional amphibious landing craft (e.g., Landing Craft, Utility) taking part in amphibious landing operations generate elevated noise levels in the immediate vicinity of the vehicle. During beach landing training events, LCAC amphibious craft approach the beach, spend an average of 7.5 minutes practicing approaches and departures, and then depart. Only about 22 training events per year involve LCAC amphibious craft and less than 10 percent of those events take place between 10:00 p.m. and 7:00 a.m.

Each event involves an average of three LCAC amphibious craft. Although noise generated by amphibious landing training is noticeable and may be disturbing particularly when it occurs late at night, there are relatively few training events per year and most of the training events do not occur at the closest point on the beach to residences. LCAC amphibious craft overland training involves the amphibious craft coming ashore at Dam Neck Annex North Beach and travelling parallel to the beach for approximately 2,000 feet. These training events require spending greater amounts of time ashore with engines at high power settings. The closest residences to LCAC amphibious craft overland training maneuvers course are apartments located 3,200 feet to the west and residences located 2,900 feet to the north. At these distances, LCAC amphibious craft maximum noise level is roughly 72 dBA, and is less likely to be disturbing. Boaters hearing LCAC amphibious craft operations may be annoyed. However, boaters do not often stay in one place for long periods of time, and so are only exposed to elevated noise levels briefly. LCAC amphibious craft pilots generally avoid operating close to non-participating vessels to minimize collision risk and as part of being a good neighbor. The greater separation distance results in reduced noise levels for the civilian vessels.

Vehicle movement occurs on beach/dune training areas within Dam Neck Annex and Camp Pendleton. This activity occurs throughout the year in support of training events. Tactical and non-tactical vehicle types used in training events are described in Appendix D (Platform Glossary). Vehicles other than amphibious craft generate noise levels comparable to civilian vehicles of similar size and horsepower (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). Vehicle traffic noise is a normal part of baseline conditions in the affected environment. Continuation of vehicle operations at Dam Neck Annex under the No Action Alternative would not change the existing noise environment. Impacts would be negligible even for those training events in TAs located near noise-sensitive locations.

Only 28 training events with blank-fire occur in non-beach/dune training areas. An estimated 50 rounds of blank 5.56 mm ammunition are fired during each Field Training Exercise. Approximately 40 percent of exercises occur between 10:00 p.m. and 7:00 a.m. The closest residences to the Shipboard Trainer and Baum Village which are located 960 feet and 2,500 feet away, respectively, are exposed to peak noise levels below 87 dBP during these training events. Blank weapons firing noise would be audible at the closest residences, but levels would be below Noise Zone 2 and 3 levels. Therefore, noise impacts under the No Action Alternative are not significant.

4.5.6.2 Alternative 1

Under Alternative 1, beach landings would be the same as under the No Action Alternative at this location and, therefore, beach landings would not cause significant impacts from noise to nearby residences or boaters.

Alternative 1 would include 291 additional hours of vehicle operations over the amount analyzed in the No Action Alternative. The additional vehicle movement would occur on beach/dune training areas within Dam Neck Annex and Camp Pendleton. Each of the 76 additional tactical and non-tactical vehicles training events under Alternative 1 would involve vehicles running in the training area for as long as 30 minutes. Tactical and non-tactical vehicles generate noise levels similar to those generated by civilian vehicles of comparable size and horsepower (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). Traffic noise generated by civilian vehicles is a near-constant noise source in the affected area, and the addition of vehicle training events Dam Neck Annex training areas would not change the noise environment. Noise impacts would not be significant.

Approximately 7,600 additional blank-fire rounds would be used under Alternative 1 as compared to the No Action Alternative. These additional rounds would be fired along the beach/dune training areas. Firing of 5.56 mm blank rounds would generate noise levels below 87 dBP at the closest residences which are located 1,300 feet from the training area. Firing of 7.62 mm blank rounds generates between 87 and 104 dBP (Noise Zone 2) at this distance (see Table 3.5-1 in Section 3.5.1.1.1, Munitions and Equipment and Section 4.5.2, Methodology, for standards applicable to each noise metric) resulting in some potential for disturbance. The noise generated by firing of 7.62 mm blank rounds decreases to below 87 dBP at a distance of 3,270 feet. Roughly half of the training area is more than 3,270 feet from the nearest residence. If training occurs randomly throughout the training area, this means that only about half of the training events per year (i.e., 38) would result in noise levels at the closest residence exceeding 87 dBP (Noise Zone 2). Thirty-eight events per year equates to about one event per 10 days on average. Alternative 1 training would not take place during the night. Although residences that are not exposed to noise levels above 87 dBP under the No Action Alternative would be exposed to noise levels between 87 and 104 dBP (Noise Zone 2) under Alternative 1, noise events exceeding 87 dBP would be relatively infrequent. Given the relatively low number of potentially disturbing events, noise impacts would not significant.

USFF weapons firing with non-lethal training ammunition does not currently occur at Dam Neck Annex and Camp Pendleton. Implementation of Alternative 1 would include the use of approximately 30,400 rounds of non-lethal training ammunition on the beach/dune training areas. Paintball guns generate less noise than 5.56 mm blanks, and would not be disturbing at off-installation locations. Based on the above analysis, noise impacts associated with additional training events proposed under Alternative 1 would not be considered significant.

4.5.6.3 Alternative 2

Alternative 2 training events are the same as those under Alternative 1 at this location; as noted in Table 4.5-5, no additional training would occur. Impacts under Alternative 2 would be the same as under Alternative 1 and are discussed below (previous analysis is repeated for the reader's convenience).

Under Alternative 2, beach landings would be the same as under the No Action Alternative at this location and, therefore, beach landings would not cause significant impacts from noise to nearby residences or boaters.

Alternative 2 would include 291 additional hours of vehicle operations over the amount analyzed in the No Action Alternative and would be the same as Alternative 1. Vehicle movement occurs on beach/dune training areas within Dam Neck Annex and Camp Pendleton. Each additional vehicle training event under Alternative 2 would involve vehicles running for up to 30 minutes. Tactical and non-tactical vehicles (see Appendix D, Platform Glossary, for typical vehicle types) generate noise levels similar to those generated by civilian vehicles (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). As civilian traffic is a near-constant noise source in the affected area, noise generated by an increase in tactical and non-tactical vehicles within the installation would not change the noise environment.

As with Alternative 1, approximately 7,600 additional blank-fire rounds would be used under Alternative 2 as compared to the No Action Alternative. These additional rounds would be fired along the beach/dune training areas. At the closest residences located 1,300 feet north of the training area, firing of 5.56 mm blank rounds would generate noise levels below 87 dBP. However, firing of 7.62 mm blank rounds generates between 87 and 104 dBP (Noise Zone 2) at this distance resulting in some potential for disturbance (see Section 4.5.2, Methodology, for standards applicable to each noise metric). The noise generated by firing of 7.62 mm blank rounds decreases to below 87 dBP at a distance of 3,270 feet. About half of the training area is more than 3,270 feet from the closest residence. If it is assumed that training events occur randomly throughout the training area, about half of the training events can be assumed to be within 3,270 feet (resulting in noise levels above 87 dBP at the residences) while the other half of the training events are farther than 3,270 and result in noise levels below 87 dBP at the closest residences. Because the number of potentially disturbing events is relatively low, noise impacts would not significant.

USFF weapons firing with non-lethal training ammunition does not currently occur at Dam Neck Annex and Camp Pendleton. As under Alternative 1, implementation of Alternative 2 would include the use of approximately 30,400 rounds of non-lethal training ammunition on the beach/dune training areas. Paintball guns generate less noise than 5.56 mm blanks, and would not be disturbing at off-installation locations. As under Alternative 1, noise impacts associated with additional training events proposed under Alternative 2 would not be considered significant.

4.5.6.4 Summary

Under all alternatives, LCAC amphibious craft operations generate noise levels that could be disturbing at the closest residences to the portions of the beach used for beach landing practice. However, there are only 22 training events per year involving LCAC amphibious craft and less than 10 percent of the events occur between 10:00 p.m. and 7:00 a.m. Operations of other vehicles generate noise levels similar to those generated by civilian vehicle traffic under baseline conditions on a near-constant basis, and would not change the noise environment. Additional operations of vehicles under Alternatives 1 and 2 would not result in changes in the noise environment. No significant noise impacts would result from vehicle operations under the No Action Alternative, Alternative 1, or Alternative 2.

Firing of 5.56 mm blank rounds under the No Action Alternative and under Alternatives 1 and 2 would result in noise levels below 87 dBP at the nearest residences. Firing of 7.62 mm blank rounds would generate noise levels between 87 and 104 dBP (Noise Zone 2) only if the rounds are fired within 3,270 feet of the residences. Potentially disturbing noise levels would be experienced during only about half of the 76 training events proposed under Alternatives 1 and 2. Because potentially disturbing noise levels would occur relatively infrequently at the residences under all three of the alternatives, there would be no significant impact on noise under the No Action, Alternative 1, or Alternative 2.

4.5.7 Naval Auxiliary Landing Field Fentress

The PTEAs applicable to ambient noise at NALF Fentress that contribute to the noise stressor include equipment use, vehicle movement, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.5-6).

Table 4.5-6. NALF Fentress Ambient Noise Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Noise*	*No. of Events*	*Noise*	*No. of Events*	*Noise*
Land – Non-Beaches/ Dunes	Equipment Use	diesel generators					4	6,300 hours
	Vehicle Movement	tactical and non-tactical vehicles	90	4,500 hours			4	1,072 hours
	Weapons Firing – Blank-Fire	small arms	90	4,500 rounds			4	12,800 rounds
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	90	9,000 rounds				

4.5.7.1 No Action Alternative

Vehicle movement occurs on non-beach/dune training areas within NALF Fentress. This activity occurs throughout the year in support of training events. Ground vehicle operations on NALF Fentress generate noise levels similar to civilian vehicles on local roads (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). Tactical and non-tactical vehicles would operate for up to four hours during each training event per year. Civilian vehicles traffic on local roadways is a common noise source which is audible throughout the affected environment. Continuation of the ongoing vehicle training under the No Action Alternative does not change the existing noise environment. Noise impacts associated with vehicle training are not significant.

Approximately 4,500 blank-fire rounds are used at NALF Fentress. Firing of 5.56 mm blank rounds is conducted near the NALF Fentress bunkers at distances of greater than 740 feet from the nearest residences. Noise levels at nearest residences are below 87 dBP (see Table 3.5-1 in Section 3.5.1.1.1, Munitions and Equipment) and are not disturbing.

Approximately 9,000 non-lethal training ammunition rounds are expended each year within the boundaries of NALF Fentress. Paintballs are less loud than 5.56 mm blank rounds, and do not generate noise levels that are disturbing at the closest residences (greater than 740 feet away).

Noise associated with ongoing training is audible at the closest residences, but not at levels considered disturbing. Therefore, noise impacts generated by continuing operations at NALF Fentress are not considered significant.

4.5.7.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, there would be no significant impacts on the affected noise environment.

4.5.7.3 Alternative 2

Under Alternative 2, weapons firing – non-lethal training ammunition would be the same as under the No Action Alternative and Alternative 1 at this location and, therefore, there would be no significant impacts to noise.

Alternative 2 would introduce equipment use in the form of diesel generator operations (approximately 6,300 hours per year associated with four events) for USFF training at NALF Fentress. Operation of the diesel generators would be spread across any given year. Diesel generators are similar to other machinery noise sources that are part of the baseline noise environment on NALF Fentress. The baseline noise environment at NALF Fentress also includes frequent jet aircraft operations and other military activities. Equipment would be properly muffled in accordance with DoD policies, and at distances of greater than 600 feet would not interrupt normal speech communication (see Section 3.5.1.1.1, Munitions and Equipment). At NALF Fentress, equipment use would take place in training areas greater than 600 feet from noise-sensitive locations. Because equipment noise would occur in the context of similar and/or louder existing noise sources and would generate noise levels that would not interrupt common activities (such as conversation), noise impacts would not be significant.

Vehicle movement operations would increase by approximately 1,070 hours annually over the No Action Alternative. Tactical and non-tactical vehicles are used to transport troops and equipment as part of training. Ground vehicle operations on NALF Fentress generate noise levels similar to civilian vehicles on local roads (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). Noise generated by civilian vehicles on local roadways is a common noise in the affected environment under baseline conditions. Addition of 1,070 hours of vehicle operations under Alternative 2 would not change the noise environment, and no significant noise impacts would result from the additional vehicle operations.

Approximately 12,800 additional blank-fire rounds would be used at NALF Fentress compared to the No Action Alternative. Under Alternative 2, firing of .50 caliber and 7.62 mm blank rounds would occur in a designated area located 1,250 feet from the closest residence. The area is used for training with blank 9 mm rounds under the No Action Alternative and includes two clearings in the forest west of the runway, which are visible in Figure 2-8. Although the trees surrounding the training areas would dampen the sound somewhat, trees were not included in noise level calculations to ensure a conservative assessment of impacts. Firing of .50 caliber blank rounds would generate noise levels up to 87 dBP at 4,180 feet from the training area, and firing of 7.62 mm would generate 87 dBP at 3,270 feet from the training area (see Table 3.5-1 and Section 4.5.2, Methodology, for standards applicable to each noise metric). These noise levels would result in some potential for disturbance at a relatively small number of residences (i.e., residences within 4,180 feet) in this sparsely populated area. Noise levels would be below 104 dBP at all noise-sensitive locations. Four additional training events per year would occur with up to two of the events occurring at least partially between 10:00 p.m. and 7:00 a.m. Although munitions noise between 87 and 104 dBP (Noise Zone 2) could be disturbing, particularly during late-night training events, the noise would be limited to four days per year.

Noise impacts associated with additional training events proposed under Alternative 2 would not be significant.

4.5.7.4 Summary

Vehicle movement generates noise levels similar to privately-owned vehicles on local roads under the No Action Alternative and Alternative 1, and would remain the same even with the addition of

1,070 hours of vehicle operations under Alternative 2. Alternative 2 would also introduce diesel generator operations, but diesel generators would be equipped with mufflers such that noise levels would not be loud enough to interfere with conversation off of the installation.

Blank-fire under the No Action Alternative and Alternative 1 generates noise levels less than 87 dBP at the closest residence. Introduction of 7.62 mm and .50 caliber blank rounds near the NALF Fentress bunkers under Alternative 2 would result in a small number of residences being exposed to noise levels between 87 and 104 dBP (Noise Zone 2); however, Alternative 2 would add only four blank-fire training events per year. Paintballs are less loud than 5.56 mm blank rounds and do not generate noise levels that are disturbing at the closest residences (greater than 740 feet away).

Neither the continuation of ongoing training under the No Action Alternative and Alternative 1 nor the additional training events under Alternative 2 would result in noise impacts that would be considered significant; therefore, there would be no significant impacts on the affected noise environment under the No Action, Alternative 1, or Alternative 2.

4.5.8 Northwest Annex

The PTEA applicable to ambient noise at Northwest Annex that contributes to the noise stressor is vehicle movement (Table 4.5-7).

Table 4.5-7. Northwest Annex Ambient Noise Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Noise*	*No. of Events*	*Noise*	*No. of Events*	*Noise*
Land – Non-Beaches/ Dunes	Vehicle Movement	tactical and non-tactical vehicles	170	510 hours				

4.5.8.1 No Action Alternative

Vehicle movement occurs on non-beach/dune training areas within Northwest Annex throughout the year in support of training events. The vehicles (see Appendix D, Platform Glossary, for typical vehicle types) generate noise levels that are comparable to civilian vehicles of similar size and horsepower (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). Ground vehicles are used in a training area located approximately 1 mile from the closest noise-sensitive location (residence) and are inaudible at that distance. As a result, there are no significant impacts on the affected noise environment from vehicle use at Northwest Annex.

4.5.8.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.5.8.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.5.8.4 Summary

Continuation of training activities at the Northwest Annex under all alternatives would not result in significant noise impacts because noise associated with vehicle use is inaudible at the closest noise-sensitive location 1 mile away. Therefore, there would be no significant impacts on the affected noise environment under the No Action, Alternative 1, or Alternative 2.

4.5.9 St. Juliens Creek Annex

The PTEAs applicable to ambient noise at St. Juliens Creek Annex that contribute to the noise stressor include equipment use, vehicle movement, and weapons firing – blank-fire (Table 4.5-8).

Table 4.5-8. St. Juliens Creek Ambient Noise Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Noise*	*No. of Events*	*Noise*	*No. of Events*	*Noise*
Land – Non-Beaches/ Dunes	Equipment Use	diesel generator	17	21,948 hours				
	Vehicle Movement	tactical and non-tactical vehicles	16	4,527 hours			28	1,890 hours
	Weapons Firing – Blank-Fire	small arms	11	35,200 rounds				

4.5.9.1 No Action Alternative

Equipment use refers to the use of portable diesel generators to provide electricity in support of Navy training events. Diesel generators are used in 17 training events at St. Juliens Creek Annex. Diesel generator noise is similar to noise generated by other equipment used on St. Juliens Creek Annex and in nearby industrial areas. Military generators are muffled in accordance with Military Standard (MIL-STD) 1474E. Noise levels off-installation may be audible. Generator use at locations more than 600 feet from the installation boundary results in off-installation noise levels below 59 dBA, which do not have potential to interfere with conversation.

Vehicle movement occurs on non-beach/dune training areas within St. Juliens Creek Annex throughout the year in support of training events. Tactical and non-tactical vehicles used during training (see Appendix D, Platform Glossary, for typical vehicle types) generate noise levels that are comparable to civilian vehicles of similar size and horsepower (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). St. Juliens Creek Annex is located in an urbanized environment, and civilian vehicles traffic noise is a near-constant noise source throughout the affected environment under baseline conditions. Continuation of ongoing vehicle training under the No Action Alternative would not change

the existing noise environment, which already includes vehicle traffic noise. Noise impacts would not be significant.

Approximately 35,200 blank-fire rounds are used at St. Juliens Creek Annex. Under the No Action Alternative, blank-fire with 7.62 mm and .50 caliber ammunition is conducted at the Building 277 Compound. Blank-fire in the Building 277 Compound is conducted only in the area immediately west of Building 277. Because firing is limited to areas farther than 70 feet from the installation boundary, off-installation noise levels do not exceed 140 dBP and hearing loss risk is minimal. However, noise levels generated by 7.62 mm and .50 caliber blank rounds do exceed 104 dBP (Noise Zone 3) at nearby residences and are likely disturbing to residents (see Section 4.5.2, Methodology, for standards applicable to each noise metric). Approximately 30 percent of training events are conducted between 10:00 p.m. and 7:00 a.m. Only 11 blank-fire training events are conducted per year, and no noise complaints have been received regarding the ongoing blank-fire training in recent years.

Continuation of ongoing training under the No Action Alternative will not result in significant noise impacts.

4.5.9.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.5.9.3 Alternative 2

Some Alternative 2 training events are the same as those under the No Action Alternative and Alternative 1 at this location; as noted in Table 4.5-8, no additional training would occur for some PTEAs. Impacts associated with those Alternative 1 PTEAs are discussed below along with the new Alternative 2 PTEAs.

Under Alternative 2, equipment use and weapons firing – blank-fire would be the same as under the No Action Alternative and, as a result, there would be no significant impacts on the affected noise environment from equipment use.

Vehicle movement operations would increase by approximately 1,890 hours annually over the No Action Alternative. Each of the 28 additional tactical and non-tactical vehicles training events per year under Alternative 2 would involve vehicles operating in the training area (primarily in the northeast corner of the Annex) for as long as four hours. The vehicles (see Appendix D, Platform Glossary, for typical vehicle types) generate noise levels that are comparable to civilian vehicles of similar size and horsepower (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). Civilian vehicle traffic on local roadways is a near-constant noise source throughout the affected environment. The addition of vehicle training events under Alternative 2 would not change the existing noise environment even where it occurs in training areas near noise-sensitive locations.

Noise impacts under Alternative 2 would not be significant.

4.5.9.4 Summary

Generators create sound similar to other machinery used in the area and are equipped with mufflers such that noise levels off-installation would not be sufficiently loud to interfere with conversation. Vehicle movement noise is similar to noise generated by civilian vehicle traffic under baseline conditions and would not change the noise environment, even with additional vehicle hours under Alternative 2.

Blank-fire in the Building 277 Compound under all alternatives generates noise levels exceeding 104 dBP (Noise Zone 3) but not exceeding 140 dBP (hearing loss risk is minimal) at nearby residences and is likely to be disturbing. No noise complaints have been received regarding the ongoing blank-fire training in recent years.

Neither the continuation of ongoing training under the No Action Alternative and Alternative 1 nor the additional training events under Alternative 2 result in noise impacts that would be considered significant; therefore, there would be no significant impacts on the affected noise environment under the No Action, Alternative 1, or Alternative 2.

4.5.10 Naval Weapons Station Yorktown

The PTEAs applicable to ambient noise at NWS Yorktown that contribute to the noise stressor include equipment use, vehicle movement, explosives on land, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.5-9).

Table 4.5-9. Naval Weapons Station Yorktown Ambient Noise Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Noise*	*No. of Events*	*Noise*	*No. of Events*	*Noise*
Land – Non-Beaches/ Dunes	Equipment Use	diesel generators	8	2,016 hours				
	Explosives on Land	demolition materials and charge	104	104 events (average 13 detonations/event with maximum NEW of 25 pounds)				
	Vehicle Movement	tactical and non-tactical vehicles	228	27,192 hours				
	Weapons Firing – Blank-Fire	small arms	162	29,452 rounds				
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	50	5,000 rounds				

4.5.10.1 No Action Alternative

Equipment use refers to the use of portable diesel generators to provide electricity in support of Navy training events. Diesel generators are used in eight training events at NWS Yorktown. In accordance with MIL-STD-1474E, military diesel generators are designed to minimize noise levels to the extent practicable and are equipped with mufflers. Generator noise levels are similar to other machinery operated on NWS Yorktown. Generator use takes place in training locations more than 600 feet from

the installation boundary and creates off-installation noise levels below 59 dBA, which do not have the potential to interrupt conversation.

Navy EOD training includes detonations on land and occurs throughout the year. These detonations have a maximum NEW of up to 25 pounds. Training at the Yorktown EOD Demolition Range is conducted in accordance with SOPs which allow for detonation of charges up to 25 pounds NEW. However, the largest charge used at the range as part of training is the M998 charge which contains less than 9 pounds of the explosive known as Composition C3 and has an explosive power equivalent to 12 pounds of TNT. Detonation of an M998 charge generates noise levels between 115 and 130 dBP in portions of the Water Country USA water park and the King's Creek neighborhood which are both 5,800 feet from the blast location. Peak noise levels in this range are associated with a moderate risk of complaints (see Section 4.5.2, Methodology, for standards applicable to each noise metric). When they do occur, complaints are typically triggered by noise interference with activities such as conversation or watching television. Detonations are conducted only during the daytime. No noise complaints have been received regarding detonations in recent years. Noise impacts associated with continued explosives training under the No Action Alternative are not significant.

Vehicle movement occurs on non-beach/dune training areas within NWS Yorktown throughout the year in support of training events. Training events involving tactical and non-tactical vehicles last for as long as four hours. Noise levels generated are comparable to civilian vehicles of similar size and horsepower (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). Civilian traffic noise generated along roadways near NWS Yorktown (e.g., Interstate 64) is a normal part of baseline conditions in the affected environment. Continuation of ongoing vehicle operations under the No Action Alternative would not change the existing noise environment. Noise impacts are not significant.

Approximately 29,450 blank-fire rounds are used at NWS Yorktown with approximately 40 percent of blank-fire training events occurring between 10:00 p.m. and 7:00 a.m. During training that includes blank-fire, portions of the Colonial Parkway, which are as close as 300 feet from training areas, could be exposed to noise levels exceeding 104 dBP (Noise Zone 3). As discussed below, the segment of the Colonial Parkway adjacent to the Home Station Training Lanes is not often used by park visitors for extended periods of time. There is typically less traffic on the Parkway late at night. Training events occurring between 10:00 p.m. and 7:00 a.m. would be less likely to be heard by people on the Parkway than events held during the daytime. The Navy has consulted with the National Park Service regarding small arms noise, and if proper notification is given by the Navy, the National Park Service does not have concerns with training noise (Navy, 2011b).

Approximately 5,000 non-lethal training ammunition rounds are expended each year within the boundaries of NWS Yorktown with up to 40 percent of training events being conducted between 10:00 p.m. and 7:00 a.m. Shotgun slugs used by EOD personnel at the Yorktown EOD Demolition Range to disrupt explosive devices generate noise levels below 87 dBP at the installation boundary approximately 5,000 feet away. The noise is not disturbing at the closest noise-sensitive locations. The Home Station Training Lanes are located approximately 300 feet from the Colonial Parkway which runs through a thin strip of land owned by the National Park Service. Use of practice grenades at the Home Station Training Lanes does not generate noise that could be hazardous to hearing (i.e., above 140 dBP) at the Colonial Parkway. In the rare instance that a practice grenade is used in portions of the Home Station Training Lanes training area within 390 feet of the parkway, people that happen to be on the closest 500 feet segment to the explosive simulator could experience noise levels exceeding 130 dBP.

Noise levels in this range are associated with a high likelihood of complaints. People on the parkway within 1,130 feet of an explosive simulator detonation could experience noise levels exceeding 115 dBP, a level associated with a moderate likelihood of complaints. Because the section of the parkway within 1,130 feet of the Home Station Training Lanes does not include popular fishing spots or any vehicle pull-offs, people are rarely in the area for an extended period of time. Users of the parkway may be momentarily alarmed by the noise. The National Park Service has been consulted regarding this potential issue and has indicated that, if proper notification is given, the National Park Service does not have concerns with training noise at the Home Station Training Lanes (Navy, 2011b). The closest off-installation residence to the Home Station Training Lanes is more than a mile away and is not disturbed by noise resulting from weapons firing training.

Noise impacts associated with continuing operations under the No Action Alternative is not considered significant.

4.5.10.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, there would be no significant noise impacts on the affected noise environment.

4.5.10.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no significant noise impacts on the affected noise environment.

4.5.10.4 Summary

Generators operating at NWS Yorktown under the No Action Alternative are muffled and do not create noise levels at off-installation locations with potential to interfere with conversation. Vehicle operations under the No Action Alternative generate noise levels similar to civilian vehicles that operate on roadways adjacent to NWS Yorktown under baseline conditions, and would not change the existing noise environment. Noise generated by explosives training at the EOD range exceeds 115 dBP in portions of Water Country USA and the King's Creek neighborhood, but detonations are only conducted during daytime. Blank-fire at the Home Station Training Lanes generates noise at greater than 104 dBP (Noise Zone 3) along the Colonial Parkway which is administered by the National Park Service. Use of practice grenades at the Home Station Training Lanes could generate noise exceeding 130 dBP along a very small segment of the parkway (within 390 feet of the detonation) and would exceed 115 dBP over a longer segment of the parkway. Approximately 40 percent of the training events are conducted between 10:00 p.m. and 7:00 a.m., during a time when there are fewer cars driving on the Colonial Parkway. Users of this portion of the parkway are typically in motion, and any noise exposure would be very brief. The National Park Service has been consulted regarding noise generated by Navy training and has indicated that, if proper notification is given, the National Park Service does not have concerns with use of small arms at the Home Station Training Lanes (Navy, 2011b). Vehicle movement creates noise similar to that associated with vehicular traffic off-installation and would not be disturbing off-installation.

Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative at this location and, therefore, there would be no significant impacts on the affected noise environment under the No Action, Alternative 1, or Alternative 2.

4.5.11 Cheatham Annex

The PTEAs applicable to ambient noise at Cheatham Annex that contribute to the noise stressor include equipment use, vehicle movement, weapons firing – blank-fire, and underwater movement (Table 4.5-10).

Table 4.5-10. Cheatham Annex Ambient Noise Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Noise*	*No. of Events*	*Noise*	*No. of Events*	*Noise*
Land – Non-Beaches/ Dunes	Equipment Use	diesel generator	99	74,380 hours				
	Vehicle Movement	tactical and non-tactical vehicles	62	8,683 hours				
	Weapons Firing – Blank-Fire	small arms	28	82,400 rounds				
Water and Adjacent Shoreline	Underwater Movement	remotely operated vehicles	1	8 hours				

4.5.11.1 No Action Alternative

Equipment use refers to the use of portable diesel generators to provide electricity in support of Navy training events. Diesel generators are used in 99 events at Cheatham Annex. Operation of diesel generators takes place in locations more than 600 feet from the installation boundary, resulting in off-installation noise levels of less than 59 dBA, which do not have the potential to disrupt conversation. All generators used during training are equipped with mufflers in accordance with MIL-STD-1474E. Generators create noise that is similar to noise created under baseline conditions by other equipment on the installation.

Vehicle movement occurs on non-beach/dune training areas within Cheatham Annex throughout the year in support of training events. Tactical and non-tactical vehicles training events last for as long as 90 minutes. Noise levels generated by the vehicles (see Appendix D, Platform Glossary, for typical vehicle types) are comparable to civilian vehicles of similar size and horsepower (see Table 3.5-5 in Section 3.5.1.1.2, Ground Vehicles and Surface Vessels). Noise generated by civilian traffic on Interstate 64 and other roadways near Cheatham Annex is a normal part of baseline conditions in the affected environment. The existing noise environment would not change under the No Action Alternative, and noise impacts are not significant.

Approximately 82,400 blank-fire rounds are used at Cheatham Annex within non-beach/dune training areas. The pier and C-130 Cargo Load Trainer are located more than a mile from the closest known noise-sensitive location and blank fire at these locations will not result in any substantive noise impacts. Cheatham Annex training areas are primarily distant from any noise-sensitive locations and the vast majority of blank-fire is conducted in locations sufficiently far from residences that noise levels are not of concern. The southeastern corner of Cheatham Annex Training Area F is located across Penniman

Road from several residences including the King's Creek neighborhood. Although Cheatham Annex Training Area F is used for training involving firing of blank 7.62 mm, .50-caliber, 9 mm, and 5.56 mm rounds, these rounds are typically fired in northern portions of the training area, which are more easily accessible by road. Dense vegetation makes unit cross-country movement to the southeastern corner of the training area very difficult and that area is rarely used. If .50 caliber blank rounds (i.e., the loudest ammunition type used in the training area) were fired within 1,010 feet of residences, noise levels at the residences would exceed 104 dBP (see Section 4.5.2, Methodology, for standards applicable to each noise metric).

A remotely operated vehicle (i.e., battery operated with a small propeller) is operated in Jones Pond for approximately eight hours per year. The propeller does not generate significant noise underwater. With the small usage of the remotely operated vehicle and battery-powered operation, underwater movement does result in significant impacts on the affected noise environment.

Noise impacts associated with continuation of ongoing training operations under the No Action Alternative are not significant.

4.5.11.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.5.11.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.5.11.4 Summary

Noise levels generated by vehicle movement and equipment use are similar to existing noise sources on and near the installation. Generators operating at Cheatham Annex under the No Action Alternative are muffled and do not create noise levels at off-installation locations with potential to interfere with conversation. Vehicle operations under the No Action Alternative generate noise levels similar to civilian vehicles that operate on roadways adjacent to the installation and would not change the existing noise environment. Blank-fire in Training Area F could be disturbing at times, and could potentially exceed 104 dBP (Noise Zone 3) at residences located south of the training area if fired within 1,010 feet of residences. Noise levels would not exceed 140 dBP at off-installation locations, and hearing loss risk would be minimal.

Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative at this location and, therefore, there would be no significant impacts on the affected noise environment under the No Action, Alternative 1, or Alternative 2.

4.5.12 First Landing State Park

No noise stressors are generated during PTEAs (i.e., personnel movement) performed at First Landing State Park. However, due to the proximity to JEB Fort Story, the VADCR provides notice on the First Landing State Park website that the park is near a military training center that operates year-round in any weather at any time of day or night; park guests may experience unusual sights and loudness. The First Landing State Park website further notes that training usually ends by 10 p.m. and that these military activities pose no risk to park guests (VADCR, 2016).

4.5.13 Southern Branch of the Elizabeth River

The PTEAs applicable to ambient noise at the Southern Branch of the Elizabeth River that contribute to the noise stressor include vessel movement and weapons firing – blank-fire (Table 4.5-11).

Table 4.5-11. Southern Branch of the Elizabeth River Ambient Noise Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Noise*	*No. of Events*	*Noise*	*No. of Events*	*Noise*
Water and Adjacent Shoreline	Vessel Movement	small vessels	30	1,980 hours				
	Weapons Firing – Blanks	small caliber	30	144,000 rounds				

4.5.13.1 No Action Alternative

Small vessel movement is limited to the Southern Branch of the Elizabeth River. Annual hours of operation under the No Action Alternative consist of 1,980 hours of vessel movement. Portions of the Southern Branch of the Elizabeth River that are narrow with residences along the shorelines are usually designated as 'no wake' zones. Low speeds and engine power settings used by surface vehicles in these zones are associated with relatively low noise levels. In broader portions of the waterway with residences along the shoreline, boat operations can be conducted at higher speeds and correspondingly higher engine power settings, but are most frequently conducted near the center of the waterway relatively distant from residences. Continuation of military surface vessel activity in the context of similar ongoing civilian boating activity will not result in substantive disturbances or annoyance to people nearby.

Under the No Action Alternative, underwater noise in the Southern Branch of the Elizabeth River is generated by small vessel movement. Movements involve straight-line transits and training maneuvers. Small boats produce low levels of noise at higher frequencies (up to several kHz). Underwater noise in this location is chronic and long-term due to the level of human activity. There are no anticipated impacts to the human environment due to underwater noise; impacts to aquatic biological resources are discussed in Section 4.3 (Biological Resources). There is no significant impact on noise associated with continuation of ongoing training operations under the No Action Alternative.

Approximately 144,000 rounds of blank-fire occur at the designated blank-fire area along the Southern Branch of the Elizabeth River. Blank-fire occurs only in the designated blank-fire area shown in Figure 2-15. The area surrounding the blank firing area is predominantly marshland, but a single residential street extends to the shoreline north of the firing area. Blank rounds are fired only towards the southern shore of the Southern Branch of the Elizabeth River, meaning that the residential area on the north shore are behind the firing position and exposed to lower noise levels than are experienced to the left, right, or forward of the firing position. When .50 caliber blank rounds (approximately 48,000 out of the 144,000 total rounds fired per year) are fired, a small number of residences located within about 1,010 feet of the firing position experience noise levels exceeding 104 dBP (Noise Zone 3). This noise

level would be considered to be unconditionally incompatible with residential land uses if it were experienced on a daily basis at a firing range (see Section 4.5.2, Methodology, for standards applicable to each noise metric). Blank firing in the Southern Branch of the Elizabeth River is actually conducted 30 times per year or less. Approximately 20 percent of events occur between 10:00 p.m. and 7:00 a.m. An area within 4,180 feet of the firing position, which includes several residential areas is affected by noise levels exceeding 87 dBP (Noise Zone 2) during firing events. This noise level would be considered generally incompatible with residential land uses if the firing were conducted on a daily basis. Because blank-fire training would be relatively infrequent (i.e., 30 events per year), continuation of this ongoing training at the designated area does not result in significant noise impacts.

4.5.13.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.5.13.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, therefore, no significant impacts would occur.

4.5.13.4 Summary

Vessel movement generates temporary elevated noise levels. However, high-speed maneuvers conducted at high engine power settings are typically conducted near the center of the waterway relatively distant from residences. Under the No Action Alternative, continuation of military surface vessel activity in the context of similar ongoing civilian boating activity will not result in substantive disturbances or annoyance to people nearby.

Firing of about one-third of the 144,000 rounds fired per year exposes a small number of residences located within 1,010 feet of the designated blank firing area to noise levels exceeding 104 dBP (Noise Zone 3). Noise levels would not exceed 140 dBP at off-installation location, and hearing loss risk would be minimal. The direction of fire would be away from the residences minimizing noise levels experienced. Residences located within about 4,200 feet of the firing position are exposed to noise levels exceeding 87 dBP (Noise Zone 2). Training is conducted up to 30 times per year with 20 percent of training events occurring between 10:00 p.m. and 7:00 a.m. Training event noise may result in temporary disruption and annoyance in nearby residential areas, but these disturbances would be relatively infrequent. Consequently, there would be no significant impacts to noise.

Under Alternatives 1 and 2, USFF training would be the same as under the No Action Alternative and, therefore, there would be no significant impacts on the affected noise environment under the No Action, Alternative 1, or Alternative 2.

4.5.14 Ambient Noise Summary

4.5.14.1 No Action Alternative Ambient Noise Summary

Tactical and non-tactical (non-amphibious) vehicle operations generate noise levels similar to civilian vehicles of comparable size and horsepower. Civilian traffic noise is a component of the noise environment under baseline conditions at all of the locations studied, and continuation of vehicle

operations would not result in changes to the existing noise environment or result in significant noise impacts.

Detonation of explosives under the No Action Alternative would generate noise levels between 115 and 130 dBP at the closest noise-sensitive locations to the JEB Little Creek EOD pit, JEB Fort Story EOD Range 1, and the EOD range at NWS Yorktown. Noise levels with potential to be harmful to hearing (i.e., above 140 dBP) would remain within installation boundaries or portions of the Chesapeake Bay that are confirmed clear of non-participants prior to detonation. No significant noise impacts would occur due to explosives use under the No Action Alternative.

Use of equipment such as generators under the No Action Alternative generates approximately 59 dBA at a distance of 600 feet, a noise level that is not sufficiently high to interrupt normal speech communication. In accordance with MIL-STD-1474E, military equipment is designed to minimize noise levels to the extent practical through use of elements such as mufflers. Equipment such as generators is used in the context of active military installations (i.e., St. Juliens Creek Annex, NWS Yorktown, and Cheatham Annex) where noise generated by other equipment and vehicles is already a part of the baseline sound environment. Because continuation of ongoing equipment use under the No Action Alternative generates noise levels that do not interrupt common activities (e.g., conversation) and takes place in the context of similar existing noise sources, noise impacts would not be significant.

LCAC amphibious craft operations at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton under the No Action Alternative result in temporary elevated noise levels at noise-sensitive locations that could be disturbing, but events are spatially distributed within training areas such that most LCAC amphibious craft training is conducted at locations in the training area that are much farther away, generating lower noise levels. Vehicles other than LCAC amphibious craft are much less loud and generate elevated noise levels only in the immediate vicinity of the vehicle.

Blank weapons are only fired when people are equipped with hearing protection who would otherwise be exposed to peak noise levels that could be harmful to hearing (i.e., 140 dBP). Under the No Action Alternative, blank weapons fire at St. Juliens Creek Annex (Building 277), Cheatham Annex (Training Area F), and the Southern Branch of the Elizabeth River (blank-fire area) could generate noise levels at residences exceeding 104 dBP (Noise Zone 3). These noise levels have a high likelihood of being disturbing particularly when they occur late at night. The noise level experienced at residences varies based on the specific location within the training area at which firing is conducted, and training is typically conducted towards the interior of the installation such that high noise levels at residences are infrequent. Blank-fire at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton, St. Juliens Creek Annex, NWS Yorktown, Cheatham Annex, and the Southern Branch of the Elizabeth River results in noise levels at residences of greater than 87 dBP; however, while noise levels between 87 and 104 dBP (Noise Zone 2) have some potential for disruption of common activities, noise levels exceeding 104 dBP (Noise Zone 3) have a greater potential for disturbance. Given the context of ongoing noise events and notification prior to relatively infrequent noise events exceeding 104 dBP, blank-fire under the No Action Alternative does not result in significant noise impacts.

Non-lethal training ammunition would not result in significant noise impacts. Shotgun slugs are used as part of EOD training and are typically conducted relatively far from installation boundaries in accordance with range safety regulations. Noise generated by the shotgun does not exceed 104 dBP (Noise Zone 3); however, shotgun noise at JEB Fort Story could exceed 87 dBP (Noise Zone 2) at adjacent residences and when combined with other blank-fire noise at this same level, adjacent residences may experience noise

levels greater than 87 dBP more frequently over several days. Paintballs are relatively quiet and would not result in noise impacts off of the installation. Use of practice grenades at the NWS Yorktown Home Station Training Lanes would affect small portions of the Colonial Parkway at peak noise levels exceeding 130 dBP but not 140 dBP. The portion of the parkway affected by elevated noise levels is used primarily by people in moving cars and is only moderately noise sensitive.

Under the No Action Alternative, underwater noise in the Southern Branch of the Elizabeth River is generated by small vessel movement. Vessel movements involve straight-line transits and training maneuvers. Small boats produce low levels of noise at higher frequencies (up to several kilohertz). Underwater noise in this location is chronic and long-term due to the level of human activity. There are no anticipated impacts to the human environment due to underwater noise; impacts to aquatic biological resources are discussed in Section 4.3 (Biological Resources).

4.5.14.2 Alternative 1 Ambient Noise Summary

Under Alternative 1, several new or more frequent noise-generating training activities would occur compared to the activities under the No Action Alternative. These activities would take place in the Hampton Roads region, an area that has hosted a large number of military units for centuries. Similar training activities to those proposed under Alternative 1 have been occurring in the region of influence for decades, and ongoing military training noise (see Section 3.5, Ambient Noise) is an important aspect of the context in which noise impacts would occur.

Addition of tactical and non-tactical vehicle training operations to baseline environments that include civilian vehicle traffic noise would not result in changes to the existing noise environment or result in significant noise impacts.

Detonation of explosives under Alternative 1 would generate noise levels between 115 and 130 dBP at the closest noise-sensitive locations to the JEB Little Creek EOD pit, JEB Fort Story EOD Range 1 and Building 900, and the EOD range at NWS Yorktown. In all locations except Building 900, explosives use under baseline conditions or the No Action Alternative already results in peak noise levels at or exceeding peak noise levels that would be experienced under Alternative 1. Noise levels exceeding 140 dBP (which can be harmful to hearing) would remain within installation boundaries or portions of the Chesapeake Bay that are confirmed clear of non-participants prior to detonation. The number of detonations conducted annually would increase relative to the No Action Alternative at the JEB Little Creek EOD pit, JEB Fort Story EOD Range 1 and Building 900 under Alternative 1. However, individual detonation event peak noise levels at EOD Range 1 would not exceed those generated under the No Action Alternative, and detonations conducted at Building 900 would be relatively infrequent (76 per year). LCAC amphibious craft operations at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton under Alternative 1 would result in temporary elevated noise levels at noise-sensitive locations that could be disturbing, but events are spatially distributed within training areas such that most LCAC amphibious craft training is conducted at locations in the training area that are much farther away, generating lower noise levels. Vehicles other than LCAC amphibious craft are much less loud and generate elevated noise levels only in the immediate vicinity of the vehicle. LCAC amphibious craft and vehicle noise events would become more frequent under Alternative 1, but the noise level of individual events would not change and noise impacts would not be significant.

Blank weapons are only fired when people are equipped with hearing protection who would otherwise be exposed to peak noise levels that could be harmful to hearing (i.e., 140 dBP). Under Alternative 1,

blank weapons fire at St. Juliens Creek Annex (Building 277), Cheatham Annex (Training Area F), and the Southern Branch of the Elizabeth River (blank-fire area) could generate noise levels at residences exceeding 104 dBP (Noise Zone 3). These noise levels have a high likelihood of being disturbing particularly when they occur late at night. The noise level experienced at residences varies based on the specific location within the training area at which firing is conducted, and training is typically conducted towards the interior of the installation such that high noise levels at residences are infrequent. Blank-fire at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton, St. Juliens Creek Annex, NWS Yorktown, Cheatham Annex, and the Southern Branch of the Elizabeth River results in noise levels at residences of greater than 87 dBP; however, while noise levels between 87 and 104 dBP (Noise Zone 2) have some potential for disruption of common activities, noise levels exceeding 104 dBP (Noise Zone 3) have a greater potential for disturbance. At JEB Fort Story, Dam Neck Annex and Camp Pendleton, the number of blank rounds fired annually would increase under Alternative 1, but no new or additional off-installation locations would be exposed to noise levels greater than 87 dBP. Given the context of ongoing noise events, blank-fire under Alternative 1 would not result in significant noise impacts.

Non-lethal training ammunition would not result in significant noise impacts. Shotgun slugs (non-lethal training ammunition) are used as part of EOD training that is typically conducted relatively far from installation boundaries in accordance with range safety regulations. Noise generated by the shotgun does not exceed 104 dBP (Noise Zone 3); however, shotgun noise at JEB Fort Story could exceed 87 dBP (Noise Zone 2) at adjacent residences and when combined with other blank-fire noise at this same level, adjacent residences may experience noise levels greater than 87 dBP more frequently over several days. Paintballs are relatively quiet and would not result in noise impacts off-station. Use of practice grenades at the NWS Yorktown Home Station Training Lanes would affect small portions of the Colonial Parkway at peak noise levels exceeding 130 but not 140 dBP. The portion of the parkway affected by elevated noise levels is used primarily by people in moving cars and is only moderately noise sensitive.

Under Alternative 1, underwater noise in the Southern Branch of the Elizabeth River is generated by small vessel movement. Vessel movements involve straight-line transits and training maneuvers. Small boats produce low levels of noise at higher frequencies (up to several kilohertz). Underwater noise in this location is chronic and long-term due to the level of human activity. There are no anticipated impacts to the human environment due to underwater noise; impacts to aquatic biological resources are discussed in Section 4.3 (Biological Resources).

4.5.14.3 Alternative 2 Noise Summary

Alternative 2 includes the same training that occurs under Alternative 1, plus the addition of three newly proposed training locations to provide increased flexibility to train throughout the Hampton Roads fleet concentration area. The Hampton Roads region has hosted a large number of military units for centuries. Similar training activities to those proposed under Alternative 2 have been occurring in the region of influence for decades, and ongoing military training noise (see Section 3.5, Ambient Noise) is an important aspect of the context in which noise impacts would occur.

Additional use of equipment such as generators at NALF Fentress under Alternative 2 would generate noise levels off installation that are not sufficiently high to interrupt normal speech communication. Generators and other equipment would be used in the context of an active military installation where other equipment and vehicles (e.g., jet aircraft) generate noise on a regular basis as part of the baseline sound environment. Noise impacts would not be significant.

The frequency of explosives training detonations would increase under Alternative 2 at JEB Fort Story EOD Range 1. Peak noise levels generated during detonations would not exceed those generated during detonations conducted under the No Action Alternative. Noise levels exceeding 140 dBP (which can be harmful to hearing) would remain within installation boundaries or portions of the Chesapeake Bay that are confirmed clear of non-participants prior to detonation.

LCAC amphibious craft operations at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton under Alternative 2 would result in temporary elevated noise levels at noise-sensitive locations that could be disturbing, but events are spatially distributed within training areas such that most LCAC amphibious craft training is conducted at locations in the training area that are much farther away, generating lower noise levels. Vehicles other than LCAC amphibious craft are much less loud and generate elevated noise levels only in the immediate vicinity of the vehicle. Addition of tactical and non-tactical vehicle training operations to baseline environments that include civilian vehicle traffic noise would not result in changes to the existing noise environment or result in significant noise impacts.

Blank weapons are only fired when people are equipped with hearing protection who would otherwise be exposed to peak noise levels that could be harmful to hearing (i.e., 140 dBP). Under Alternative 2, blank weapons fire at St. Juliens Creek Annex (Building 277), Cheatham Annex (Training Area F), and the Southern Branch of the Elizabeth River (blank-fire area) could generate noise levels at residences exceeding 104 dBP (Noise Zone 3). These noise levels have a high likelihood of being disturbing particularly when they occur late at night. The noise level experienced at residences varies based on the specific location within the training area at which firing is conducted, and training is typically conducted towards the interior of the installation such that high noise levels at residences are infrequent. Blank-fire at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton, St. Juliens Creek Annex, NWS Yorktown, Cheatham Annex, and the Southern Branch of the Elizabeth River results in noise levels at residences of greater than 87 dBP; however, while noise levels between 87 and 104 dBP (Noise Zone 2) have some potential for disruption of common activities, noise levels exceeding 104 dBP (Noise Zone 3) have a greater potential for disturbance. At Dam Neck Annex and Camp Pendleton, the number of blank rounds fired annually would increase under Alternative 2, but no new or additional off-installation locations would be exposed to noise levels greater than 87 dBP. In addition, at JEB Fort Story and NALF Fentress, the number of blank rounds would increase under Alternative 2, and residences currently exposed at below 87 dBP would be exposed to between 87 and 104 dBP (Noise Zone 2). Given the context of ongoing noise events, blank-fire under Alternative 2 would not result in significant noise impacts.

Non-lethal training ammunition would not result in significant noise impacts. Shotgun slugs are used as part of EOD training that is typically conducted relatively far from installation boundaries in accordance with range safety regulations. Noise generated by the shotgun does not exceed 104 dBP (Noise Zone 3); however, shotgun noise at JEB Fort Story could exceed 87 dBP (Noise Zone 2) at adjacent residences and when combined with other blank-fire noise at this same level, adjacent residences may experience noise levels greater than 87 dBP more frequently over several days. Paintballs are relatively quiet and would not result in noise impacts off-station. Use of practice grenades at the NWS Yorktown Home Station Training Lanes would affect small portions of the Colonial Parkway at peak noise levels exceeding 130 but not 140 dBP. The portion of the parkway affected by elevated noise levels is used primarily by people in moving cars and is only moderately noise sensitive.

Under Alternative 2, underwater noise in the Southern Branch of the Elizabeth River is generated by small vessel movement. Vessel movements involve straight-line transits and training maneuvers. Small boats produce low levels of noise at higher frequencies (up to several kilohertz). Underwater noise in this location is chronic and long-term due to the level of human activity. There are no anticipated impacts to the human environment due to underwater noise; impacts to aquatic biological resources are discussed in Section 4.3 (Biological Resources).

4.6 Public Health and Safety

4.6.1 Overview

The public health and safety analysis addresses issues related to the health and well-being of civilians living in the study area. Specifically, this section provides information on hazards associated with USFF VACAPES inland training. This discussion of public health and safety includes consideration for any activities, occurrences, or operations that have the potential to affect the safety, well-being, or health of members of the public.

EO 13045, Protection of Children from Environmental Health Risks and Safety Risks, was eliminated as an issue for further consideration because all proposed activities occur on Navy property or on navigable waterways where there are no child populations present. Therefore, the Proposed Action would not lead to disproportionate risks to children that result from environmental health risks or safety risks.

4.6.2 Methodology

The analyses identified activities that have a potential to affect public health and safety and evaluated the degree to which these activities increase or decrease public health and safety risks to the public. In this section, public health and safety considers risks associated with the public interaction between Navy and non-Navy vessels and the general public along with the use of blank-fire in public areas.

4.6.3 Impacts Common to All Locations Under All Alternatives

4.6.3.1 Public Health

Noise-related health impacts are discussed in Section 4.5 (Ambient Noise). Impacts related to hazardous materials and wastes from training operations are discussed in Section 4.7 (Hazardous Materials and Wastes). As stated in Section 4.7, because the public would not be exposed to hazardous materials and wastes, no impacts to public health are anticipated from implementation of the Proposed Action (see Section 4.7).

4.6.3.2 Safety

Various PTEAs described in this EA involve potentially hazardous military training elements, for example events with moving vehicles and explosives. For safety purposes, this training occurs within the confines of military installations from which the public is excluded. Given that these potentially hazardous training events occur within installation boundaries and in accordance with SOPs, these PTEAs are not discussed further in this section. This section focuses on those PTEAs with the potential for public interaction and the potential for public health and safety impacts.

Weapons training with blanks rounds occurs at various training areas located both on and off installation. As noted above, installations are inaccessible to the general public so there are no impacts

associated with public interaction of the public with expended brass casings. Given the applied safety zones, there is no potential impact to the public from ejected brass casings outside the installations. Therefore, weapons firing – blank-fire is not expected to impact safety. Regardless, the Navy would continue to apply existing safety procedures and standards to ensure that no adverse impacts occur, as discussed in Section 3.6.1.1 (Common Safety Practices).

4.6.4 Regional Conditions

The PTEAs applicable to public health and safety within the study area that contribute to the public interaction stressor includes weapons firing – blank-fire and vessel movement (Table 4.6-1).

Table 4.6-1. Regional Public Health and Safety Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Public Interaction*	*No. of Events*	*Public Interaction*	*No. of Events*	*Public Interaction*
Water and Adjacent Shoreline	Vessel Movement	small vessels	30	1,980 hours				
	Weapons Firing – Blank-Fire	small caliber	30	144,000 rounds				

Key: No. = number.

4.6.4.1 No Action Alternative

Public Interaction

The only potential for interaction between Navy vessels and public or commercial vessels would be limited to areas associated with the Southern Branch of the Elizabeth River. According to the Navy Safety Center statistics, there are no recorded accidents involving the interaction of Navy vessels with public or civilian vessels in the Southern Branch of the Elizabeth River.

Under the No Action Alternative, 30 small vessel events and 1,980 hours of vessel movement with the potential for public interaction would occur each year in the region of influence (Southern Branch of the Elizabeth River). As described in Section 3.6 (Public Health and Safety), whether military or civilian, vessel operators have a duty to abide by maritime requirements as administered by the U.S. Coast Guard. These requirements include that vessel operators are alert at all times, travel at a safe speed for the prevailing conditions, use state-of the-art satellite navigational systems, and are trained to take proper action to avoid collisions. The Navy also uses highly qualified operators on small vessels to maintain awareness of the surrounding environment. Continued implementation of these practices minimizes the potential for interaction between Navy vessels and other vessels.

Weapons training with blanks rounds occurs from Navy small vessels within a designated area on the Southern Branch of the Elizabeth River. Approximately 144,000 blank rounds are expended each year at a designated area. All other blank rounds are expended within the boundaries of a Navy installation and are not quantified as part of this analysis. The firing of blank rounds results in expended brass casings in close proximity to the firing weapon. Approximately 15 percent of expended brass casings are not captured within the small vessel and are released into the water adjacent to the vessel. Since in-water Navy training events include SOPs that preclude blank-fire activities within the Southern Branch of the Elizabeth River if non-participants are present within 200 feet of small vessels, no impacts associated with public interaction of the public with expended brass casings would occur.

No Action Alternative Public Health and Safety Summary

Public interaction from vessel movement is unlikely under the No Action Alternative and public interaction from weapons firing – blank-fire does not occur under the No Action Alternative. Blank-fire training either occurs within Navy installation boundaries, or from Navy vessels only if non-participants are greater than 200 feet from the vessels. Vessel movement during training events is conducted by trained Navy personnel, practicing safe navigation. As a result, there are no significant impacts on public health and safety under the No Action Alternative.

4.6.4.2 Alternative 1

Under Alternative 1, USFF training would be the same with respect to public interaction as under the No Action Alternative; therefore, as discussed in Section 4.6.4.1 (No Action Alternative), no significant impacts would occur.

Alternative 1 Public Health and Safety Summary

Public interaction from vessel movement is unlikely under Alternative 1 and public interaction from weapons firing – blank-fire does not occur under Alternative 1. Blank-fire training would either occur within Navy installation boundaries or from Navy vessels only if non-participants are greater than 200 feet from the vessels. Vessel movement during training events would be conducted by trained Navy personnel, practicing safe navigation. As a result, there would be no significant impacts on public health and safety under Alternative 1.

4.6.4.3 Alternative 2

Under Alternative 2, USFF training would be the same with respect to public interaction as under the No Action Alternative; therefore, as discussed in Section 4.6.4.1 (No Action Alternative), no significant impacts would occur.

Alternative 2 Public Health and Safety Summary

Public interaction from vessel movement is unlikely under Alternative 2 and from weapons firing – blank-fire does not occur under Alternative 2. Blank-fire training would either occur within Navy installation boundaries or from Navy vessels if non-participants are greater than 200 feet from the vessels. Vessel movement during training events would be conducted by trained Navy personnel, practicing safe navigation. As a result, there would be no significant impacts on public health and safety under Alternative 2.

4.7 Hazardous Materials and Waste

4.7.1 Overview

Training activities may require hazardous materials use and may generate hazardous constituents. In addition, training activities may disturb ERP sites. The potential impacts to each of these elements are addressed for each of the 10 training locations within the study area.

The discussion in each training installation begins with identification of specific training activities and the stressors with potential to impact hazardous materials and ERP sites. The No Action Alternative represents the existing training activities. Activities under Alternatives 1 and 2 are either the same as, or an increase from the No Action Alternative.

4.7.2 Methodology

The analyses focused on how and to what degree the alternatives would affect hazardous materials usage and management. The analysis also evaluated potential impacts associated with hazardous constituents, as well as impacts to ERP sites. Potential impacts were analyzed for the following effects:

- Posing an increased likelihood of an uncontrolled release of hazardous materials or constituents that could contaminate soil, surface water, groundwater, or air.
- Causing physical impacts to, or exposing contaminants associated with, existing ERP sites.

Potential impacts associated with hazardous constituents are analyzed based on whether releases would cause adverse health impacts to the public or whether releases would require new mitigation measures or trigger additional reporting by exceeding Emergency Planning and Community Right-to-Know Act thresholds. Potential impacts of hazardous constituent on specific media (e.g., Section 4.2, Water Resources, or Section 4.3, Biological Resources) are discussed in those sections.

4.7.3 Impacts Common to All Locations Under All Alternatives

Pollutants

As discussed in Section 3.7 (Hazardous Materials and Wastes), several elements regarding the management of hazardous materials would be common for all Navy activities in the study area. These common elements are summarized below:

- Label, handle, store, transport, issue, track, used, and dispose of all hazardous materials in a manner that is compliant with Occupational Safety and Health Administration requirements, and other applicable regulations.
- Use the Consolidated Hazardous Material Reutilization and Inventory Management Program (CHRIMP) to centrally control and issue hazardous materials on an as-needed basis, and ensure that serviceable, partially used, or excess materials are returned for potential redistribution, reuse, recycling.
- To minimize hazardous waste generation, change the process to eliminate or reduce the use of hazardous materials at the source; substitute a less hazardous material into the process when possible; and recycle or recover and reuse of hazardous materials.

- Implement emergency and spill response measures and procedures (including Spill Prevention, Control, and Countermeasure Plans where appropriate) to minimize the potential releases of fuel or other hazardous materials, and to quickly respond to, and mitigate, any release.

4.7.4 Joint Expeditionary Base Little Creek

The PTEAs applicable to hazardous materials and waste at JEB Little Creek that contribute to the pollutants stressor include explosives on land and vehicle movement (Table 4.7-1).

Table 4.7-1. Joint Expeditionary Base Little Creek Hazardous Materials and Waste Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Pollutants*	*No. of Events*	*Pollutants*	*No. of Events*	*Pollutants*
Land – Beaches/ Dunes	Explosives on Land	demolition materials and charge			2	2 events (2 detonations with a maximum NEW of 1.25 pounds)		
	Vehicle Movement	tactical and non-tactical vehicles	815	3,560 hours	2	1 hour		

Key: NEW = net explosive weight; No. = number. Note: Additional training event details are in Appendix C.

4.7.4.1 No Action Alternative

4.7.4.1.1 Hazardous Materials

Pollutants

JEB Little Creek uses hazardous materials as part of the operation of vehicles used in training. The use of the hazardous materials is tracked through the CHRIMP system, and all materials are stored in proper containers, employing secondary containment as necessary to prevent and limit accidental spills. JEB Little Creek has emergency response procedures and site-specific contingency plans for all hazardous material locations. All spills, leaks, and accidental discharges of petroleum products or hazardous materials are reported and mitigated. Under Emergency Planning and Community Right-to-Know Act's Tier II program, JEB Little Creek currently reports on the quantity of hazardous materials exceeding applicable thresholds. Hazardous materials used to support vehicle use in training events is conducted in compliance with existing plans and reporting requirements.

4.7.4.1.2 Hazardous Constituents

Pollutants

No hazardous constituents result from vehicle movement and no impacts occur. Air pollutants, such as carbon dioxide, carbon monoxide, and nitrogen oxides, are generated from operation of vehicle engines. These emissions are discussed in Section 4.1 (Air Quality).

4.7.4.1.3 Environmental Restoration Sites

Pollutants

Five ERP sites overlap proposed training areas (see Figure 4.7-1). Site 9, Site 10, and Solid Waste Management Unit 7A/B have land use controls associated with them that: prohibit digging into or disturbing the existing soil cover, prohibit residential development on the site, and prohibit use of the shallow aquifer groundwater beneath the sites other than for environmental monitoring and testing. No digging or use of groundwater occurs during No Action Alternative training events. Vehicle traffic may disturb superficial soils, but this disturbance is not to such an extent that it impacts ERP sites. Regardless, any activities located on or adjacent to ERP sites are coordinated with Environmental Management. Consequently, no impacts to ERP sites occur.

4.7.4.2 Alternative 1

4.7.4.2.1 Hazardous Materials

Pollutants

Explosives on beach/dune training areas are limited to two events per year with a maximum NEW of 1.25 pounds. This is an increase of two events per year as compared to the No Action Alternative. Hazardous materials would not be used as part of explosives training; consequently, no impacts would occur.

A minor increase in vehicle movement (two events per year) would occur on beach/dune training areas along the northern shoreline of JEB Little Creek. This activity would occur throughout the year in support of training events. The use of hazardous materials (e.g., fuel, lubricating oil) would increase commensurate with an increase in the number of operations. All hazardous materials would be managed according to established procedures and any accidental discharges of these materials would be reported and mitigated. There would be no changes in the overall quantity of hazardous materials stored at JEB Little Creek resulting from Alternative 1, so no additional reporting under Emergency Planning and Community Right-to-Know Act's Tier II program would be required.

4.7.4.2.2 Hazardous Constituents

Pollutants

Explosives on beach/dune training areas are limited to two events per year with a maximum NEW of 1.25 pounds. This is an increase of two events per year as compared to the No Action Alternative. As noted in Section 3.7 (Hazardous Materials and Waste), most of the munitions constituents would be consumed during detonations. The detonation of explosives primarily produces water vapor, carbon dioxide, and nitrogen. In addition, carbon monoxide and nitrogen oxides may be formed. The quantities produced of these two hazardous chemicals during detonation are very small. For example, the detonation of 1 pound of TNT (2,4,6-trinitrotoluene) produces approximately 0.01 pound of carbon monoxide and of nitrogen oxides. Based on the number of proposed events and the quantities of explosives that would be used, less than 1 pound of carbon monoxide and nitrogen oxides would be generated. By comparison, a typical car may produce approximately 500 pounds of carbon monoxide and 40 pounds of nitrogen oxides during the year.

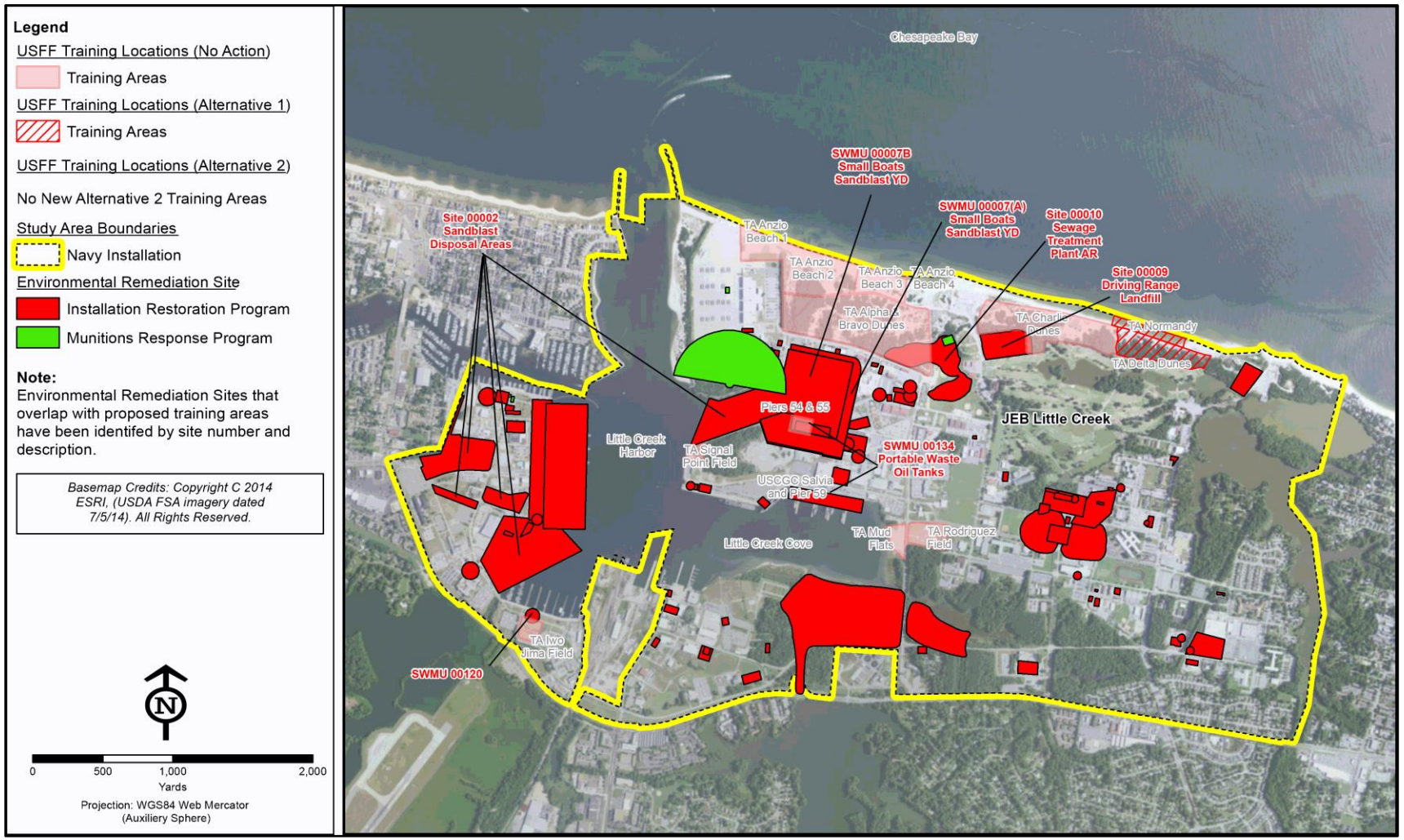

Figure 4.7-1. Training Locations and ERP Sites at JEB Little Creek

Studies indicate that if the energetic materials detonate as designed, the resulting residue deposition would be small (Jenkins & Vogel, 2014). Only a small percentage of munitions fail to detonate as designed. These non-functioning munitions are typically referred to as "duds." Dud rates vary from munition to munition; however, existing DoD policies ensure that dud, or failure, rates are very low. Navy safety policies in place require the documentation and notification of duds; if multiple duds occur in one exercise, the exercise is halted (Jenkins & Vogel, 2014). As part of routine range clearance activities, unexploded ordnance items (or duds) present on the surface are destroyed. Additionally, DoD Directive 4715.11, Environmental and Explosives Safety Management on Operational Ranges Within the United States, requires all military ranges to be operated in ways that ensure their long-term viability to meet the national defense mission while protecting the environment. As such, Navy ordnance training activities are conducted under controlled conditions within bermed areas; consequently, no significant impacts would be expected from deposition of munitions constituents into off-range ground areas or surface waters (Section 4.3, Water Resources). Chemical releases to the air from detonation training activities would be tracked and reported as required.

No hazardous constituents would result from vehicle movement and no impacts would occur. Air pollutants would be generated from operation of vehicle engines. These emissions are discussed in Section 4.1 (Air Quality).

As discussed in Section 3.7.3.2 (JEB Little Creek, Hazardous Constituents), JEB Little Creek currently reports annual on-site and off-site releases of hazardous constituents under the USEPA's TRI program. Under Alternative 1, explosives training on TA Delta Dunes would not result in new TRI chemical reporting thresholds being exceeded; consequently, no impacts would occur. Additionally, established procedures require that metallic debris (e.g., brass cases) be collected after training. These items are sent off for recycling and not disposed of as solid waste.

4.7.4.2.3 Environmental Restoration Sites

Pollutants

Explosives training would occur only on TA Delta Dunes, which does not contain any ERP sites. In addition, under Alternative 1, impacts associated with vehicle training would be the same as under the No Action Alternative at this location; consequently, no impacts would occur.

4.7.4.3 Alternative 2

Alternative 2 training events are the same as those under Alternative 1 at this location; as noted in Table 4.7-1, no additional training would occur. Impacts under Alternative 2 would be the same as under Alternative 1 and are discussed below.

4.7.4.3.1 Hazardous Materials

Pollutants

Explosives on beach/dune training areas are limited to two events per year with a maximum NEW of 1.25 pounds. Hazardous materials would not be used as part of explosives training.

A minor increase in vehicle movement would occur on beach/dune training areas along the northern shoreline of JEB Little Creek. This activity would occur throughout the year in support of training events. The use of hazardous materials (e.g., fuel, lubricating oil) would increase commensurate with an increase in the number of operations. All hazardous materials would be managed according to

established procedures and any accidental discharges of these materials would be reported and mitigated. There would be no changes in the overall quantity of hazardous materials stored at JEB Little Creek resulting from Alternative 2, so no additional reporting under Emergency Planning and Community Right-to-Know Act's Tier II program would be required.

4.7.4.3.2 Hazardous Constituents

Pollutants

As noted in Section 3.7 (Hazardous Materials and Waste), most of the munitions constituents would be consumed during detonations. The detonation of explosives primarily produces water vapor, carbon dioxide, and nitrogen. In addition, carbon monoxide and nitrogen oxides may be formed. The quantities produced of these two hazardous chemicals during detonation are very small. For example, the detonation of 1 pound of TNT produces approximately 0.01 pound of carbon monoxide and of nitrogen oxides. Based on the number of proposed events and the quantities of explosives that would be used, less than 1 pound of carbon monoxide and nitrogen oxides would be generated. By comparison, a typical car may produce approximately 500 pounds of carbon monoxide and 40 pounds of nitrogen oxides during the year.

Studies indicate that if the energetic materials detonate as designed, the resulting residue deposition would be small (Jenkins & Vogel, 2014). Only a small percentage of munitions fail to detonate as designed. These non-functioning munitions are typically referred to as "duds." Dud rates vary from munition to munition; however, existing DoD policies ensure that dud, or failure, rates are very low. Navy safety policies in place require the documentation and notification of duds; if multiple duds occur in one exercise, the exercise is halted (Jenkins & Vogel, 2014). As part of routine range clearance activities, unexploded ordnance items (or duds) present on the surface are destroyed. Additionally, DoD Directive 4715.11, Environmental and Explosives Safety Management on Operational Ranges Within the United States, requires all military ranges to be operated in ways that ensure their long-term viability to meet the national defense mission while protecting the environment. As such, Navy ordnance training activities are conducted under controlled conditions within bermed areas; consequently, no significant impacts would be expected from deposition of munitions constituents into off-range ground areas or surface waters (Section 4.3, Water Resources). Chemical releases to the air from detonation training activities would be tracked and reported as required.

As discussed in Section 3.7.3.2 (JEB Little Creek, Hazardous Constituents), JEB Little Creek currently reports annual on-site and off-site releases of hazardous constituents under the USEPA's TRI program. Under Alternative 2, explosives training on TA Delta Dunes would not result in new TRI chemical reporting thresholds being exceeded; consequently, no impacts would occur. Additionally, established procedures require that metallic debris (e.g., brass cases) be collected after training. These items are sent off for recycling and not disposed of as solid waste.

No hazardous constituents would result from vehicle movement and no impacts would occur. Air pollutants would be generated from operation of vehicle engines. These emissions are discussed in Section 4.1 (Air Quality).

4.7.4.3.3 Environmental Restoration Sites

Pollutants

Explosives training would occur only on TA Delta Dunes, which does not contain any ERP sites; consequently, no impacts would occur. In addition, under Alternative 2, impacts associated with vehicle training would be the same as under the No Action Alternative at this location; consequently, no impacts would occur.

4.7.4.4 Summary

The No Action Alternative represents baseline conditions at this location. Under Alternatives 1 and 2, USFF training would increase by two events that include explosives and vehicle movement in beach/dune training areas. Explosives on beach/dune training areas would only occur within TA Delta Dunes and would be limited to two events per year with a maximum NEW of 1.25 pounds. A minor increase in vehicle movement (two events per year) would occur on beach/dune training areas along the northern shoreline of JEB Little Creek.

Proposed activities at JEB Little Creek, consisting of explosives on land and vehicle movement would use hazardous materials and generate hazardous constituents; however, materials would be managed within the existing plans and procedures. In addition, the training events would not occur on or in the vicinity of ERP sites and therefore, impacts to these sites would not occur. Therefore, under all alternatives, there would be no impact on hazardous materials and wastes at JEB Little Creek.

4.7.5 Joint Expeditionary Base Fort Story

The PTEAs applicable to hazardous materials and waste at JEB Fort Story that contribute to the pollutants stressor include vehicle movement, explosives on land, and weapons firing – non-lethal training ammunition (Table 4.7-2).

4.7.5.1 No Action Alternative

4.7.5.1.1 Hazardous Materials

Pollutants

Navy EOD training includes detonations on land and occurs throughout the year. These detonations have a 1.25-pound NEW. EOD training occurs at JEB Fort Story in non-beach/dune areas. Hazardous materials are not used as part of explosives training or non-lethal ammunition training.

Vehicle movement occurs on beach/dune and non-beach/dune training areas within JEB Fort Story. This activity occurs throughout the year in support of training events. JEB Fort Story uses hazardous materials as part of the operation vehicles used in training. The use of hazardous materials is tracked through the CHRIMP system, and all materials are stored in proper containers, employing secondary containment as necessary to prevent and limit accidental spills. JEB Fort Story has emergency response procedures and site-specific contingency plans for all hazardous material locations. All spills, leaks, and accidental discharges of petroleum products or hazardous materials are reported and mitigated. Under Emergency Planning and Community Right-to-Know Act's Tier II program, Fort-Story currently reports on the quantity of hazardous materials exceeding applicable thresholds.

Table 4.7-2. Joint Expeditionary Base Fort Story Hazardous Materials and Waste Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Pollutants*	*No. of Events*	*Pollutants*	*No. of Events*	*Pollutants*
Land – Beaches/ Dunes	Vehicle Movement	tactical and non-tactical vehicles	412	4,735 hours	79	3,171 hours		
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	28	2,800 rounds	76	15,200 rounds		
Land – Non-Beaches/ Dunes	Explosives on Land	demolition materials and charge	108	• 80 events (average 8 detonations/event with maximum NEW of 1.25 pounds) • 28 events (1 detonation/event with maximum NEW of 1.25 pounds)	556	• 240 events (average 9 detonations/event with maximum NEW of 0.2 pounds) • 240 events (average 13 detonations/event with maximum NEW of 1.25 pounds) • 76 events (1 detonation/event with maximum NEW of 1.25 pounds)	56	• 56 events (1 detonation/event maximum NEW 1.25 pounds)
	Vehicle Movement	tactical and non-tactical vehicles	362	9,587 hours	240	60 hours	56	3,640 hours
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	84	8,400 rounds			56	5,600 rounds

Key: NEW = net explosive weight; No. = number. Note: Additional training event details are in Appendix C.

4.7.5.1.2 Hazardous Constituents

Pollutants

As noted in Section 3.7 (Hazardous Materials and Waste), most of the munitions constituents would be consumed during detonations. The detonation of explosives primarily produces water vapor, carbon dioxide, and nitrogen. In addition, carbon monoxide and nitrogen oxides may be formed. Based on the maximum number of events and the quantities of explosives used approximately 8.5 pounds of carbon monoxide and nitrogen oxides are generated. These quantities are very minor when compared to other sources (e.g., automobiles).

Studies indicate that if the energetic materials detonate as designed, the resulting residue deposition would be small (Jenkins & Vogel, 2014). Only a small percentage of munitions fail to detonate as designed. These non-functioning munitions are typically referred to as "duds." Dud rates vary from munition to munition; however, existing DoD policies ensure that dud, or failure, rates are very low. Navy safety policies in place require the documentation and notification of duds; if multiple duds occur in one exercise, the exercise is halted (Jenkins & Vogel, 2014). As part of routine range clearance activities, unexploded ordnance items (or duds) present on the surface are destroyed. Additionally, DoD Directive 4715.11, Environmental and Explosives Safety Management on Operational Ranges Within the United States, requires all military ranges to be operated in ways that ensure their long-term viability to meet the national defense mission while protecting the environment. As such, Navy ordnance training activities are conducted under controlled conditions within bermed areas; consequently, no significant impacts would be expected from deposition of munitions constituents into off-range ground areas or surface waters (Section 4.3, Water Resources). Chemical releases to the air from detonation training activities are tracked and reported as required.

As discussed in Section 3.7.4.2 (JEB Fort Story, Hazardous Constituents), JEB Fort Story currently reports annual on-site and off-site releases of hazardous constituents under the USEPA's TRI program. Under the No Action Alternative, explosives training do not result in new TRI chemical reporting thresholds being exceeded. Additionally, established procedures require that metallic debris (e.g., brass cases) be collected after training. These items are sent off for recycling and not disposed of as solid waste.

No hazardous constituents result from vehicle movement and no impacts occur. Air pollutants are generated from operation of vehicle engines. These emissions are discussed in Section 4.1 (Air Quality).

Paintball guns are used for non-lethal weapons training. These guns use compressed gas to fire a small, ping-pong-like paintball that contains paint. The brightly colored paint marks the target when the balls strike. Paintballs are made of non-toxic, biodegradable and water soluble food ingredients. The outer shell is gelatin-based (the ingredient used to make gummy bears), and the inner base filling is polyethylene glycol (inert ingredient in cough syrup) thickened with crayon wax. Food dye is used to color the paintballs.

4.7.5.1.3 Environmental Restoration Sites

Pollutants

Five ERP sites overlap training areas (see Figure 4.7-2). Land use controls associated with restoration sites prevent digging or contact with groundwater resulting from digging without proper controls in place. Additionally, at one affected site (Site 11S), the withdrawal of groundwater is prohibited except for environmental monitoring and testing. No digging or use of groundwater occurs during No Action

Alternative training activities. Vehicle traffic can disturb superficial soils, but this disturbance is not at such a level as to impact ERP sites. No soil disturbance or groundwater withdrawal occurs as part of non-lethal ammunition training. Explosives training are limited to explosive training areas, which avoid all ERP sites (see Figure 4.7-2). Regardless, any activities located on or adjacent to ERP sites are coordinated with Environmental Management.

4.7.5.2 Alternative 1

4.7.5.2.1 Hazardous Materials

Pollutants

Explosives operations under Alternative 1 would increase more than five times over the No Action Alternative. These events would be distributed throughout the year. As under the No Action Alternative, EOD training would occur at JEB Fort Story in non-beach/dune areas. Hazardous materials are not used as part of explosives training or non-lethal ammunition training. Therefore, no impacts would occur.

Alternative 1 would include nearly 4,700 additional hours of vehicle movement over the amount analyzed in the No Action Alternative. Vehicle movement would occur on beach/dune and non-beach/dune training areas. Impact from vehicle movement would be of a similar nature to those described under the No Action Alternative. Hazardous materials would be managed according to the same processes and procedures as described for the No Action Alternative and would be accommodated by the current management system. Therefore, no impacts would occur.

Implementation of Alternative 1 would more than double the total number of paintball rounds fired as compared to the No Action Alternative. However, the number of training events would be distributed throughout the year. All of the additional non-lethal training ammunition would be expended in beach/dune training areas. Hazardous materials would not be used as part of non-lethal ammunition training.

4.7.5.2.2 Hazardous Constituents

Pollutants

As noted in Section 3.7 (Hazardous Materials and Waste), most of the munitions constituents would be consumed during detonations. Based on the number of proposed events and the quantities of explosives that would be used, approximately 46 additional pounds of carbon monoxide and nitrogen oxides would be generated. These quantities would be very minor when compared to other sources (e.g., automobiles). As under the No Action Alternative, only a small percentage of munitions fail to detonate as designed. In addition, as part of routine range clearance activities, unexploded ordnance items (or duds) present on the surface are destroyed and Navy ordnance training activities are conducted under controlled conditions within bermed areas; consequently, no significant impacts would be expected from deposition of munitions constituents into off-range ground areas or surface waters (Section 4.3, Water Resources). Chemical releases to the air from detonation training activities would continue to be tracked and reported as required. No new TRI chemical thresholds would be exceeded and established procedures would be used to track and report additional releases of lead.

No hazardous constituents would result from vehicle movement and no impacts would occur. Air pollutants would be generated from operation of vehicle engines. These emissions are discussed in Section 4.1 (Air Quality).

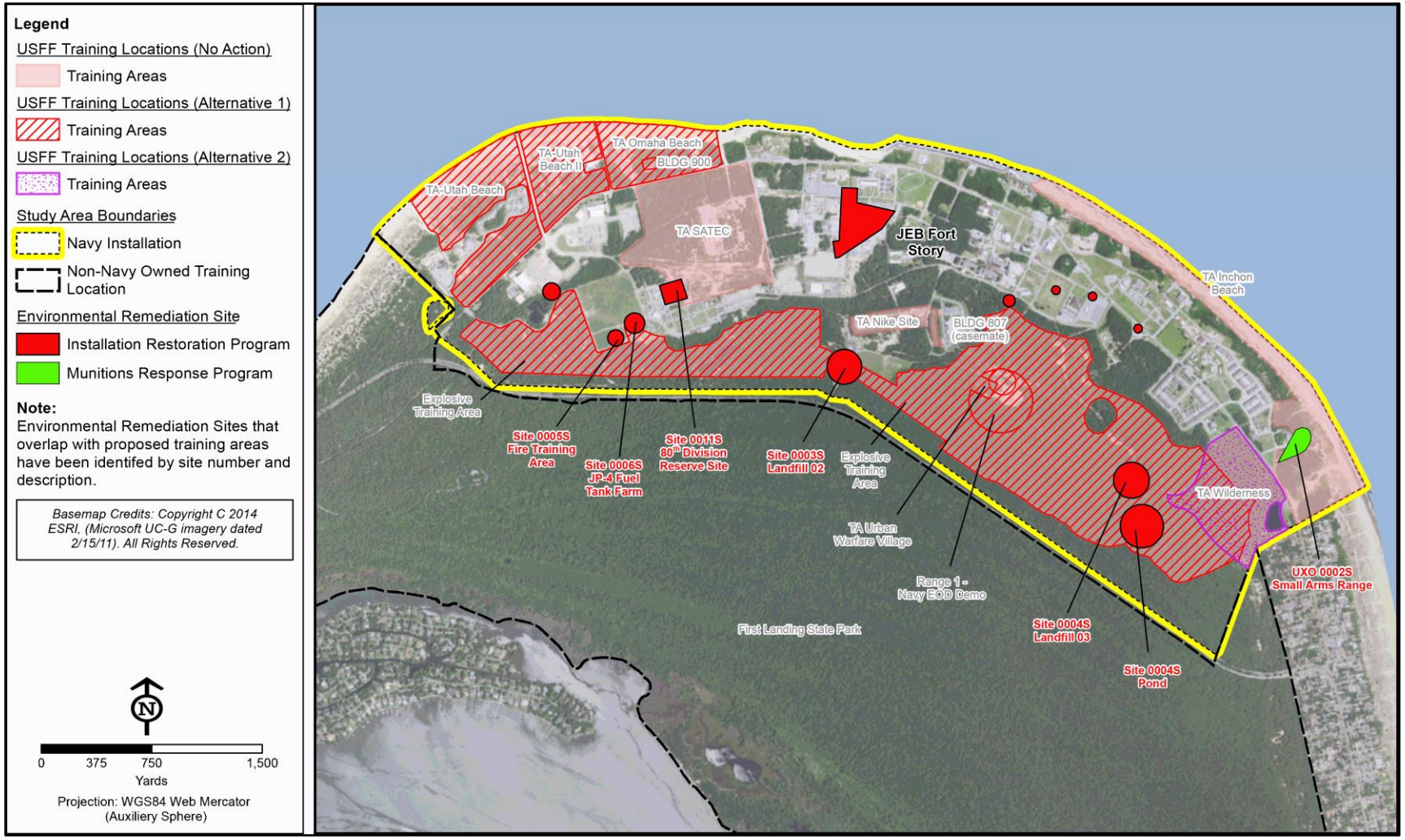

Figure 4.7-2. Training Locations and ERP Sites at Fort Story

Under Alternative 1, the use of paintball guns for training would increase. As discussed above, paintballs are made of non-toxic, biodegradable and water soluble food ingredients. Consequently, no hazardous constituents are expended as part of this training.

4.7.5.2.3 Environmental Restoration Sites

Pollutants

Under Alternative 1, impacts associated with vehicle training would be the same as under the No Action Alternative at this location and, therefore, no impacts would occur.

No soil disturbance or groundwater withdrawal would occur as part of non-lethal ammunition training; consequently, no impacts to ERP sites would occur.

4.7.5.3 Alternative 2

Under Alternative 2, vehicle movement and weapons firing – non-lethal training ammunition training events in beaches/dunes are the same as those under Alternative 1 at this location (Table 4.7-2). Non-beach/dune PTEAs would increase under Alternative 2 as compared to Alternative 1.

4.7.5.3.1 Hazardous Materials

Pollutants

Alternative 2 would add a small number of additional on-land detonations for EOD training over the number in Alternative 1 (56 events would occur on non-beach/dune training areas), resulting in 614 additional training events over the No Action Alternative. The detonations would occur throughout the year. Under Alternative 2, impacts would be the same as under the No Action Alternative at this location; therefore, no impacts would occur. Hazardous materials would be managed according to the same processes and procedures as described for the No Action Alternative and would be accommodated by the current management system.

Vehicle movement operations would increase by approximately 3,600 hours annually from the level analyzed in Alternative 1 or a total of 8,311 hours over the No Action Alternative. Vehicle movement would occur on beach/dune and non-beach/dune training areas. Under Alternative 2, vehicle training would increase. However, impacts associated with vehicle training would be the same as under the No Action Alternative at this location and, therefore, no impacts would occur.

Under Alternative 2, non-lethal weapons training would increase over the level analyzed for Alternative 1 by approximately 5,600 rounds annually or a total of 51,200 rounds over the No Action Alternative. Hazardous materials would not be used as part of non-lethal ammunition training.

4.7.5.3.2 Hazardous Constituents

Pollutants

As noted in Section 3.7 (Hazardous Materials and Waste), most of the munitions constituents would be consumed during detonations. Based on the maximum number of proposed events and the quantities of explosives that would be used, approximately 18 pounds of carbon monoxide and nitrogen oxides would be generated. As under the No Action Alternative, only a small percentage of munitions fail to detonate as designed. In addition, as part of routine range clearance activities, unexploded ordnance items (or duds) present on the surface are destroyed and Navy ordnance training activities are conducted under controlled conditions within bermed areas; consequently, no significant impacts would be expected

from deposition of munitions constituents into off-range ground areas or surface waters (Section 4.3, Water Resources). Chemical releases to the air from detonation training activities would continue to be tracked and reported as required. No new TRI chemical thresholds would be exceeded and established procedures would be used to track and report on additional releases of lead.

No hazardous constituents would result from vehicle movement and no impacts would occur. Air pollutants would be generated from operation of vehicle engines. These emissions are discussed in Section 4.1 (Air Quality).

Under Alternative 2, the use of paintball guns for training would increase over the No Action Alternative. As discussed above, paintballs are made of non-toxic, biodegradable and water soluble food ingredients. Consequently, no hazardous constituents are expended as part of this training.

4.7.5.3.3 Environmental Restoration Sites

Pollutants

Under Alternative 2, impacts would be the same as under the No Action Alternative at this location; therefore, no impacts would occur.

4.7.5.4 Summary

Under all alternatives, proposed activities at JEB Fort Story, consisting of explosives on land and vehicle movement would use hazardous materials and generate hazardous constituents; however, materials would be managed within the existing plans and procedures. The increase in use of hazardous materials and hazardous constituents under Alternatives 1 and 2 as compared to the No Action Alternative would be accommodated by the current management. No hazardous constituents would be generated with weapons firing of non-lethal training ammunition. In addition, the training events would not occur on or in the vicinity of ERP sites. Therefore, under all alternatives, there would be no impact on hazardous materials and wastes at JEB Fort Story.

4.7.6 Dam Neck Annex and Camp Pendleton

The PTEAs applicable to hazardous materials and waste at Dam Neck Annex and Camp Pendleton that contribute to the pollutants stressor include vehicle movement and weapons firing – non-lethal training ammunition (Table 4.7-3).

Table 4.7-3. Dam Neck Annex and Camp Pendleton Hazardous Materials and Waste Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Pollutants*	*No. of Events*	*Pollutants*	*No. of Events*	*Pollutants*
Land – Beaches/ Dunes	Vehicle Movement	tactical and non-tactical vehicles	64	3,715 hours	76	291 hours		
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun			76	30,400 rounds		

Key: No. = number. Note: Additional training event details are in Appendix C.

4.7.6.1 No Action Alternative

4.7.6.1.1 Hazardous Materials

Pollutants

Vehicle movement occurs on beach/dune training areas within Dam Neck Annex and Camp Pendleton. This activity occurs throughout the year in support of training events. Hazardous materials are used as part of the operation of vehicles used in training. For Dam Neck Annex, the use of hazardous materials is tracked by NAS Oceana. All materials are stored in proper containers, employing secondary containment as necessary to prevent and limit accidental spills. All spills, leaks, and accidental discharges of petroleum products or hazardous materials are reported and mitigated. There are no changes in the overall quantity of hazardous materials used or stored resulting from the No Action Alternative.

4.7.6.1.2 Hazardous Constituents

Pollutants

No hazardous constituents result from vehicle movement and no impacts occur. Air pollutants are generated from operation of vehicle engines. These emissions are discussed in Section 4.1 (Air Quality).

4.7.6.1.3 Environmental Restoration Sites

Pollutants

As Figure 4.7-3 shows, no vehicle training activities occur on or near ERP sites, so there are no potential impacts to these sites.

4.7.6.2 Alternative 1

4.7.6.2.1 Hazardous Materials

Pollutants

Alternative 1 would include 291 additional hours of vehicle operations over the amount analyzed in the No Action Alternative. Vehicle movement occurs on beach/dune training areas within Dam Neck Annex and Camp Pendleton. Under Alternative 1, vehicle training would increase slightly. However, impacts associated with hazardous materials would be the same as under the No Action Alternative at this location and, therefore, no impacts would occur. Hazardous materials would be managed according to the same processes and procedures as described for the No Action Alternative and would be accommodated by the current management system.

USFF weapons firing with non-lethal training ammunition does not currently occur at Dam Neck Annex and Camp Pendleton. Implementation of Alternative 1 would include the use of approximately 30,400 rounds of non-lethal training ammunition on the beach/dune training areas. Hazardous materials would not be used as part of non-lethal ammunition training.

4.7.6.2.2 Hazardous Constituents

Pollutants

As discussed in Section 4.7.5.1 (No Action Alternative), paintballs are made of non-toxic, biodegradable and water soluble food ingredients and thus no hazardous constituents would occur. No hazardous constituents would result from vehicle movement and no impacts would occur. Air pollutants would be generated from operation of vehicle engines. These emissions are discussed in Section 4.1 (Air Quality).

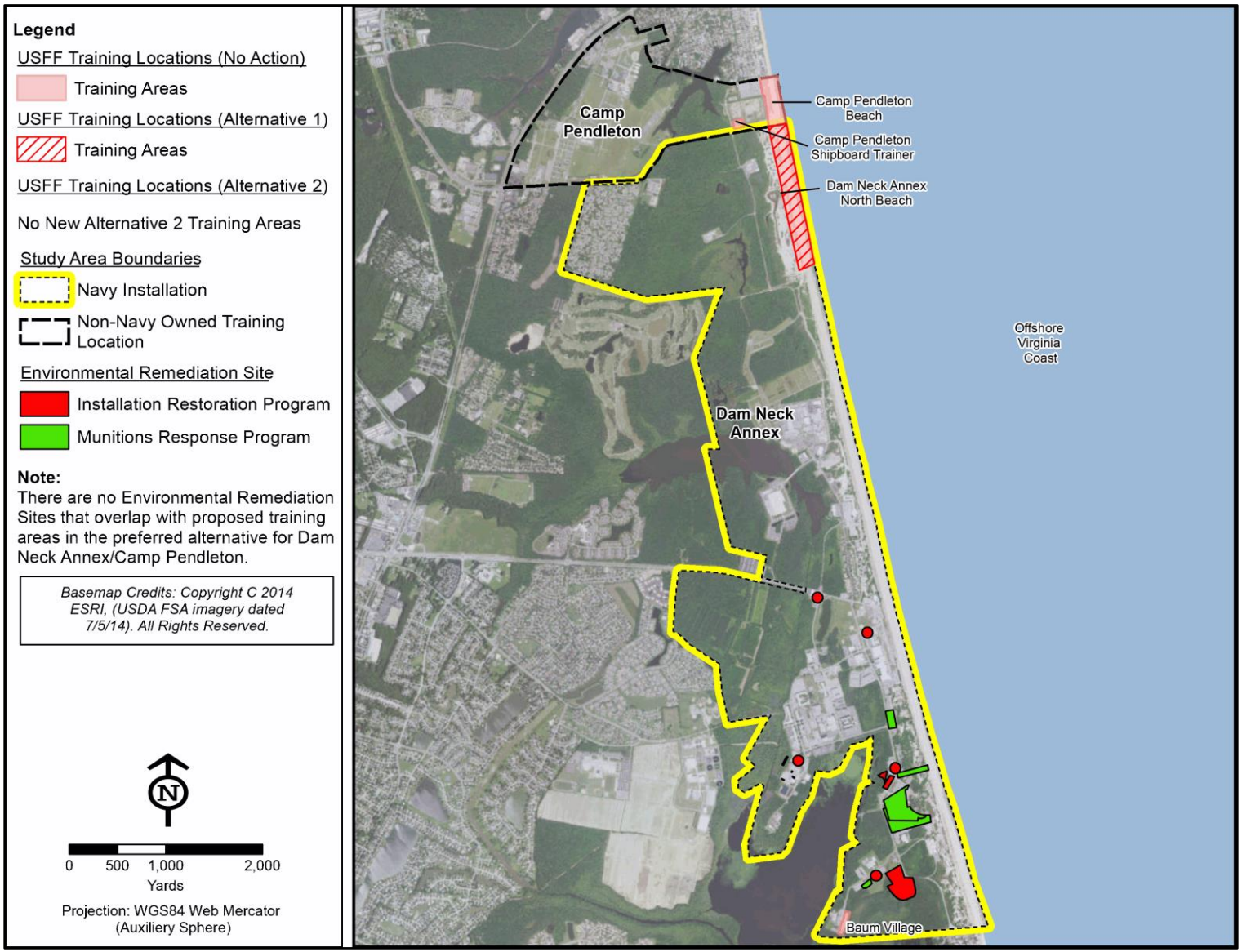

Figure 4.7-3. Training Locations and ERP Sites at Dam Neck and Camp Pendleton

4.7.6.2.3 Environmental Restoration Sites

Pollutants

Under Alternative 1, impacts associated with vehicle training would be the same as under the No Action Alternative at this location and, therefore, no impacts would occur. ERP sites would not be located in areas used for non-lethal ammunition training.

4.7.6.3 Alternative 2

Alternative 2 training events are the same as those under Alternative 1 at this location; as noted in Table 4.7-3, no additional training would occur. Impacts under Alternative 2 would be the same as under Alternative 1 and are discussed below.

4.7.6.3.1 Hazardous Materials

Pollutants

Alternative 2 would include 291 additional hours of vehicle operations over the amount analyzed in the No Action Alternative above. Vehicle movement occurs on beach/dune training areas within Dam Neck Annex and Camp Pendleton. Under Alternative 2, vehicle training would increase slightly. However, impacts associated with hazardous materials would be the same as under the No Action Alternative at this location and, therefore, no impacts would occur. Hazardous materials would be managed according to the same processes and procedures as described for the No Action Alternative and would be accommodated by the current management system.

USFF weapons firing with non-lethal training ammunition does not currently occur at Dam Neck Annex and Camp Pendleton. Implementation of Alternative 2 would include the use of approximately 30,400 rounds of non-lethal training ammunition on the beach/dune training areas. Hazardous materials would not be used as part of non-lethal ammunition training.

4.7.6.3.2 Hazardous Constituents

Pollutants

As discussed in Section 4.7.5.1 (No Action Alternative), paintballs are made of non-toxic, biodegradable and water soluble food ingredients and thus no hazardous constituents would occur. No hazardous constituents would result from vehicle movement and no impacts would occur. Air pollutants would be generated from operation of vehicle engines. These emissions are discussed in Section 4.1 (Air Quality).

4.7.6.3.3 Environmental Restoration Sites

Pollutants

Under Alternative 2, impacts associated with vehicle training would be the same as under the No Action Alternative at this location and, therefore, no impacts would occur. ERP sites would not be located in areas used for non-lethal ammunition training.

4.7.6.4 Summary

Under all alternatives, the proposed activities at Dam Neck Annex and Camp Pendleton consisting of vehicle movement would use hazardous materials; however, materials would be managed within the existing plans and procedures. No hazardous constituents would be generated with weapons firing –

non-lethal training ammunition. In addition, the training events would not occur on or in the vicinity of ERP sites and therefore, impacts to these sites would not occur. Therefore, under all alternatives, there would be no impact on hazardous materials and wastes at Dam Neck Annex and Camp Pendleton.

4.7.7 Naval Auxiliary Landing Field Fentress

The PTEAs applicable to hazardous materials and waste at NALF Fentress that contribute to the pollutants stressor include with equipment use, vehicle movement, and weapons firing – non-lethal training ammunition (Table 4.7-4).

Table 4.7-4. NALF Fentress Hazardous Materials and Waste Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Pollutants*	*No. of Events*	*Pollutants*	*No. of Events*	*Pollutants*
Land – Non-Beaches/ Dunes	Equipment Use	diesel generators					4	6,300 hours
	Vehicle Movement	tactical and non-tactical vehicles	90	4,500 hours			4	1,072 hours
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	90	9,000 rounds				

Key: No. = number. Note: Additional training event details are in Appendix C.

4.7.7.1 No Action Alternative

4.7.7.1.1 Hazardous Materials

Pollutants

Vehicle movement occurs on non-beach/dune training areas within NALF Fentress. This activity occurs throughout the year in support of training events. Hazardous materials (e.g., fuel, lubricating oil) are used as part of the operation of vehicles used in training. For NALF Fentress, the use of hazardous materials is tracked by NAS Oceana. All hazardous materials are stored in proper containers, employing secondary containment as necessary to prevent and limit accidental spills. All spills, leaks, and accidental discharges of petroleum products or hazardous materials from vehicle operations (e.g., rupture hydraulic line) or from maintenance-related activities are reported and mitigated. Under Emergency Planning and Community Right-to-Know Act's Tier II program, NAS Oceana reports on the quantity of hazardous materials exceeding applicable thresholds. Hazardous materials would be managed according to the same processes and procedures as described for the No Action Alternative and would be accommodated by the current management system.

Approximately 9,000 non-lethal training ammunition rounds are expended each year within the boundaries of NALF Fentress. Hazardous materials are not used as part of non-lethal ammunition training.

4.7.7.1.2 Hazardous Constituents

Pollutants

As discussed in Section 4.7.5.1 (No Action Alternative), paintballs are made of non-toxic, biodegradable and water soluble food ingredients and thus, no hazardous constituents occur. No hazardous constituents result from vehicle movement and no impacts occur. Air pollutants are generated from operation of vehicle engines. These emissions are discussed in Section 4.1 (Air Quality).

4.7.7.1.3 Environmental Restoration Sites

Pollutants

As Figure 4.7-4 shows, one ERP site, Site Unexploded Ordnance 10 (Machine Gun Boresight Range and Dive Bombing Targets), overlaps proposed training locations; however, vehicle operations occur on abandoned runways and do not affect this ERP site. Additionally, several other potential source areas at NALF Fentress which are not depicted on Figure 4.7-4 have been identified around the airfield. These potential sites include current and historical firefighting training areas, historical crash or abandoned aircraft sites, and current and historical wastewater irrigation fields. No soil disturbance or groundwater withdrawal occurs as part of non-lethal ammunition training; consequently, no impacts would occur to any site.

4.7.7.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no impacts on hazardous materials and wastes.

4.7.7.3 Alternative 2

Under Alternative 2, weapons firing – non-lethal training ammunition PTEAs would be the same as those under Alternative 1 at this location. Equipment use and vehicle movement PTEAs would increase by six events (6,300 hours per year and 1,072 hours per year, respectively) as compared to Alternative 1, as noted in Table 4.7-4.

4.7.7.3.1 Hazardous Materials

Pollutants

Alternative 2 would introduce equipment use in the form of diesel generator operations (approximately 6,300 hours per year) for USFF training at NALF Fentress. Operation of the diesel generators would be spread across any given year. Hazardous materials comprise diesel fuel and lubricants used in generators. Fueling operations would be conducted in accordance with established procedures designed to minimize the potential for any releases. Any fuel or oil leaks would be reported and mitigated. Therefore, no impacts would occur under Alternative 2. Hazardous materials would be managed according to the same processes and procedures as described for the No Action Alternative and would be accommodated by the current management system.

Vehicle movement operations would increase by approximately 1,070 hours annually over the No Action Alternative. The use of hazardous materials (e.g., fuel, lubricating oil) would increase commensurate with an increase in the number of operations. All hazardous materials would be managed according to established procedures and any accidental discharges of these materials would be reported and mitigated. There would be no changes in the overall quantity of hazardous materials stored at NAS Oceana resulting from Alternative 2, so no additional reporting under Emergency Planning and Community Right-to-Know Act's Tier II program would be required. No impacts would occur under Alternative 2.

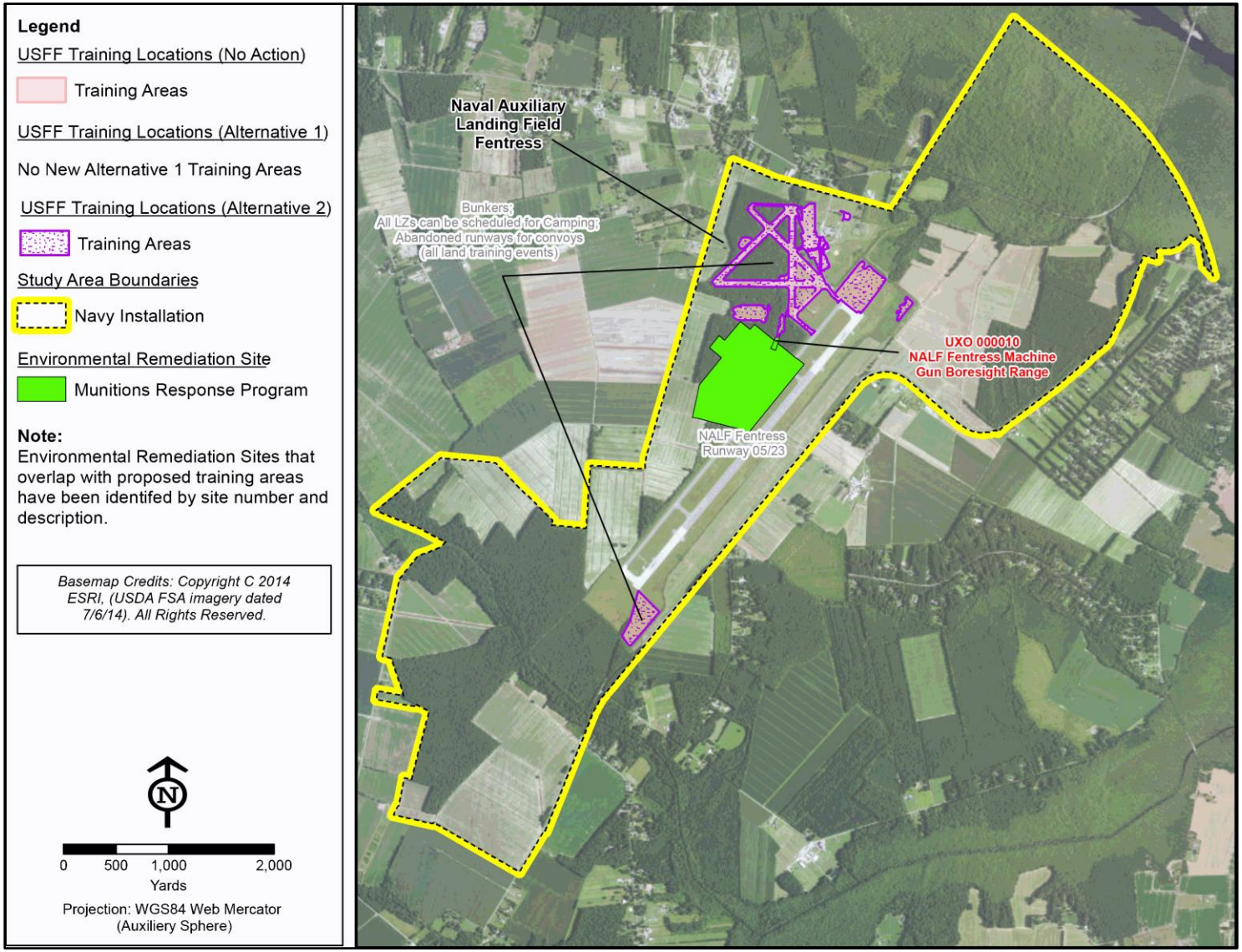

Figure 4.7-4. Training Locations and ERP Sites at NALF Fentress

4.7.7.3.2 Hazardous Constituents

Pollutants

The burning of diesel fuel produces carbon dioxide, carbon monoxide and nitrogen oxides. Chemical releases to the air from generator operations would be tracked and reported as required (see Section 4.1, Air Quality, for more information). Under Alternative 2, impacts associated with hazardous constituents would be the same as under the No Action Alternative at this location.

4.7.7.3.3 Environmental Restoration Sites

Pollutants

ERP sites would not be affected by generator operations and would not be located in areas used for vehicle training.

4.7.7.4 Summary

Under all alternatives, proposed activities at NALF Fentress consisting of equipment use and vehicle movement would use hazardous materials; however, materials would be managed within the existing plans and procedures. No hazardous constituents would be generated with weapons firing – non-lethal training ammunition. In addition, the training events would not disrupt ERP sites and therefore, impacts to these sites would not occur. As a result, there would be no impact on hazardous materials and wastes. Therefore, under all alternatives, there would be no impact on hazardous materials and wastes at NALF Fentress.

4.7.8 Northwest Annex

The PTEA applicable to hazardous materials and waste at Northwest Annex that contributes to the pollutants stressor includes vehicle movement (Table 4.7-5).

Table 4.7-5. Northwest Annex Hazardous Materials and Waste Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Pollutants*	*No. of Events*	*Pollutants*	*No. of Events*	*Pollutants*
Land – Non-Beaches/ Dunes	Vehicle Movement	tactical and non-tactical vehicles	170	510 hours				

Key: No. = number. Note: Additional training event details are in Appendix C.

4.7.8.1 No Action Alternative

4.7.8.1.1 Hazardous Materials

Pollutants

Vehicle movement occurs on non-beach/dune training areas within Northwest Annex throughout the year in support of training events. Hazardous materials (e.g., fuel, lubricating oil) are used as part of the operation of vehicles used in training. For Northwest Annex, the use of hazardous materials is tracked at Naval Support Activity Hampton Roads. All hazardous materials are stored in proper containers, employing secondary containment as necessary to prevent and limit accidental spills. All spills, leaks, and accidental discharges of petroleum products or hazardous materials from vehicle operations (e.g., rupture hydraulic line) or from maintenance-related activities are reported and mitigated. Under Emergency Planning and Community Right-to-Know Act's Tier II program, Naval Support Activity Hampton Roads reports on the quantity of hazardous materials exceeding applicable thresholds.

4.7.8.1.2 Hazardous Constituents

Pollutants

No hazardous constituents result from vehicle movement and no impacts occur. Air pollutants are generated from operation of vehicle engines. These emissions are discussed in Section 4.1 (Air Quality).

4.7.8.1.3 Environmental Restoration Sites

Pollutants

No ERP sites have been identified at Northwest Annex.

4.7.8.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no impacts on hazardous materials and wastes.

4.7.8.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no impacts on hazardous materials and wastes.

4.7.8.4 Summary

Under all alternatives, proposed activities at Northwest Annex consisting of vehicle movement would use hazardous materials and generate hazardous constituents; however, materials would be managed within the existing plans and procedures. No hazardous constituents would be generated with vehicle movement. In addition, the training events would not disrupt ERP sites and therefore, impacts to these sites would not occur. Therefore, under all alternatives, there would be no impact on hazardous materials and wastes at Northwest Annex.

4.7.9 St. Juliens Creek Annex

The PTEAs applicable to hazardous materials and waste at St. Juliens Creek Annex that contribute to the pollutants stressor include vehicle movement and equipment use (Table 4.7-6).

Table 4.7-6. St. Juliens Creek Annex Hazardous Materials and Waste Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Pollutants*	*No. of Events*	*Pollutants*	*No. of Events*	*Pollutants*
Land – Non-Beaches/ Dunes	Equipment Use	diesel generator	17	21,948 hours				
	Vehicle Movement	tactical and non-tactical vehicles	16	4,527 hours			28	1,890 hours

Key: No. = number. Note: Additional training event details are in Appendix C.

4.7.9.1 No Action Alternative

4.7.9.1.1 Hazardous Materials

Pollutants

Equipment use refers to the use of portable diesel generators to provide electricity in support of Navy training events. Diesel generators are used in 17 training events at St. Juliens Creek Annex. Hazardous materials comprise diesel fuel and lubricants used in generators. Fueling operations are conducted in accordance with established procedures designed to minimize the potential for any releases. Any fuel or oil leaks are reported and mitigated. Under Emergency Planning and Community Right-to-Know Act's Tier II program, St. Juliens Creek Annex reports on the quantity of hazardous materials exceeding applicable thresholds.

Vehicle movement occurs on non-beach/dune training areas within St. Juliens Creek Annex throughout the year in support of training events. Hazardous materials (e.g., fuel, lubricating oil) are used as part of the operation and maintenance of vehicles used in training. All hazardous materials are stored in proper containers, employing secondary containment as necessary to prevent and limit accidental spills. All spills, leaks, and accidental discharges of petroleum products or hazardous materials from vehicle operations (e.g., rupture hydraulic line) or from maintenance-related activities are reported and mitigated. Under Emergency Planning and Community Right-to-Know Act's Tier II program, St. Juliens Creek Annex reports on the quantity of hazardous materials exceeding applicable thresholds.

4.7.9.1.2 Hazardous Constituents

Pollutants

The burning of diesel fuel produces carbon dioxide, carbon monoxide and nitrogen oxides. Chemical releases to the air from generator operations are tracked and reported as required. No hazardous constituents result from vehicle movement and no impacts occur. Air pollutants are generated from operation of vehicle engines. These emissions are discussed in Section 4.1 (Air Quality).

4.7.9.1.3 Environmental Restoration Sites

Pollutants

ERP sites are not affected by generator operations, and no ERP sites are located within the area used for vehicle movement (Figure 4.7-5).

4.7.9.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no impacts on hazardous materials and wastes.

4.7.9.3 Alternative 2

Some Alternative 2 training events are the same as those under Alternative 1 at this location; as noted in Table 4.7-4; no additional training would occur for some PTEAs. Impacts associated with those Alternative 1 PTEAs are discussed below along with the new Alternative 2 PTEAs.

4.7.9.3.1 Hazardous Materials

Pollutants

Vehicle movement operations would increase by approximately 1,890 hours annually over Alternative 1 and the No Action Alternative. The use of hazardous materials (e.g., fuel, lubricating oil) would increase commensurate with an increase in the number of operations. All hazardous materials would be managed according to established procedures and any accidental discharges of these materials would be reported and mitigated. There would be no changes in the overall quantity of hazardous materials stored at St. Juliens Creek Annex resulting from Alternative 2, so no additional reporting under Emergency Planning and Community Right-to-Know Act's Tier II program would be required. No impacts would occur under Alternative 2.

4.7.9.3.2 Hazardous Constituents

Pollutants

Under Alternative 2, impacts associated with hazardous materials, would be the same as under the No Action Alternative at this location; consequently, no impacts would occur.

4.7.9.3.3 Environmental Restoration Sites

Pollutants

Under Alternative 2, ERP Site 003 is present within the training area; however, the site has received regulatory closure. In addition, vehicle traffic may disturb superficial soils, but this disturbance is not to such an extent that it impacts ERP sites.

4.7.9.4 Summary

Under all alternatives, proposed activities at St. Juliens Creek Annex consisting of equipment use and vehicle movement would use hazardous materials and generate hazardous constituents; however, materials would be managed within the existing plans and procedures. In addition, the training events would not disrupt ERP sites and therefore, impacts to these sites would not occur. Therefore, under all alternatives, there would be no impact on hazardous materials and wastes at St. Juliens Creek Annex.

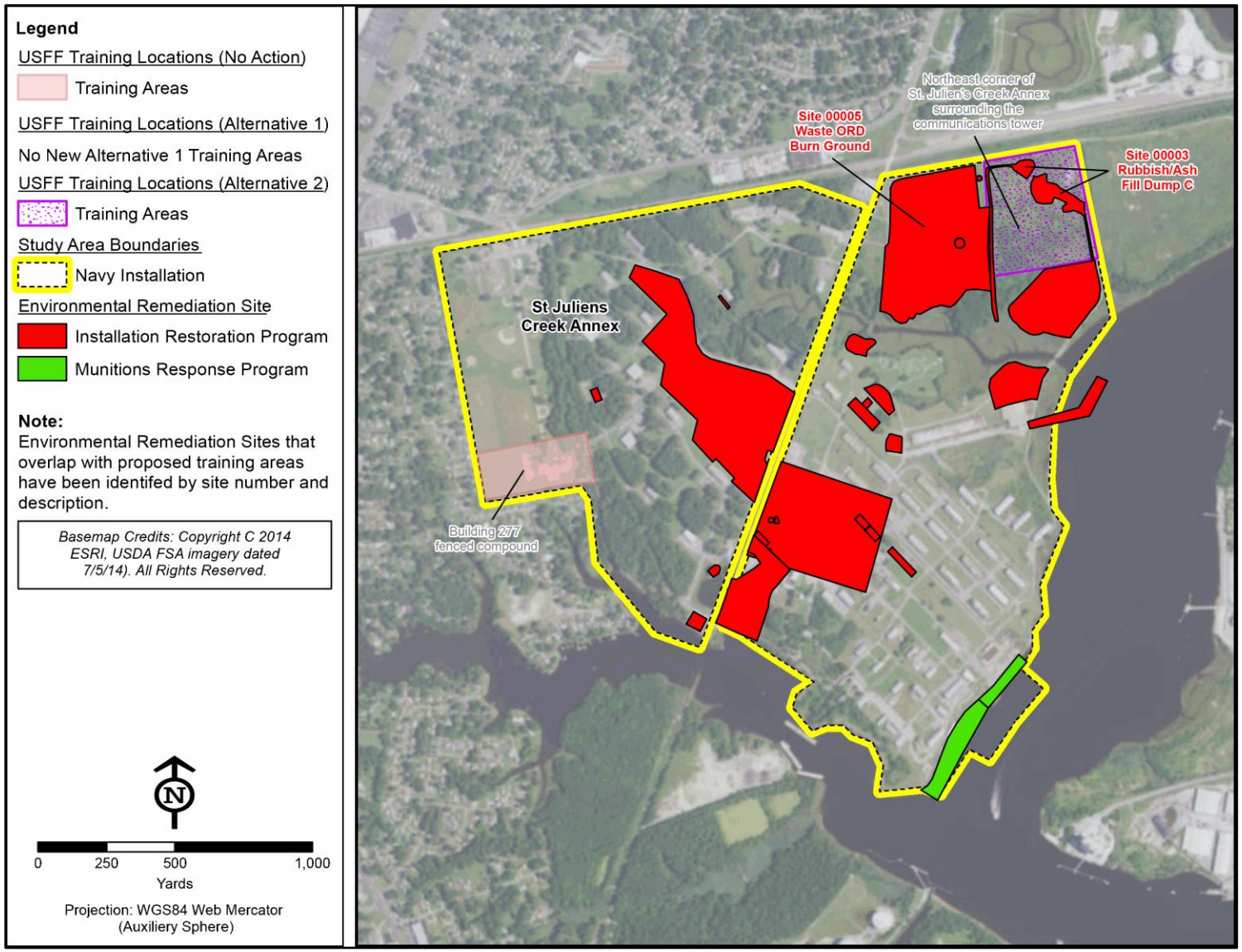

Figure 4.7-5. Training Locations and ERP Sites at St. Juliens Creek Annex

4.7.10 Naval Weapons Station Yorktown

The PTEAs applicable to hazardous materials and waste at NWS Yorktown that contribute to the pollutants stressor include vehicle movement, explosives on land, equipment use, and weapons firing – non-lethal training ammunition (Table 4.7-7).

Table 4.7-7. Naval Weapons Station Yorktown Hazardous Materials and Waste Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Pollutants*	*No. of Events*	*Pollutants*	*No. of Events*	*Pollutants*
Land – Non-Beaches/ Dunes	Equipment Use	diesel generators	8	2,016 hours				
	Explosives on Land	demolition materials and charge	104	104 events (average 13 detonations/event with maximum NEW of 25 pounds)				
	Vehicle Movement	tactical and non-tactical vehicles	228	27,192 hours				
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	50	5,000 rounds				

Key: NEW = net explosive weight; No. = number. Note: Additional training event details are in Appendix C.

4.7.10.1 No Action Alternative

4.7.10.1.1 Hazardous Materials

Pollutants

Equipment use refers to the use of portable diesel generators to provide electricity in support of Navy training events. Diesel generators are used in eight training events at NWS Yorktown. Hazardous materials comprise diesel fuel and lubricants used in the generators. Fueling operations are conducted in accordance with established procedures designed to minimize the potential for releases. Any fuel or oil leaks are reported and mitigated.

Navy EOD training includes detonations on land and occurs throughout the year. These detonations have a maximum NEW of up to 25 pounds. Hazardous materials are not used as part of explosives training; consequently, no impacts occur.

Vehicle movement occurs on non-beach/dune training areas within NWS Yorktown throughout the year in support of training events. Hazardous materials (e.g., fuel, lubricating oil) are used as part of the operation of vehicles used in training. The use of these materials is tracked through the CHRIMP system and all materials are managed as necessary to prevent spills. All hazardous materials are stored in proper containers, employing secondary containment as necessary to prevent and limit accidental spills. All spills, leaks, and accidental discharges of petroleum products or hazardous materials from vehicle operations (e.g., rupture hydraulic line) or from maintenance-related activities are reported and mitigated. Under the Emergency Planning and Community Right-to-Know Act's Tier II program, NWS Yorktown reports on the quantity of hazardous materials exceeding applicable thresholds.

Approximately 5,000 non-lethal training ammunition rounds are expended each year within the boundaries of NWS Yorktown. Hazardous materials are not used as part of non-lethal ammunition training.

4.7.10.1.2 Hazardous Constituents

Pollutants

The burning of diesel fuel produces carbon dioxide, carbon monoxide and nitrogen oxides. Chemical releases to the air from generator operations are tracked and reported as required (see Section 4.1, Air Quality, for more information).

As noted in Section 3.7 (Hazardous Materials and Waste), most of the munitions constituents would be consumed during detonations. The detonation of explosives primarily produces water vapor, carbon dioxide, and nitrogen. In addition, carbon monoxide and nitrogen oxides may be formed. Based on the maximum number of events and the quantities of explosives used, approximately 340 pounds of carbon monoxide and nitrogen oxides are generated. These quantities are very minor when compared to other sources (e.g., automobiles). As under the No Action Alternative, only a small percentage of munitions fail to detonate as designed. In addition, as part of routine range clearance activities, unexploded ordnance items (or duds) present on the surface are destroyed and Navy ordnance training activities are conducted under controlled conditions within bermed areas; consequently, no significant impacts would be expected from deposition of munitions constituents into off-range ground areas or surface waters (Section 4.3, Water Resources). Chemical releases to the air from detonation training activities are tracked and reported as required.

As discussed in Section 3.7 (Hazardous Materials and Waste), NWS Yorktown currently reports annual on-site and off-site releases of hazardous constituents under the USEPA's TRI program. Under the No Action Alternative, explosives training on the Yorktown EOD Demolition Range do not result in new TRI chemical reporting thresholds being exceeded. Additionally, established procedures require that metallic debris (e.g., brass cases) be collected after training. These items are sent off for recycling and not disposed of as solid waste.

No hazardous constituents result from vehicle movement and no impacts occur. Air pollutants are generated from operation of vehicle engines. These emissions are discussed in Section 4.1 (Air Quality).

Paintball guns are used for non-lethal weapons training. As discussed in Section 4.7.5.1 (No Action Alternative), paintballs are made of non-toxic, biodegradable and water soluble food ingredients. Consequently, no hazardous constituents are expended as part of this training.

4.7.10.1.3 Environmental Restoration Sites

Pollutants

Three existing ERP sites (Site Screening Area 00002, Solid Waste Management Unit 00019, and Site 00024) overlap proposed training locations. Only Solid Waste Management Unit 00019 has land use controls implemented, which prohibit the redevelopment of the site for residential use. Based on their status, ERP sites are not impacted from non-lethal ammunition training.

ERP sites are not affected by generator operations; consequently, no impacts to ERP sites occur. However, explosives training is conducted on the Yorktown EOD Demolition Range, which overlaps ERP Site Solid Waste Management Unit 00019 (see Figure 4.7-6). This ERP site has land use controls that prohibit residential use of the area. No Action Alternative training events do not result in redevelopment of this area.

4.7.10.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no impacts on hazardous materials and wastes.

4.7.10.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no impacts on hazardous materials and wastes.

4.7.10.4 Summary

Under all alternatives, proposed activities at NWS Yorktown, consisting of equipment use, explosives on land, and vehicle movement would use hazardous materials and generate hazardous constituents; however, materials would be managed within the existing plans and procedures. No hazardous constituents would be generated with weapons firing – non-lethal training ammunition. In addition, the training events would not disturb ERP sites, and, therefore, impacts to these sites would not occur. Therefore, under all alternatives, there would be no impact on hazardous materials and wastes at NWS Yorktown.

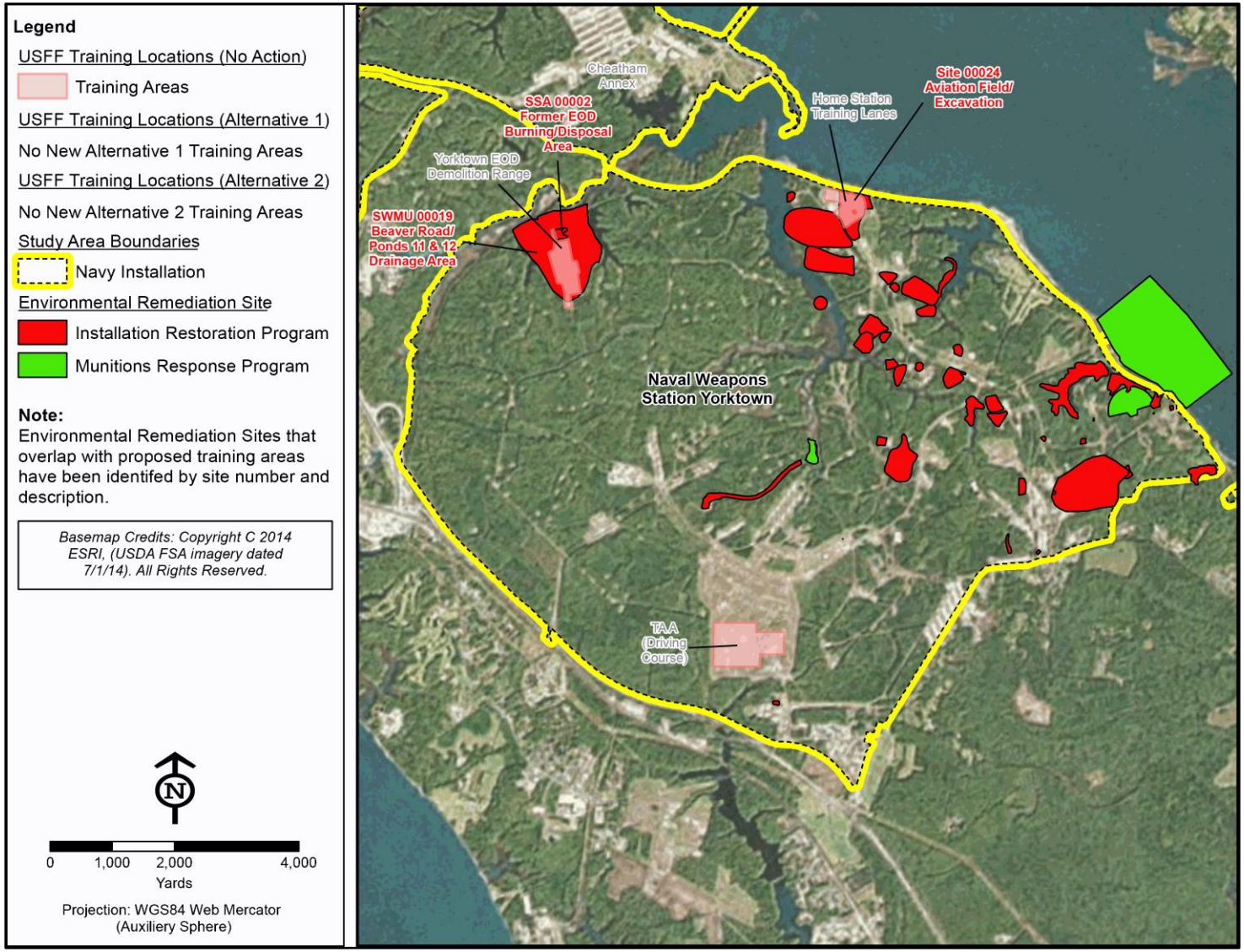

Figure 4.7-6. Training Locations and ERP Sites at NWS Yorktown

4.7.11 Cheatham Annex

The PTEAs applicable to hazardous materials and waste at Cheatham Annex that contribute to the pollutants stressor include equipment use and vehicle movement (Table 4.7-8).

Table 4.7-8. Cheatham Annex Hazardous Materials and Waste Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Pollutants*	*No. of Events*	*Pollutants*	*No. of Events*	*Pollutants*
Land – Non-Beaches/ Dunes	Equipment Use	diesel generator	99	74,380 hours				
	Vehicle Movement	tactical and non-tactical vehicles	62	8,683 hours				

Key: No. = number. Note: Additional training event details are in Appendix C.

4.7.11.1 No Action Alternative

4.7.11.1.1 Hazardous Materials

Pollutants

Equipment use refers to the use of portable diesel generators to provide electricity in support of Navy training events. Diesel generators are used in 99 events at Cheatham Annex. Hazardous materials comprise diesel fuel and lubricants used in the generators. Fueling operations are conducted in accordance with established procedures designed to minimize the potential for releases. Any fuel or oil leaks are reported and mitigated; consequently, no impacts occur.

Vehicle movement occurs on non-beach/dune training areas within Cheatham Annex throughout the year in support of training events. Hazardous materials (e.g., fuel, lubricating oil) are used as part of the operation of vehicles used in training. For Cheatham Annex, the use of hazardous materials is tracked at NWS Yorktown. All hazardous materials are stored in proper containers, employing secondary containment as necessary to prevent and limit accidental spills. All spills, leaks, and accidental discharges of petroleum products or hazardous materials from vehicle operations (e.g., rupture hydraulic line) or from maintenance-related activities are reported and mitigated. Under Emergency Planning and Community Right-to-Know Act's Tier II program, NWS Yorktown reports on the quantity of hazardous materials exceeding applicable thresholds. No impacts occur under the No Action Alternative.

4.7.11.1.2 Hazardous Constituents

Pollutants

The burning of diesel fuel produces carbon dioxide, carbon monoxide and nitrogen oxides. Chemical releases to the air from generator operations are tracked and reported as required (see Section 4.1, Air Quality, for more information).

4.7.11.1.3 Environmental Restoration Sites

Pollutants

Two sites, Area of Concern 9 (Penniman Lake Historical Industrial Areas) and Site 00012 (Disposal Site Near Water Tower) overlap proposed training areas (see Figure 4.7-7). Area of Concern 9 was originally defined as a 48-acre surface water body created in 1943 when a portion of King Creek was dammed. Following completion of contamination assessments, catch-and-release fishing restrictions were recommended for Penniman Lake as a conservative measure that was not based on a human health risk assessment. Penniman Lake is a downgradient receiving body and not the source of contamination. Therefore, a desktop evaluation of the historic industrial area uses and activities upgradient of Penniman Lake was conducted in an effort to identify a potential source (or sources) of contamination. Assessment activities are ongoing; however, no land use controls have been established for the industrial area. Site 00012 was a scrap metal disposal area. All remedial activities have been completed for Site 00012, with No Further Action approved in 2004. Training activities would not result in use of groundwater or disturbances to subsurface soils; consequently, no adverse impacts would be expected to any site (Navy, 2017j).

4.7.11.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no impacts on hazardous materials and wastes.

4.7.11.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no impacts on hazardous materials and wastes.

4.7.11.4 Summary

Under all alternatives, proposed activities at Cheatham Annex consisting of equipment use and vehicle movement would use hazardous materials and generate hazardous constituents; however, materials would be managed within the existing plans and procedures. In addition, the training events would not disturb ERP sites and therefore, impacts to these sites would not occur. Therefore, under all alternatives, there would be no impact on hazardous materials and wastes at Cheatham Annex.

4.7.12 First Landing State Park

PTEAs at First Landing State Park do not use hazardous materials or release hazardous constituents. Therefore, USFF VACAPES inland training at First Landing State Park has no impact on hazardous materials and wastes.

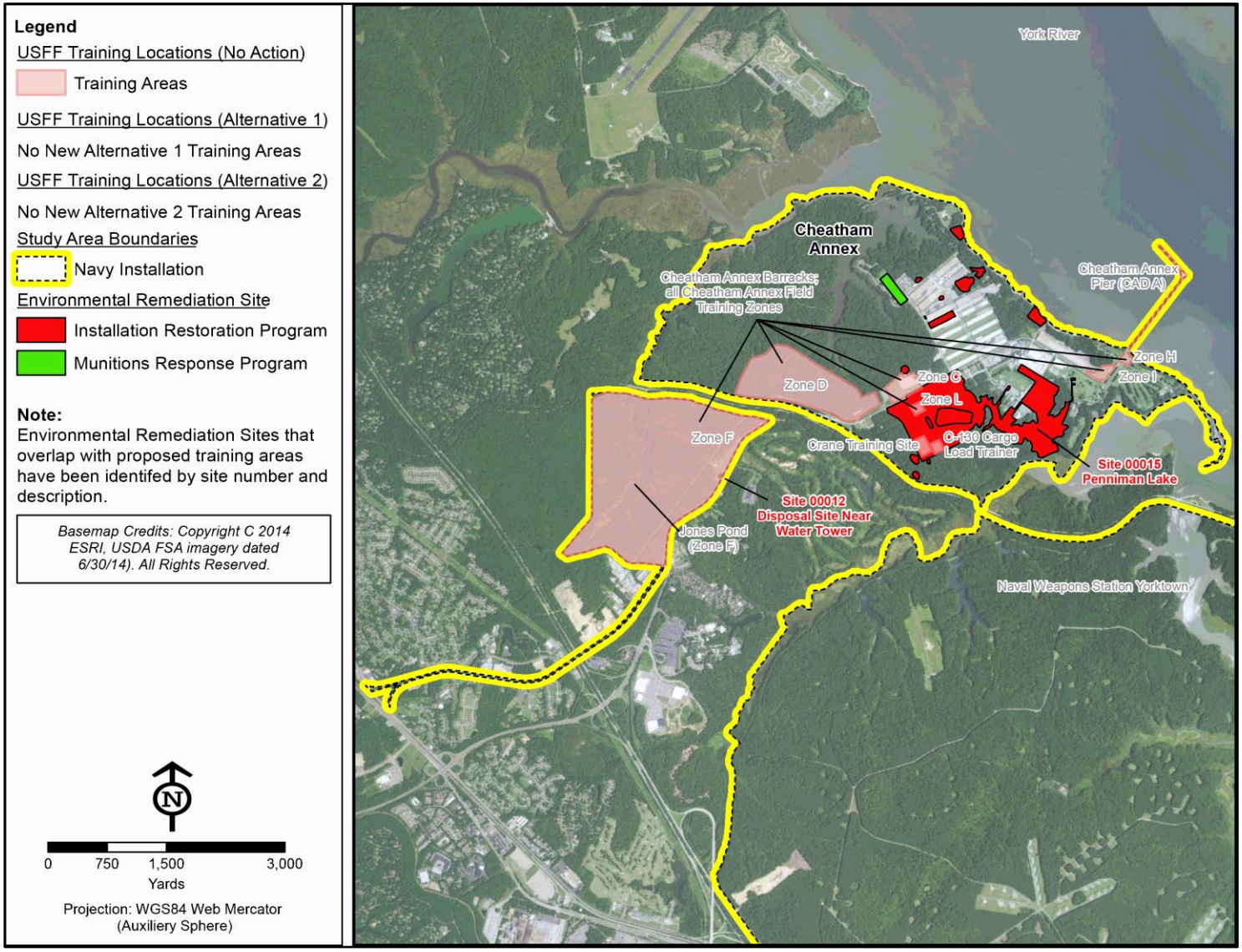

Figure 4.7-7. Training Locations and ERP Sites at Cheatham Annex

4.7.13 Southern Branch of the Elizabeth River

The PTEA applicable to hazardous materials and waste at the Southern Branch of the Elizabeth River that contribute to the pollutants stressor includes vessel movement and weapons firing of blanks (Table 4.7-9).

Table 4.7-9. Southern Branch of the Elizabeth River Hazardous Materials and Waste Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*					
			No Action Alternative		*Alternative 1 (difference from the No Action Alternative)*		*Alternative 2 (difference from Alternative 1)*	
			No. of Events	*Pollutants*	*No. of Events*	*Pollutants*	*No. of Events*	*Pollutants*
Water and Adjacent Shoreline	Vessel Movement	small vessels	30	1,980 hours				
	Weapons Firing – Blank-Fire	small caliber	30	21,600 uncaptured rounds				

Key: hours = hours; No. number. Note: Additional training event details are in Appendix C.

4.7.13.1 No Action Alternative

4.7.13.1.1 Hazardous Materials

Pollutants

Small vessel movement is limited to the Southern Branch of the Elizabeth River. Annual hours of operation under the No Action Alternative consist of 1,980 hours of vessel movement. Hazardous materials (e.g., fuel, lubricating oil) are used as part of the operation of vessels. The use of these materials is tracked at their originating location. All hazardous materials are stored in proper containers, employing secondary containment as necessary to prevent and limit accidental spills.

Approximately 21,600 rounds of expended brass casing from blank-fire are not captured during Navy training events. The uncaptured expended brass casings represent approximately 15 percent of all blank-fire rounds expended during training activities in the Southern Branch of the Elizabeth River. Hazardous materials are not used as part of blank-fire ammunition training; consequently, no impacts occur.

4.7.13.1.2 Hazardous Constituents

Pollutants

No hazardous constituents result from vessel movement and no impacts occur. Air pollutants are generated from operation of vessel engines. These emissions are discussed in Section 4.1 (Air Quality).

Hazardous constituents (such as copper or zinc) compose part of the expended brass casings and are not individually released. The Navy tracks these releases and reports them under the TRI program, as appropriate.

4.7.13.1.3 Environmental Restoration Sites

Pollutants

No ERP sites are located in the Southern Branch of the Elizabeth River.

4.7.13.2 Alternative 1

Under Alternative 1, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no impacts on hazardous materials and wastes.

4.7.13.3 Alternative 2

Under Alternative 2, USFF training would be the same as under the No Action Alternative at this location and, as a result, there would be no impacts on hazardous materials and wastes.

4.7.13.4 Summary

Under all alternatives, proposed activities at the Southern Branch of the Elizabeth River consisting of vessel movement and weapons firing – blank-fire (uncaptured expended brass casings) would use hazardous materials and generate hazardous constituents; however, materials would be managed within the existing plans and procedures. Uncaptured expended brass casings would continue to be tracked. In addition, the training events would not disturb ERP sites and therefore, impacts to these sites would not occur. Therefore, under all alternatives, there would be no impact on hazardous materials and wastes at Southern Branch of the Elizabeth River.

4.7.14 Hazardous Materials and Waste Summary

4.7.14.1 No Action Alternative Hazardous Materials and Waste Summary

Under the No Action Alternative, installations would continue to use hazardous materials as part of routine operations. These materials would continue to be tracked and managed according to established procedures, including site-specific emergency response and contingency plans. Any releases or accidental discharges of hazardous materials would be immediately reported and mitigated, and no new regulatory thresholds would be exceeded. ERP sites would also be managed as they are currently. Consequently, there would be no impacts from hazardous materials or hazardous wastes associated with implementation of the No Action Alternative.

4.7.14.2 Alternative 1 Hazardous Materials and Waste Summary

Under Alternative 1, some of the proposed training activities would require the use of hazardous materials and would generate hazardous constituents. The additional training events would be expected to use the same types of hazardous materials as the No Action Alternative. These materials would be managed according to established procedures. No new regulatory thresholds would be exceeded and no new hazardous materials reporting would be required. Proposed activities would also not disturb ERP sites or interfere with existing land use controls (if any) on these sites. Consequently, there would be no impacts to hazardous materials, hazardous constituents, hazardous wastes, or ERP sites.

4.7.14.3 Alternative 2 Hazardous Materials and Waste Summary

As with Alternative 1, some of the proposed training activities would require the use of hazardous materials and would generate hazardous constituents. The additional training events would be expected to use the same types of hazardous materials as the No Action Alternative. These materials would be managed according to established procedures. No new regulatory thresholds would be exceeded and no new hazardous materials reporting would be required. Proposed activities would also not disturb ERP sites or interfere with existing land use controls (if any) on these sites. Consequently, there would be no impacts to hazardous materials, hazardous constituents, hazardous wastes, or ERP sites.

4.8 Socioeconomics

4.8.1 Overview

Socioeconomics considers the potential impacts to commercial and recreational transportation and fishing and recreational activities in the study area. The Proposed Action in-water training occurs at two locations: Jones Pond at Cheatham Annex and along the Southern Branch of the Elizabeth River. Since Jones Pond is within the installation boundary no impacts to commercial and recreational transportation and fishing would occur as the installation is not open to public transportation and fishing; fishing at Jones Pond, including bass fishing tournaments, is only available to active duty, reservists, retirees, DoD civilian employees, and eligible family members. Therefore, the in-water training analysis in this section focuses on potential impacts to commercial and recreational transportation and fishing from the public interaction stressor along the Southern Branch of the Elizabeth River. The analysis of impacts to recreational activities in the study areas focuses on the interaction of training events with recreational users outside of installation boundaries.

4.8.2 Methodology

The stressors that could potentially affect socioeconomics are public interaction along the Southern Branch of the Elizabeth River and noise associated with multiple PTEAs throughout the study area. Each PTEA was evaluated to determine how the noise generated by the PTEA would potentially impact recreational uses within the study area. Socioeconomic impacts due to noise were determined based on the location and duration of the activity. Detailed noise analysis associated with the training events is included in Section 4.5 (Ambient Noise).

4.8.3 Impacts Common to All Locations Under All Alternatives

Public Interaction

In terms of recreation, most installations manage recreational resources within installation boundaries for the benefit of active and retired military, civilian employees of the installation, and families and guests of these authorized user groups. In most cases, the general public is not allowed to enter installations for recreational use. Therefore, no socioeconomic impacts are anticipated from implementation of the Proposed Action on-installation.

Noise

Most of the training in the Proposed Action is currently being conducted and has occurred in the region for decades. As a result, the surrounding community has experienced noise associated with military training events while they participate in recreational activities. However, visitors to the region may not anticipate noise from military training events while they participate in recreational activities. No significant socioeconomic impacts to commercial and recreational transportation and fishing off-installation are anticipated from implementation of the Proposed Action.

4.8.4 Regional Conditions

The PTEAs applicable to socioeconomics in the study area that contribute to the public interaction along the Southern Branch of the Elizabeth River and noise stressors include vehicle movement, vessel movement, equipment use, explosives on land, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition (Table 4.8-1).

4.8.4.1 No Action Alternative

4.8.4.1.1 Commercial and Recreational Transportation and Fishing

Under the No Action Alternative, the applicable stressor to commercial and recreational transportation and fishing is public interaction.

Public Interaction

Under the No Action Alternative, there would be potential for interaction between small Navy vessels and the public during 30 training events resulting in approximately 1,980 hours of vessel movement (see Table 4.8-1). Navy small vessel movement along the Southern Branch of the Elizabeth River is consistent with other vessel movement along this waterway. As indicated in Section 3.8 (Socioeconomics), the Southern Branch of the Elizabeth River experiences a high volume and diversity of vessel traffic. However, as described in Section 3.6 (Public Health and Safety), the Navy practices safe navigation, regardless of the conditions. SOPs require that vessel operators be alert at all times, travel at a safe speed for the prevailing conditions, observe no wake zones, use state-of the-art satellite navigational systems, and are trained to take proper action to avoid collisions. The Navy also uses highly qualified operators on small vessels to maintain awareness of the surrounding environment. Continued implementation of these practices minimizes the potential for public interaction between Navy vessels and other vessels; therefore, no significant impacts on commercial and recreational transportation and fishing activities are anticipated during vessel movement. Favored fishing areas change over time with fluctuations in fish populations and communities, preferred target species, and fishing modes and styles. Popular fishing sites are characterized by relative ease of access, ability to anchor or secure the boat, and abundant presence of target fish. The Navy strives to reduce interaction with the public by conducting training activities in a manner that is compatible with commercial and recreational waterway users. Therefore, commercial and recreational transportation and fishing would not be adversely affected by interaction with small Navy vessels under the No Action Alternative.

Approximately 144,000 blank rounds are expended each year at a designated area on the Southern Branch of the Elizabeth River (Figure 2-15). In-water training events incorporate and adhere to SOPs for operators of small vessels to visually scan the area to ensure that non-participants (including those involved in commercial and recreational transportation and fishing) are not present. For instance, if non-participants are present within 200 feet of small vessels, the Navy does not conduct blank-fire activities within the Southern Branch of the Elizabeth River. Blank-fire on the Southern Branch of the Elizabeth River is limited to a designated area that is separated from residences and recreational areas (Section 4.5, Ambient Noise). This separation as well as the non-participant separation minimizes the potential for interaction between the public and the Navy during blank fire weapons training. Therefore, under the No Action Alternative, there would be no significant impacts on commercial and recreational transportation and fishing resulting from public interaction.

4.8.4.1.2 Recreational Activities

Under the No Action Alternative, the applicable stressor to recreational activities is noise.

Noise

Approximately 1,170 beach landings using amphibious craft are conducted within the study area on beach/dune training areas at three locations (JEB Little Creek, JEB Fort Story, and Dam Neck Annex).

Table 4.8-1. Regional Socioeconomics Stressors

Location	*Primary Training Event Activity*	*Contributing platform, equipment, or weapon*	*Annual Quantity*								
			No Action Alternative			*Alternative 1 (difference from the No Action Alternative)*			*Alternative 2 (difference from Alternative 1)*		
			No. of Events	*Public Interaction*	*Noise*	*No. of Events*	*Public Interaction*	*Noise*	*No. of Events*	*Public Interaction*	*Noise*
Land – Beaches/ Dunes	Beach Landings	amphibious	127		1,167 landings	3		165 landings			
	Explosives on Land	demolition materials and charge				2		2 events (2 detonations with a maximum NEW of 1.25 pounds)			
	Vehicle Movement	tactical and non-tactical vehicles	1,243		19,012 hours	166		3,463 hours			
	Weapons Firing – Blank-Fire	small caliber	28		1,400 rounds	152		30,552 rounds			
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	28		2,800 rounds	152		45,600 rounds			
Land – Non-Beaches/ Dunes	Equipment Use	diesel generators	46		98,344 hours				4		6,300 hours
	Explosives on Land	demolition materials and charge	212		• 80 events (average 8 detonations/event with maximum NEW of 1.25 pounds) • 28 events (1 detonation/event with maximum NEW of 1.25 pounds) • 104 events (average 13 detonations/event with maximum NEW of 25 pounds)	556		• 240 events (average 9 detonations/event with maximum NEW of 0.2 pounds) • 240 events (average 13 detonations/event with maximum NEW of 1.25 pounds) • 76 events (1 detonation/event with maximum NEW of 1.25 pounds)	56		• 56 events (1 detonation/event maximum NEW 1.25 pounds)
	Vehicle Movement	tactical and non-tactical vehicles	928		54,999 hours	231		60 hours	61		6,602 hours
	Weapons Firing – Blank-Fire	small caliber	517		753,220 rounds	480		5,280 rounds	60		15,712 rounds
	Weapons Firing – Non-Lethal Training Ammunition	paintball gun	224		22,400 rounds				56		5,600 rounds
Water and Adjacent Shoreline	Vessel Movement	small vessels	30	1,980 hours	1,980 hours						
	Weapons Firing – Blank-Fire	small caliber	30	144,000 rounds	144,000 rounds						

Key: NEW = net explosive weight; No. = number.
Note: Addition training event details are included in Appendix C.

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Recreational users in the region near these three installations could experience noise associated with beach landings. However, the Hampton Roads region is known for its large military presence and the majority of the public surrounding Navy locations that conduct beach landings have experienced these events for decades. In addition, the areas surrounding where beach landings occur do not reach levels identified as an annoyance outside of the installation boundaries (Section 4.5, Ambient Noise). Therefore, the No Action Alternative does not result in impacts to recreational activities in the region as a result of noise.

Equipment use refers to the use of portable diesel generators to provide electricity in support of Navy training events. Diesel generators are used in 46 training events at multiple locations within the region; all locations are within Navy installation boundaries. Recreational users in the region could experience noise associated with equipment use. Noise associated with the Navy's use of diesel generators is not anticipated to disrupt recreational activities in the region because the noise levels are consistent with ambient noise within the region and does not reach levels identified as an annoyance (Section 4.5, Ambient Noise).

Navy EOD training includes detonations on land and occurs throughout the year. These detonations range from approximately 1.25 pounds NEW up to 25 pounds NEW. EOD training primarily occurs at JEB Little Creek, JEB Fort Story, and NWS Yorktown in non-beach/dune areas. Recreational users in the region near these three installations could experience noise associated with explosives on land. The Hampton Roads region is known for its large military presence and the majority of residents and local public surrounding Navy locations that conduct explosive operations have experienced these events for decades. New residents, tourists, and visitors may be unfamiliar with the Navy presence and the noise associated with Navy training activities. However, explosive training occurs within Navy installation boundaries and is temporary and sporadic and therefore, ongoing training does not result in significant noise levels that would impact recreational activities in the region (Section 4.5, Ambient Noise).

Vehicle movement includes operation of on-road and off-road tactical and non-tactical vehicles in support of training missions and troop transport throughout the region. Vehicles operate within the boundaries of Navy installations, including beach/dune areas. Noise from vehicle movement involved with training events is consistent with ambient noise associated with a military installation and, therefore, noise from vehicle movement does not impact recreational activities within the region.

As noted above, noise associated with small vessel movement is limited to the Southern Branch of the Elizabeth River and would not be anticipated to result in impacts to recreational users within the region because the area already experiences vessel noise as part of the existing ambient noise environment and the Navy implements strict safety operations which reduce public interactions during training events.

Approximately 144,000 blank rounds are expended each year at a designated area on the Southern Branch of the Elizabeth River (Figure 2-15). All other blank rounds are expended within the boundaries of a Navy installation. In addition, approximately 25,200 non-lethal training ammunition rounds are expended each year within the boundaries of Navy installations with the majority of these rounds expended in non-beach/dune training areas. In-water training events incorporate and adhere to SOPs that include if non-participants are present within 200 feet of small vessels; as noted in Section 2.7 (Best Management Practices Included in Proposed Action), blank-fire activities from small vessels are not conducted if non-participants are within 200 feet of participating small vessels. In addition, blank-fire on the Southern Branch of the Elizabeth River is limited to a designated area that is separated from

residences (Section 4.5, Ambient Noise). This separation as well as the non-participant separation minimizes the impacts of noise from blank-fire events on the general public.

All other blank-fire events occur within the boundaries of a Navy installation with the majority occurring on non-beach/dune training areas. Blank-fire events and weapons firing with non-lethal training ammunition that occur on the beach/dune training areas may be heard by recreational users of the adjacent waters; however, with increased distance from the shoreline and vessel traffic noise are part of the ambient noise environment and noise from blank-fire as well as from weapons firing with non-lethal training ammunition is not anticipated to result in impacts to recreational activities on adjacent lands or waters (Section 4.5, Ambient Noise). In addition, only 28 blank-fire and weapons firing with non-lethal training ammunition events occur on beach/dune areas within the region in a given year and therefore, the likelihood of recreational users experiencing noise from these events is small.

4.8.4.1.3 No Action Alternative Regional Socioeconomic Summary

Navy vessel traffic is consistent with commercial and recreational vessel traffic within the Southern Branch of the Elizabeth River. In addition, the Navy adheres to SOPs during training activities involving weapons firing – blank-fire and vessel movement which reduce the potential for interaction between the public and the Navy. Therefore, noise and public interaction associated with vessel movement and blank weapons firing from USFF training along the Southern Branch of the Elizabeth River does not impact commercial and recreational traffic and fishing in the region.

Noise from beach landings, equipment use, explosives on land, vehicle movement, vessel movement, weapons firing – blank-fire and weapons firing – non-lethal training ammunition primarily occur within Navy installation boundaries and therefore, is not anticipated to be disruptive to recreational users in the surrounding area. However, vehicle movement, vessel movement, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition occur on beach/dune training areas or in a water training area where recreational users of the adjacent waterways may hear noise associated with these training events. In general, the number of training events spread across the year in the region is small. In addition, recreational boaters are likely present offshore of beach/dune training areas for a brief period of time and are exposed to existing vessel traffic noise as part of the ambient noise environment; therefore, under the No Action Alternative, there is no significant impact to socioeconomic resources (commercial and recreational transportation and fishing and regional recreational activities).

4.8.4.2 Alternative 1

4.8.4.2.1 Commercial and Recreational Transportation and Fishing

Under Alternative 1, the applicable stressor to commercial and recreational transportation and fishing is public interaction.

Public Interaction

USFF training along the Southern Branch of the Elizabeth River would be the same as under the No Action Alternative and, therefore, as described under the No Action Alternative, there would be no significant impacts on commercial and recreational transportation and fishing.

4.8.4.2.2 Recreational Activities

Under the Alternative 1, the applicable stressor to recreational activities is noise.

Noise

Three additional training events that include beach landings with amphibious vehicles would occur. As under the No Action Alternative, recreational users near the JEB Little Creek, JEB Fort Story, and Dam Neck Annex shorelines could experience noise associated with beach landings. Although the noise associated with beach landings may be moderately disruptive at times and loud noise events would be relatively infrequent, the noise generated by beach landings would not reach levels identified as an annoyance, and would not result in significant noise impacts that would affect recreational users (Section 4.5, Ambient Noise).

Under Alternative 1, equipment use would be the same as under the No Action Alternative and, as a result, there would be no significant impacts on recreational activities from equipment use.

Explosives training events under Alternative 1 would increase more than 2.5 times over those discussed above for the No Action Alternative. These events would be distributed throughout the year. As under the No Action Alternative, EOD training would primarily occur at JEB Little Creek, JEB Fort Story, and NWS Yorktown in non-beach/dune areas; however, two training events per year would occur on a beach/dune training area. Recreational users in the region (i.e., near JEB Little Creek, JEB Fort Story, and NWS Yorktown) could experience additional noise associated with an increase in the number of events with explosives on land. New residents, tourists, and visitors may be unfamiliar with the Navy presence and the noise associated with Navy training activities. However, the majority of the public surrounding Navy locations that conduct explosive operations have experienced these types of events for decades. In addition, the training areas where the additional explosive training would occur are within Navy installation boundaries. The explosive training would not reach levels identified as an annoyance outside of the installation boundaries. Therefore, explosive training would not impact recreational activities in the region (Section 4.5, Ambient Noise). The additional two training events per year that would occur on a beach/dune training area within a Navy installation (JEB Little Creek) are not anticipated to disrupt recreational activities since they would be infrequent. In addition, in accordance with safety regulations, Navy personnel would conduct a check of the on-installation land areas and publically-accessible water areas adjacent to the shoreline. Detonations would be delayed until the area affected by noise levels potentially damaging to hearing has been confirmed clear. While recreational boaters may be present offshore of beach/dune training areas for a brief period of time, the infrequent explosives training events combined with existing Navy SOPs make it unlikely that recreational activities would be disrupted.

Alternative 1 would include nearly 5,000 additional hours of vehicle operations over the amount analyzed in the No Action Alternative. Vehicle movement would occur throughout the multiple training locations. Vehicles would operate within the boundaries of Navy installations, including beach/dune areas. Noise from vehicle movement involved with training events would be consistent with ambient noise associated with a military installation and therefore, noise from vehicle movement would not impact recreational activities within the region.

Under Alternative 1, vessel movement would be the same as under the No Action Alternative and, as a result, there would be no significant impacts on recreational activities from vessel movement.

Under Alternative 1, no additional weapons firing – blank-fire would occur at the designated area on the Southern Branch of the Elizabeth River but approximately 35,830 additional blank rounds would be expended within the boundaries of a Navy installation. The conditions for blank-fire activities within the Southern Branch of the Elizabeth River would be the same as described for the No Action Alternative. The additional blank-fire training events would occur within the boundaries of a Navy installation with the majority occurring on non-beach/dune training areas. However, blank-fire training events on beach/dune training areas would increase over five times that of existing events. As noted for the No Action Alternative, blank-fire training events that would occur on the beach/dune training areas may be heard by recreational users of the adjacent land or waters. While the number of blank-fire training events would increase under Alternative 1, recreational use of adjacent waters is typically by boaters who are only present offshore for brief periods of time as they transit the area. Recreational users are not permitted on the beach in blank-fire training areas and therefore, recreational users would only potentially hear noise from blank-fire if they were present in the nearshore environment or at adjacent properties during a given training event under certain weather conditions.

Blank-fire training events on non-beach/dune training areas under Alternative 1 would nearly double that of existing events. Noise from blank-fire training could exceed levels which may disrupt recreational users. However, less than 1,000 of these training events would occur annually at multiple training locations with the majority occurring in training areas that are not adjacent to installation boundaries or near noise-sensitive areas (Section 4.5, Ambient Noise). Therefore, there would be no significant impacts to recreational activities.

Implementation of Alternative 1 would nearly triple the total number of paintball rounds fired under the No Action Alternative. However, the number of training events would be distributed throughout the year and at multiple training locations. All of the additional non-lethal training ammunition would be expended in beach/dune training areas. Weapons firing with non-lethal training ammunition is not anticipated to generate noise levels that are disruptive to recreational users outside of the installation boundaries; however, shotgun slugs (non-lethal training ammunition) used as part of the EOD training may generate noise at recreational areas adjacent to JEB Fort Story and when combined with other blank-fire noise, adjacent recreational users may experience noise levels that is disruptive (Section 4.5, Ambient Noise). As with blank-fire training events, weapons firing with non-lethal training ammunition that would occur on the beach/dune training areas may be heard by recreational users of the adjacent waters or properties; however, with increased distance from the shoreline and vessel traffic noise as part of the ambient noise environment, noise from weapons firing with non-lethal training ammunition is not anticipated to significantly impact recreational activities in adjacent waters (Section 4.5, Ambient Noise). While the number of non-lethal training ammunition training events would increase under Alternative 1, recreational use of adjacent waters is typically by boaters who are only present along the shoreline for brief periods of time as they transit the area. Therefore, recreational users would only potentially hear noise from weapons firing with non-lethal training ammunition if they were present in the nearshore environment during a given training event. Furthermore, recreational users at First Landing State Park are notified via the Park's website that the recreational area is adjacent to a military training center and park guests may experience unusual sights and loudness.

4.8.4.2.3 Alternative 1 Regional Socioeconomic Summary

Under Alternative 1, Navy vessel traffic would be consistent with commercial and recreational vessel traffic within the Southern Branch of the Elizabeth River. In addition, the Navy adheres to SOPs during

training activities involving weapons firing – blank-fire and vessel movement, which reduce the potential for interaction between the public and the Navy. Therefore, noise and public interaction associated with vessel movement and blank weapons firing from USFF training along the Southern Branch of the Elizabeth River does not result in impacts to commercial and recreational traffic and fishing in the region.

Noise from beach landings, equipment use, and vessel movement would be the same as under the No Action Alternative. Noise from increases in explosives on land, vehicle movement, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition would primarily occur within non-beach/dune training areas and therefore, is not anticipated to be disruptive to recreational users in the surrounding area. The Hampton Roads region is known for its large military presence and the majority of residents and local public surrounding Navy locations have experienced training events for decades. New residents, tourists, and visitors may be unfamiliar with the Navy presence and the noise associated with Navy training activities. However, training occurs within Navy installation boundaries and is typically temporary and sporadic and therefore, training does not result in significant noise levels that would impact recreational activities in the region (Section 4.5, Ambient Noise). Explosives on land and additional vehicle movement, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition would occur on beach/dune training areas where recreational users of the adjacent waterways may hear noise associated with these training events. Recreational boaters are likely present in waters adjacent to beach/dune training areas for brief periods of time and are exposed to existing vessel traffic noise as part of the ambient noise environment; therefore, under Alternative 1, there would be no significant impact on recreational activities.

4.8.4.3 Alternative 2

4.8.4.3.1 Commercial and Recreational Transportation and Fishing

Under Alternative 2, the applicable stressor to commercial and recreational transportation and fishing is public interaction.

Public Interaction

USFF training along the Southern Branch of the Elizabeth River would be the same as under the No Action Alternative and, therefore, as described under the No Action Alternative, there would be no significant impacts on commercial and recreational transportation and fishing.

4.8.4.3.2 Recreational Activities

Under the Alternative 2, the applicable stressor to recreational activities is noise.

Three additional training events that include beach landings with amphibious vehicles would occur. As under the No Action Alternative, recreational users near the JEB Little Creek, JEB Fort Story, and Dam Neck Annex shorelines could experience noise associated with beach landings. Noise associated with the Navy's use of amphibious vehicles is not anticipated to disrupt recreational activities because the noise levels would not reach levels identified as an annoyance (Section 4.5, Ambient Noise).

Under Alternative 2, equipment use in the form of diesel generator operations would increase by approximately 6,300 hours annually over the levels analyzed in the No Action Alternative and Alternative 1, which did not propose the use of diesel generators above the No Action Alternative.

Operation of the diesel generators would occur throughout the region's installations and be spread across any given year. All equipment use would occur in non-beach/dune training areas. As under the No Action Alternative, recreational users in the region could experience noise associated with equipment use. The use of diesel generators would be limited to non-beach/dune training areas with an additional four training events per year over the No Action Alternative. Noise associated with the Navy's use of diesel generators is not anticipated to disrupt recreational activities in the region because the noise levels are consistent with ambient noise within the region and would not reach levels off installation identified as an annoyance (Section 4.5, Ambient Noise).

Alternative 2 would add additional on-land detonations for EOD training over the number in Alternative 1 (56 events would occur on non-beach/dune training areas), resulting in approximately 5,550 additional detonations over the No Action Alternative. All detonations would occur throughout the year at JEB Little Creek, JEB Fort Story, and NWS Yorktown. Recreational users near JEB Little Creek and JEB Fort Story could experience additional noise associated with an increase in the number of events with explosives on land. New residents, tourists, and visitors may be unfamiliar with the Navy presence and the noise associated with Navy training activities. However, the majority of the public surrounding Navy locations that conduct explosive operations have experienced these types of events for decades and the additional training events with explosives on land would occur within the same Navy installations as the existing training events. In addition, the training areas where the additional explosive training would occur is within Navy installation boundaries and would not reach levels identified as an annoyance outside of the installation boundaries and therefore, would not impact recreational activities in the region (Section 4.5, Ambient Noise).

Vehicle movement operations would increase by approximately 6,600 hours annually from the level analyzed in Alternative 1 or a total of 11,565 hours over the No Action Alternative. The additional vehicle movements would occur across multiple training locations with multiple vehicles typically supporting a training event but would occur on non-beach/dune training areas. Vehicles would operate within the boundaries of Navy installations, including beach/dune areas. Noise from vehicle movement involved with training events would be consistent with ambient noise associated with a military installation and therefore, noise from vehicle movement would not impacts to recreational activities within the region.

Under Alternative 2, vessel movement along the Southern Branch of the Elizabeth River would be the same as under the No Action Alternative and Alternative 1 and, therefore, as discussed under the No Action Alternative, there would be no significant impacts on recreational activities from vessel movement.

Under Alternative 2, the number of blank rounds that would be expended at the designated area on the Southern Branch of the Elizabeth River would be the same as under the No Action Alternative. However, approximately 51,540 additional blank rounds would be expended within the boundaries of a Navy installation (5,280 blank rounds over Alternative 1). The noise impacts to recreational users related to blank-fire activities within the Southern Branch of the Elizabeth River would be the same as described for the No Action Alternative. The additional blank-fire training events would occur within the boundaries of Navy installations (i.e., JEB Fort Story and NALF Fentress) with the majority occurring on non-beach/dune training areas. However, as under Alternative 1, blank-fire training events on beach/dune training areas would increase over five times that of existing events with the corresponding estimated rounds identified in Table 4.8-1. The increase in events and rounds fired would result in an

increase in the frequency of noise events at Dam Neck Annex, JEB Fort Story and NALF Fentress. As noted for the No Action Alternative, blank-fire training events that would occur on the beach/dune training areas may be heard by recreational users of the adjacent waters. While the number of blank-fire training events would increase under Alternative 2, recreational use of adjacent waters is typically by boaters who are only present offshore for brief periods of time as they transit the area. Recreational users are not permitted on the beach in blank-fire training areas and therefore, recreational users would only potentially hear noise from blank-fire if they were present in the nearshore environment during a given training event.

Blank-fire training events on non-beach/dune training areas would approximately double that of existing events. Noise from blank-fire training could exceed levels which may disrupt recreational users. However, less than 1,100 of these training events would occur annually at multiple training locations with the majority occurring in training areas that are not adjacent to installation boundaries or near noise-sensitive areas (Section 4.5, Ambient Noise) and therefore, there would be no significant impacts to recreational activities.

Under Alternative 2, non-lethal weapons training would increase over the level analyzed for Alternative 1 by approximately 5,600 rounds annually or a total of 51,200 rounds over the No Action Alternative (Table 4.8-1). Weapons firing with non-lethal training ammunition is not anticipated to generate noise levels that are disruptive to recreational users outside of the installation boundaries (Section 4.5, Ambient Noise). As with blank-fire training events, weapons firing with non-lethal training ammunition that would occur on the beach/dune training areas may be heard by recreational users of the adjacent waters; however, with increased distance from the shoreline and vessel traffic noise as part of the ambient noise environment, noise from weapons firing with non-lethal training ammunition is not anticipated to result in significant impacts to recreational activities in adjacent waters (Section 4.5, Ambient Noise). While the number of non-lethal training ammunition training events would increase under Alternative 2, recreational use of adjacent waters is typically by boaters who are only present along the shoreline for brief periods of time as they transit the area. Therefore, recreational users would only potentially hear noise from weapons firing with non-lethal training ammunition if they were present in the nearshore environment during a given training event. Furthermore, recreational users at First Landing State Park are notified via the Park's website that the recreational area is adjacent to a military training center and park guests may experience unusual sights and loudness.

Alternative 2 Regional Socioeconomic Summary

Under Alternative 2, Navy vessel traffic would be consistent with commercial and recreational vessel traffic within the Southern Branch of the Elizabeth River. In addition, the Navy adheres to SOPs during training activities involving weapons firing – blank-fire and vessel movement, which reduce the potential for interaction between the public and the Navy. Therefore, noise and public interaction associated with vessel movement and blank weapons firing from USFF training along the Southern Branch of the Elizabeth River would not impact commercial and recreational traffic and fishing in the region.

Noise from vessel movement would be the same as under the No Action Alternative. Noise from increases in equipment use, explosives on land, vehicle movement, weapons firing – blank-fire and weapons firing – non-lethal training ammunition would primarily occur within non-beach/dune training areas and therefore, is not anticipated to be disruptive to recreational users in the surrounding area. The Hampton Roads region is known for its large military presence and the majority of residents and local public surrounding Navy locations have experienced training events for decades. New residents,

tourists, and visitors may be unfamiliar with the Navy presence and the noise associated with Navy training activities. However, training occurs within Navy installation boundaries and is typically temporary and sporadic and therefore, training does not result in significant noise levels that would impact recreational activities in the region (Section 4.5, Ambient Noise). Explosives on land and additional vehicle movement, weapons firing – blank-fire and weapons firing – non-lethal training ammunition would occur on beach/dune training areas where recreational users of the adjacent waterways may hear noise associated with these training events. Recreational boaters are likely present in waters adjacent to beach/dune training areas for brief periods of time and are exposed to existing vessel traffic noise as part of the ambient noise environment; therefore, under Alternative 2, there would be no significant impact on recreational activities.

4.9 Summary of Impacts

A summary of the potential impacts associated with each of the action alternatives and the No Action Alternative is presented in Table 4.9-1.

Table 4.9-1. Summary of Potential Impacts to Resource Areas

Resource Area	*No Action Alternative*	*Alternative 1*	*Alternative 2 (Preferred Alternative)*
Air Quality	There are no significant impacts to air quality. The study area is in attainment for all criteria pollutants. In addition, the No Action Alternative air emissions are reflected in the current ambient criteria air pollutant concentrations in the study area air quality control region. Under the No Action Alternative, the highest criteria pollutant emissions are nitrogen oxides and carbon monoxide at 3.40 and 2.47 percent of the regional air emissions, respectively. These annual emissions of criteria pollutants remain very low in comparison to the existing baseline conditions in the region. Further, these operations have been ongoing in the region of influence for decades and are part of the existing baseline which is at attainment in all locations. Greenhouse gas emissions represent approximately 0.55 percent of the regional greenhouse gas emissions, which is nominal.	There would be no significant impacts to air quality. The additional training events would result in a slight increase in criteria pollutant emissions above the baseline levels. The highest criteria pollutant emissions increases would be in carbon monoxide at 0.09 percent. Greenhouse gas emissions would increase by less than 0.01 percent, so climate change would be impacted slightly by implementation of Alternative 1. A very minute change of this magnitude is not likely to have any impact on global climate change, sea level rise, or any potential impacts of climate change.	There would be no significant impacts to air quality. The additional training events would result in a slight increase in criteria pollutant emissions above the baseline levels. The highest criteria pollutant emissions would be in nitrogen oxides and carbon monoxide at 0.17 and 0.14 percent, respectively. Greenhouse gas emissions would increase by less than 0.02 percent, so climate change is not likely to be appreciably impacted by implementation of Alternative 2. A very minute change of this magnitude is not likely to have any impact on global climate change, sea level rise, or any potential impacts of climate change.
Water Resources	There are no significant impacts on water resources. Surface water impacts from physical disturbance are not significant since training activities do not increase contributions of nutrients or substances that affect dissolved oxygen conditions to stormwater or water resources located at or near the training sites. Stormwater outfalls would continue to be monitored in accordance with existing permits and plans. Wetland areas are present within and adjacent to training areas; however, destruction or modification of wetlands does not occur. Some shorelines are within a coastal flood zone with velocity hazard but training events do not impact that status. In addition, shorelines along the Southern Branch of the Elizabeth River are not altered by training events as the activities primarily occur within the water and do not result in degradation of the shoreline. Soils present within the training areas have varying potential for runoff; beach/dune areas have the greatest potential for erosion. The Navy manages beach/dune areas to minimize erosion and maintain shorelines for training events. Sediments within the Southern Branch of the Elizabeth River may temporarily experience physical disturbance but the sandy substrate resettles quickly. In addition, uncaptured brass casings are expected to deteriorate and may disperse with river currents; periodic dredging may further remove casings from the sediment.	There would be no significant impacts on water resources. The additional training events would not increase contributions of nutrients or substances that affect dissolved oxygen conditions to stormwater or water resources located at or near the training areas. Stormwater outfalls would continue to be monitored in accordance with existing permits and plans. Wetland areas are present within and adjacent to training areas; however, destruction or modification of wetlands would not occur. Some shorelines are within a coastal flood zone with velocity hazard but training events would not impact that status. In addition, shorelines along the Southern Branch of the Elizabeth River are not altered by training events as the activities primarily occur within the water and would not result in degradation of the shoreline. Soils present within the training areas have varying potential for runoff; beach/dune areas have the greatest potential for erosion. The Navy manages beach/dune areas to minimize erosion and maintain shorelines for training events. Sediments within the Southern Branch of the Elizabeth River may temporarily experience physical disturbance but the sandy substrate resettles quickly. In addition, uncaptured brass casings are expected to deteriorate and may disperse with river currents; periodic dredging may further remove casings from the sediment.	There would be no significant impacts on water resources. The additional training events would not increase contributions of nutrients or substances that affect dissolved oxygen conditions to stormwater or water resources located at or near the training areas. Stormwater outfalls would continue to be monitored in accordance with existing permits and plans. Wetland areas are present within and adjacent to training areas; however, destruction or modification of wetlands would not occur. Some shorelines are within a coastal flood zone with velocity hazard but training events would not impact that status. In addition, shorelines along the Southern Branch of the Elizabeth River are not altered by training events as the activities primarily occur within the water and would not result in degradation of the shoreline. Soils present within the training areas have varying potential for runoff; beach/dune areas have the greatest potential for erosion. The Navy manages beach/dune areas to minimize erosion and maintain shorelines for training events. Sediments within the Southern Branch of the Elizabeth River may temporarily experience physical disturbance but the sandy substrate resettles quickly. In addition, uncaptured brass casings are expected to deteriorate and may disperse with river currents; periodic dredging may further remove casings from the sediment.
Biological Resources	There are no significant impacts on biological resources. While physical disturbance associated with beach landings, personnel movement, vehicle movement, and explosives on land have the potential to disturb individual plants and soils, which could degrade habitats over time, training that utilizes beach habitats is typically restricted to unvegetated portions of the beach and vehicles training at inland areas typically use existing roads and trails. Physical strike associated with beach landings, personnel movement, vehicle movement, explosives on land and weapons firing – non-lethal training ammunition has the potential to impact wildlife. However, most mammals, reptiles, amphibians, and birds are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, invertebrates, less mobile reptiles, and amphibians, would move into a	There would be no significant impacts on biological resources. While physical disturbance associated with increased beach landings, personnel movement, vehicle movement, and explosives on land have the potential to disturb individual plants and soils, which could degrade habitats over time, training that utilizes beach habitats would be typically restricted to unvegetated portions of the beach and vehicles training at inland areas would typically use existing roads and trails. Physical strike associated with increased beach landings, personnel movement, vehicle movement, explosives on land and weapons firing – non-lethal training ammunition has the potential to impact mammals. However, most mammals, reptiles, amphibians, and birds are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, invertebrates, less mobile reptiles, and amphibians, move into a protected	There would be no significant impacts on biological resources. While physical disturbance associated with increased beach landings, personnel movement, vehicle movement, and explosives on land have the potential to disturb individual plants and soils, which could degrade habitats over time, training that utilizes beach habitats would be typically restricted to unvegetated portions of the beach and vehicles training at inland areas would typically use existing roads and trails. Physical strike associated with increased beach landings, personnel movement, vehicle movement, explosives on land and weapons firing – non-lethal training ammunition has the potential to impact mammals. However, most mammals, reptiles, amphibians, and birds are highly mobile and agile and would likely move away from a training activity or, in the case of small mammals, invertebrates, less mobile reptiles, and amphibians, move into a protected

Table 4.9-1. Summary of Potential Impacts to Resource Areas [Continued]

Resource Area	*No Action Alternative*	*Alternative 1*	*Alternative 2 (Preferred Alternative)*
Biological Resources (continued)	protected location, such as a burrow or vegetation, for cover. Nesting sea turtles on the beach are large enough to be seen and can be easily avoided. Daily patrols of beaches on Dam Neck Annex would identify and visibly mark sea turtle nests and monitor them for potential hatchlings reducing the potential for direct strike. Weapons firing – blank-fire results in expended brass casings; however, the casings are picked up by the Navy and do not pose a strike risk as they are expended in close proximity to the weapon, where wildlife would not be expected to occur. INRMP management measures benefiting wildlife include implementing projects that enhance and restore native habitats, as well as locating and monitoring sea turtle nesting activities on JEB Fort Story and Dam Neck Annex beaches. Noise associated with vehicle movement, operation of generators, use of explosives, and simulated weapons fire all have the potential to disturb wildlife to varying degrees. Most noise events would be localized and occur for a relatively short period of time (minutes to hours). Fish species have the potential to be struck by remotely operated vehicles (Jones Pond) or vessels (Southern Branch of the Elizabeth River), and to be disturbed by underwater noise produced by these objects. Large, bottom-feeding fish in the Elizabeth River could potentially ingest small-caliber shell casings. Most affected adult fish are highly mobile and would avoid collisions, and noise effects are not expected to result in population-level impacts. Similarly, a small number of individuals are expected to be affected by ingestion. Atlantic sturgeons may be affected by vessel strikes and ingestion. The Navy has determined that the Proposed Action may result in takes of migratory birds. These takes would not result in a significant adverse effect on a population of a migratory bird species. The Proposed Action is a military readiness activity; therefore, these takes are in compliance with the Migratory Bird Treaty Act. Large wooded tracts within the study area offer potential habitat for northern long-eared bats. Protections afforded to the northern long-eared bat under the ESA 4(d) rule have to do with restrictions on the removal of maternal roost trees and hibernacula. Since no tree clearing is proposed, the Navy has determined that the Proposed Action would have a no effect on the northern long-eared bat. JEB Little Creek, JEB Fort Story, and Dam Neck Annex include appropriate foraging habitats and are in the range of the piping plover, red knot, and roseate tern. It is likely that any individuals observed on-site would be rare occurrences and considered transient individuals. Generally, birds are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area; therefore, the Navy has determined that the Proposed Action would have no effect on the roseate tern. Given that individual migrating piping plovers and red knots have been sighted on the installations in historical surveys at JEB Fort Story and Dam Neck Annex/Camp Pendleton, the Navy has determined that the Proposed Action may affect, but is not likely to adversely affect, the ESA-listed piping plover and red knot. NWS Yorktown and Cheatham Annex are in the historical range of the small whorled pogonia, and both installations contain appropriate habitats for the	location, such as a burrow or vegetation, for cover. Nesting sea turtles on the beach are large enough to be seen and can be easily avoided. Daily patrols of beaches on Dam Neck Annex would identify and visibly mark sea turtle nests and monitor them for potential hatchlings reducing the potential for direct strike. Weapons firing – blank-fire results in expended brass casings; however, the casings are picked up by the Navy and do not pose a strike risk as they are expended in close proximity to the weapon, where mammals would not be expected to occur. INRMP management measures benefiting wildlife include implementing projects that enhance and restore native habitats, as well as locating and monitoring sea turtle nesting activities on JEB Fort Story and Dam Neck Annex beaches. Noise associated with increased vehicle movement, operation of generators, use of explosives, and simulated weapons fire all have the potential to disturb wildlife to varying degrees. Most noise events would be localized and occur for a relatively short period of time (minutes to hours). Fish species have the potential to be struck by remotely operated vehicles (Jones Pond) or vessels (Southern Branch of the Elizabeth River), and to be disturbed by underwater noise produced by these objects. Large, bottom-feeding fish in the Elizabeth River could potentially ingest small-caliber shell casings. Most affected adult fish are highly mobile and would avoid collisions, and noise effects are not expected to result in population-level impacts. Similarly, a small number of individuals would be affected by ingestion. Atlantic sturgeons may be affected by vessel strikes and ingestion. The Navy has determined that the Proposed Action may result in takes of migratory birds. These takes would not result in a significant adverse effect on a population of a migratory bird species. The Proposed Action is a military readiness activity; therefore, these takes are in compliance with the Migratory Bird Treaty Act. Large wooded tracts within the study area offer potential habitat for northern long-eared bats. Protections afforded to the northern long-eared bat under the ESA 4(d) rule have to do with restrictions on the removal of maternal roost trees and hibernacula. Since no tree clearing is proposed, the Navy has determined that the Proposed Action would have a no effect on the northern long-eared bat. JEB Little Creek, JEB Fort Story, and Dam Neck Annex include appropriate foraging habitats and are in the range of the piping plover, red knot, and roseate tern. It is likely that any individuals observed on-site would be rare occurrences and considered transient individuals. Generally, birds are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area; therefore, the Navy has determined that Alternative 1 would have no effect on the roseate tern. Given that individual migrating piping plovers and red knots have been sighted on the installations in historical surveys at JEB Fort Story and Dam Neck Annex/Camp Pendleton, the Navy has determined that Alternative 1 may affect, but is not likely to adversely affect, the ESA-listed piping plover and red knot. NWS Yorktown and Cheatham Annex are in the historical range of the small whorled pogonia, and both installations contain appropriate habitats for the	location, such as a burrow or vegetation, for cover. Nesting sea turtles on the beach are large enough to be seen and can be easily avoided. Daily patrols of beaches on Dam Neck Annex would identify and visibly mark sea turtle nests and monitor them for potential hatchlings reducing the potential for direct strike. Weapons firing – blank-fire results in expended brass casings; however, the casings are picked up by the Navy and do not pose a strike risk as they are expended in close proximity to the weapon, where mammals would not be expected to occur. INRMP management measures benefiting wildlife include implementing projects that enhance and restore native habitats, as well as locating and monitoring sea turtle nesting activities on JEB Fort Story and Dam Neck Annex beaches. Noise associated with increased vehicle movement, operation of generators, use of explosives, and simulated weapons fire all have the potential to disturb wildlife to varying degrees. Most noise events would be localized and occur for a relatively short period of time (minutes to hours). Fish species have the potential to be struck by remotely operated vehicles (Jones Pond) or vessels (Southern Branch of the Elizabeth River), and to be disturbed by underwater noise produced by these objects. Large, bottom-feeding fish in the Elizabeth River could potentially ingest small-caliber shell casings. Most affected adult fish are highly mobile and would avoid collisions, and noise effects are not expected to result in population-level impacts. Similarly, a small number of individuals would be affected by ingestion. Atlantic sturgeons may be affected by vessel strikes and ingestion. The Navy has determined that the Proposed Action may result in takes of migratory birds. These takes would not result in a significant adverse effect on a population of a migratory bird species. The Proposed Action is a military readiness activity; therefore, these takes are in compliance with the Migratory Bird Treaty Act. Large wooded tracts within the study area offer potential habitat for northern long-eared bats. Protections afforded to the northern long-eared bat under the ESA 4(d) rule have to do with restrictions on the removal of maternal roost trees and hibernacula. Since no tree clearing is proposed, the Navy has determined that the Proposed Action would have a no effect on the northern long-eared bat. JEB Little Creek, JEB Fort Story, and Dam Neck Annex include appropriate foraging habitats and are in the range of the piping plover, red knot, and roseate tern. It is likely that any individuals observed on-site would be rare occurrences and considered transient individuals. Generally, birds are very responsive, alert, and mobile and should easily avoid personnel and vehicle movements by relocating to another area; therefore, the Navy has determined that Alternative 2 would have no effect on the roseate tern. Given that individual migrating piping plovers and red knots have been sighted on the installations in historical surveys at JEB Fort Story and Dam Neck Annex/Camp Pendleton, the Navy has determined that Alternative 2 may affect, but is not likely to adversely affect, the ESA-listed piping plover and red knot. NWS Yorktown and Cheatham Annex are in the historical range of the small whorled pogonia, and both installations contain appropriate habitats for the

Table 4.9-1. Summary of Potential Impacts to Resource Areas [Continued]

Resource Area	*No Action Alternative*	*Alternative 1*	*Alternative 2 (Preferred Alternative)*
Biological Resources (continued)	species. Annual monitoring by installation Natural Resources staff would be employed to identify potential impacts before they become an issue; therefore, the Navy has determined that the Proposed Action would have no effect on the small whorled pogonia. Sea turtle nest monitoring and management guidelines for JEB Fort Story and Dam Neck Annex/Camp Pendleton would continue. There is no historical evidence of nesting sea turtles at JEB Little Creek and, therefore, the Navy has determined that the Proposed Action would have no effect on nesting loggerhead, green, and Kemp's ridley sea turtles. At JEB Fort Story and Dam Neck Annex offshore occurrences of loggerhead and Kemp's ridley sea turtles have been documented and they may potentially nest at these locations. Green sea turtles were not detected during acoustic and satellite tagging studies conducted offshore of JEB Fort Story and thus are not expected to nest on JEB Fort Story beaches; the Navy has determined that the Proposed Action would have no effect on green sea turtles at JEB Fort Story. However, one green sea turtle nest was documented on Sandbridge Beach, a few miles south of Dam Neck Annex; based on this proximity, green sea turtles may potentially nest on Dam Neck Annex. Given the very low density of historical loggerhead and Kemp's ridley sea turtle nesting in the study area and the low probability that green sea turtles would be encountered during a training activity, the potential for impacts to loggerhead, green, and Kemp's ridley sea turtles under the No Action Alternative is not significant. Implementation of SOPs would reduce the potential for impacts to loggerhead, green sea, and Kemp's ridley turtles. As a result, the Navy has determined that the Proposed Action may affect, but is not likely to adversely affect, nesting loggerhead, green, and Kemp's ridley sea turtles; therefore, informal consultation with the USFWS is required. Under the No Action Alternative West Indian manatee, harbor seal, or Atlantic bottlenose dolphin may occur in areas of vessel activity, thus incurring risk of collision or strike. The Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water. Therefore, the Navy has determined that the Proposed Action would have no effect on the West Indian manatee. Vessel noise may disturb, masking of hearing or vocalization, or affect the behavior of marine mammals. Reactions exhibited by dolphins would likely be temporary in nature and manatees and harbor seals occur infrequently and thus have a low likelihood of being affected by vessel noise from the No Action Alternative. West Indian manatees, harbor seals, and Atlantic bottlenose dolphins may by chance encounter expended brass casings but significant impacts are not expected as the occurrences would be expected to be random with a low probability of adverse effects. Therefore, the Navy has determined that, with regard to potential effects from vessel strike, noise, and ingestion, the No Action Alternative would have no effect on the West Indian manatee. In addition, the Navy has determined that the No Action Alternative would not result in the reasonably foreseeable "take" of a West Indian manatee, harbor seal, or Atlantic bottlenose dolphin by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required. Under the No Action Alternative, hauled-out harbor seals at JEB Little Creek, JEB	species. Annual monitoring by installation Natural Resources staff would be employed to identify potential impacts before they become an issue; therefore, the Navy has determined that the Proposed Action would have no effect on the small whorled pogonia. Sea turtle nest monitoring and management guidelines for JEB Fort Story and Dam Neck Annex/Camp Pendleton would continue. There is no historical evidence of nesting sea turtles at JEB Little Creek and, therefore, the Navy has determined that the Proposed Action would have no effect on nesting loggerhead, green, and Kemp's ridley sea turtles. At JEB Fort Story and Dam Neck Annex offshore occurrences of loggerhead and Kemp's ridley sea turtles have been documented and they may potentially nest at these locations. Green sea turtles were not detected during acoustic and satellite tagging studies conducted offshore of JEB Fort Story and thus are not expected to nest on JEB Fort Story beaches; the Navy has determined that the Proposed Action would have no effect on green sea turtles at JEB Fort Story. However, one green sea turtle nest was documented on Sandbridge Beach, a few miles south of Dam Neck Annex; based on this proximity, green sea turtles may potentially nest on Dam Neck Annex. Given the very low density of historical loggerhead and Kemp's ridley sea turtle nesting in the study area and the low probability that green sea turtles would be encountered during a training activity, the potential for impacts to loggerhead, green, and Kemp's ridley sea turtles under the No Action Alternative is not significant. Implementation of SOPs would reduce the potential for impacts to loggerhead, green sea, and Kemp's ridley turtles. As a result, the Navy has determined that the Proposed Action may affect, but is not likely to adversely affect, loggerhead, green, and Kemp's ridley sea turtles; therefore, informal consultation with the USFWS is required. Under Alternative 1, West Indian manatee, harbor seal, or Atlantic bottlenose dolphin may occur in areas of vessel activity, thus incurring risk of collision or strike. The Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water. Therefore, the Navy has determined that the Proposed Action would have no effect on the West Indian manatee. Vessel noise may disturb, masking of hearing or vocalization, or affect the behavior of marine mammals. Reactions exhibited by dolphins would likely be temporary in nature and manatees and harbor seals occur infrequently and thus have a low likelihood of being affected by vessel noise from Alternative 1. Under Alternative 1 West Indian manatees, harbor seals, and Atlantic bottlenose dolphins may by chance encounter expended brass casings but significant impacts are not expected as the occurrences would be expected to be random with a low probability of adverse effects. Therefore, the Navy has determined that, with regard to potential effects from vessel strike, noise, and ingestion, the No Action Alternative would have no effect on the West Indian manatee. In addition, the Navy has determined that the No Action Alternative would not result in the reasonably foreseeable "take" of a West Indian manatee, harbor seal, or Atlantic bottlenose dolphin by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required. Under Alternative 1, hauled-out harbor seals at JEB Little Creek, JEB Fort Story,	species. Annual monitoring by installation Natural Resources staff would be employed to identify potential impacts before they become an issue; therefore, the Navy has determined that the Proposed Action would have no effect on the small whorled pogonia. Sea turtle nest monitoring and management guidelines for JEB Fort Story and Dam Neck Annex/Camp Pendleton would continue. There is no historical evidence of nesting sea turtles at JEB Little Creek and, therefore, the Navy has determined that the Proposed Action would have no effect on nesting loggerhead, green, and Kemp's ridley sea turtles. At JEB Fort Story and Dam Neck Annex offshore occurrences of loggerhead and Kemp's ridley sea turtles have been documented and they may potentially nest at these locations. Green sea turtles were not detected during acoustic and satellite tagging studies conducted offshore of JEB Fort Story and thus are not expected to nest on JEB Fort Story beaches; the Navy has determined that the Proposed Action would have no effect on green sea turtles at JEB Fort Story. However, one green sea turtle nest was documented on Sandbridge Beach, a few miles south of Dam Neck Annex; based on this proximity, green sea turtles may potentially nest on Dam Neck Annex. Given the very low density of historical loggerhead and Kemp's ridley sea turtle nesting in the study area and the low probability that green sea turtles would be encountered during a training activity, the potential for impacts to loggerhead, green, and Kemp's ridley sea turtles under the No Action Alternative is not significant. Implementation of SOPs would reduce the potential for impacts to loggerhead, green, and Kemp's ridley sea turtles. As a result, the Navy has determined that the Proposed Action may affect, but is not likely to adversely affect, loggerhead, green, and Kemp's ridley sea turtles; therefore, informal consultation with the USFWS is required. Under Alternative 2, West Indian manatee, harbor seal, or Atlantic bottlenose dolphin may occur in areas of vessel activity, thus incurring risk of collision or strike. The Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water. Therefore, the Navy has determined that the Proposed Action would have no effect on the West Indian manatee. Vessel noise may disturb, masking of hearing or vocalization, or affect the behavior of marine mammals. Reactions exhibited by dolphins would likely be temporary in nature and manatees and harbor seals occur infrequently and thus have a low likelihood of being affected by vessel noise from Alternative 3. Under Alternative 2 West Indian manatees, harbor seals, and Atlantic bottlenose dolphins may by chance encounter expended brass casings but significant impacts are not expected as the occurrences would be expected to be random with a low probability of adverse effects. Therefore, the Navy has determined that, with regard to potential effects from vessel strike, noise, and ingestion, the No Action Alternative would have no effect on the West Indian manatee. In addition, the Navy has determined that the No Action Alternative would not result in the reasonably foreseeable "take" of a West Indian manatee, harbor seal, or Atlantic bottlenose dolphin by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required. Under Alternative 2, hauled-out harbor seals at JEB Little Creek, JEB Fort Story,

Table 4.9-1. Summary of Potential Impacts to Resource Areas [Continued]

Resource Area	*No Action Alternative*	*Alternative 1*	*Alternative 2 (Preferred Alternative)*
Biological Resources (continued)	Fort Story, First Landing State Park, and Dam Neck Annex may react to the presence of people, amphibious craft, and vehicles and temporarily return to the water. Since the species is likely to return to the water when people, amphibious craft, or vehicles are present or approaching, strikes of hauled-out seals typically would not occur and this disturbance is unlikely to result in more than short-term interference with resting activities of seals. The Navy uses highly qualified operators on amphibious craft to maintain awareness of the surrounding environment. As a result, the Navy has determined that the Proposed Action would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required. The study area is located outside of Virginia bald eagle concentration areas. If a bald eagle nest is identified on a study area installation, the required buffer is established as recommended by VDGIF; USFWS and VDGIF consultation occurs for any proposed activities within the established buffer. The No Action Alternative does not result in disturbance of nesting bald eagles. No Eagle Act permit is required under the No Action Alternative.	First Landing State Park, and Dam Neck Annex may react to the presence of people, amphibious craft, and vehicles and temporarily return to the water. Since the species is likely to return to the water when people, amphibious craft, or vehicles are present or approaching, strikes of hauled-out seals typically would not occur and this disturbance is unlikely to result in more than short-term interference with resting activities of seals. The Navy uses highly qualified operators on amphibious craft to maintain awareness of the surrounding environment. As a result, the Navy has determined that the Proposed Action would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required. The study area is located outside of Virginia bald eagle concentration areas. If a bald eagle nest is identified on a study area installation, the required buffer would be established as recommended by VDGIF; USFWS and VDGIF consultation would occur for any proposed activities within the established buffer. Alternative 1 would not result in disturbance of nesting bald eagles. No Eagle Act permit is required under Alternative 1.	First Landing State Park, and Dam Neck Annex may react to the presence of people, amphibious craft, and vehicles and temporarily return to the water. Since the species is likely to return to the water when people, amphibious craft, or vehicles are present or approaching, strikes of hauled-out seals typically would not occur and this disturbance is unlikely to result in more than short-term interference with resting activities of seals. The Navy uses highly qualified operators on amphibious craft to maintain awareness of the surrounding environment. As a result, the Navy has determined that the Proposed Action would not result in the reasonably foreseeable "take" of a marine mammal species by harassment, injury, or mortality as defined under the MMPA; therefore, an application for takings under the MMPA is not required. The study area is located outside of Virginia bald eagle concentration areas. If a bald eagle nest is identified on a study area installation, the required buffer would be established as recommended by VDGIF; USFWS and VDGIF consultation would occur for any proposed activities within the established buffer. Alternative 2 would not result in disturbance of nesting bald eagles. No Eagle Act permit is required under Alternative 2.
Cultural Resources	There are no significant impacts on any significant cultural resources. Significant resources include the Camp Pendleton Historic District, Fort Story Historic District, the St. Juliens Creek Annex Historic District, and the Colonial Parkway (a contributing resource to the Colonial National Historic Park). No significant impacts to National Register of Historic Places-listed or -eligible architectural or archaeological resources at any of the training installations occur. However, training activities with a potential ground disturbance component will continue to be conducted in areas identified by the Navy as having the potential to contain undiscovered intact archaeological resources. The subsurface disturbance potential of these training activities does not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy would manage these resources in accordance with the National Historic Preservation Act and other federal and state laws, Navy, and DoD regulations and instructions, and DoD American Indian and Alaska Native Policy. With the extensive history of military activities, and earlier industrial activities at all of the training installations, noise associated with military activities has long been an element of the setting of the National Register of Historic Places-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for National Register of Historic Places listing. While noise from the existing training activities may be audibly noticeable, the resulting discernible effect has not been, and would not be, so great as to impair the integrity of any of the potentially affected resources such that they would no longer meet the National Register criteria for listing. In accordance with National Historic Preservation Act Section 106, the Navy has determined that there would be no adverse effects to historic properties by USFF training.	There would be no significant impact on significant cultural resources. Significant resources include the Camp Pendleton Historic District, Fort Story Historic District, the St. Juliens Creek Annex Historic District, and the Colonial Parkway (a contributing resource to the Colonial National Historic Park). Training activities with a potential ground disturbance component would continue to be conducted in areas identified by the Navy as having the potential to contain undiscovered intact archaeological resources. The subsurface disturbance potential of these training activities would not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy would manage these resources in accordance with the National Historic Preservation Act and other federal and state laws, Navy, and DoD regulations and instructions, and DoD American Indian and Alaska Native Policy. With the extensive history of military activities, and earlier industrial activities at all of the training installations, noise associated with military activities has long been an element of the setting of the National Register of Historic Places-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for National Register of Historic Places listing. While noise from the training activities may be audibly noticeable, the resulting discernible effect would not be so great as to impair the integrity of any of the potentially affected resources such that they would no longer meet the National Register criteria for listing Under Alternative 1, Navy training at JEB Little Creek, JEB Fort Story, and Dam Neck Annex and Camp Pendleton, with few exceptions, would increase in tempo the training activities that are already conducted at the installations. Given the nature of the training and their proximity to known National Register of Historic Places-listed or -eligible cultural resources or sensitive areas, the incremental increases in training activities would not introduce any significant impacts to the cultural resources in the respective area of potential effects. In accordance with National Historic Preservation Act Section 106, the Navy has determined that there would be no adverse effects to historic properties by USFF training with implementation of Alternative 1.	There would be no significant impact on significant cultural resources. Significant resources include the Camp Pendleton Historic District, Fort Story Historic District, the St. Juliens Creek Annex Historic District, and the Colonial Parkway (a contributing resource to the Colonial National Historic Park). Training activities with a potential ground disturbance component would continue to be conducted in areas identified by the Navy as having the potential to contain undiscovered intact archaeological resources. The subsurface disturbance potential of these training activities would not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy would manage these resources in accordance with the National Historic Preservation Act and other federal and state laws, Navy, and DoD regulations and instructions, and DoD American Indian and Alaska Native Policy. With the extensive history of military activities, and earlier industrial activities at all of the training installations, noise associated with military activities has long been an element of the setting of the National Register of Historic Places-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for National Register of Historic Places listing. While noise from the training activities may be audibly noticeable, the resulting discernible effect would not be so great as to impair the integrity of any of the potentially affected resources such that they would no longer meet the National Register criteria for listing Under Alternative 2, Navy training at JEB Little Creek, JEB Fort Story, and Dam Neck Annex and Camp Pendleton, with few exceptions, would increase in tempo the training activities that are already conducted at the installations. Given the nature of the training and their proximity to known National Register of Historic Places-listed or -eligible cultural resources or sensitive areas, the incremental increases in training activities would not introduce any significant impacts to the cultural resources in the respective area of potential effects. In accordance with National Historic Preservation Act Section 106, the Navy has determined that there would be no adverse effects to historic properties by USFF training with implementation of Alternative 2.

Table 4.9-1. Summary of Potential Impacts to Resource Areas [Continued]

Resource Area	*No Action Alternative*	*Alternative 1*	*Alternative 2 (Preferred Alternative)*
Ambient Noise	There are no significant impacts on ambient noise. Tactical and non-tactical (non-amphibious) vehicle operations generate noise levels similar to civilian vehicles of comparable size and horsepower. Civilian traffic noise is a component of the noise environment under baseline conditions at all of the locations studied, and continuation of vehicle operations would not result in changes to the existing noise environment or result in significant noise impacts. Detonation of explosives under the No Action Alternative generates noise levels between 115 and 130 dBP at the closest noise-sensitive locations to the JEB Little Creek EOD pit, JEB Fort Story EOD Range 1, and the EOD range at NWS Yorktown. Noise levels with potential to be harmful to hearing (i.e., above 140 dBP) would remain within installation boundaries or portions of the Chesapeake Bay that are confirmed clear of non-participants prior to detonation. Use of equipment such as generators under the No Action Alternative generates approximately 59 dBA at a distance of 600 feet, a noise level that is not sufficiently high to interrupt normal speech communication. In accordance with MIL-STD-1474E, military equipment is designed to minimize noise levels to the extent practical through use of elements such as mufflers. Because continuation of ongoing equipment use under the No Action Alternative generates noise levels that do not interrupt common activities (e.g., conversation) and takes place in the context of similar existing noise sources, noise impacts would not be significant. LCAC amphibious craft operations at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton under the No Action Alternative result in temporary elevated noise levels at noise-sensitive locations that could be disturbing, but events are spatially distributed within training areas such that most LCAC amphibious craft training is conducted at locations in the training area that are much further away, generating lower noise levels. Vehicles other than LCAC amphibious craft are much less loud and generate elevated noise levels only in the immediate vicinity of the vehicle. Blank weapons are not fired such that people that are not equipped with hearing protection would be exposed to peak noise levels that could be harmful to hearing (i.e., 140 dBP). Under the No Action Alternative, blank weapons fire at St. Juliens Creek Annex (Building 277), Cheatham Annex (Training Area F), and the Southern Branch of the Elizabeth River (blank-fire area) could generate noise levels at residences exceeding 104 dBP. These noise levels have a high likelihood of being disturbing particularly when they occur late at night. The noise level experienced at residences varies based on the specific location within the training area at which firing is conducted, and training is typically conducted towards the interior of the installation such that high noise levels at residences are infrequent. Blank-fire at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton, St. Juliens Creek Annex, NWS Yorktown, Cheatham Annex, and the Southern Branch of the Elizabeth River results in noise levels at residences of greater than 87 dBP; however, while noise levels between 87 and 104 dBP have some potential for disruption of common activities, noise levels exceeding 104 dBP have a greater potential for disturbance. At NALF Fentress a small number residences currently exposed at below 87 dBP would be exposed to between 87 and 104 dBP. Given	Under Alternative 1, several noise-generating training activities would begin to occur or would become more frequent. These activities would take place in the Hampton Roads region, an area that has hosted a large number of military units for centuries. Similar training activities to those proposed under Alternative 1 have been occurring in the region of influence for decades, and ongoing military training noise (see Section 3.5, Ambient Noise) is an important aspect of the context in which noise impacts would occur. Addition of tactical and non-tactical vehicle training operations to baseline environments that include civilian vehicle traffic vehicle noise would not result in changes to the existing noise environment or result in significant noise impacts. Detonation of explosives under Alternative 1 would generate noise levels between 115 and 130 dBP at the closest noise-sensitive locations to the JEB Little Creek EOD pit, JEB Fort Story EOD Range 1 and Building 900, and the EOD range at NWS Yorktown. In all locations except Building 900, explosives use under baseline conditions or the No Action Alternative already results in peak noise levels at or exceeding peak noise levels that would be experienced under Alternative 1. Noise levels exceeding 140 dBP (which can be harmful to hearing) would remain within installation boundaries or portions of the Chesapeake Bay that are confirmed clear of non-participants prior to detonation. The number of detonations conducted annually would increase relative to the No Action Alternative at the JEB Little Creek EOD pit, JEB Fort Story EOD Range 1 and Building 900 under Alternative 1. However, individual detonation event peak noise levels noise levels at EOD Range 1 would not exceed those generated under the No Action Alternative, and detonations conducted at Building 900 would be relatively infrequent (76 per year). LCAC amphibious craft operations at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton under Alternative 1 would result in temporary elevated noise levels at noise-sensitive locations that could be disturbing, but events are spatially distributed within training areas such that most LCAC amphibious craft training is conducted at locations in the training area that are much further away, generating lower noise levels. There would be a slight increase in the number of LCAC amphibious craft training events per year at JEB Fort Story under Alternative 1, but the noise level of individual events would not change. Vehicles other than LCAC amphibious craft are much less loud and generate elevated noise levels only in the immediate vicinity of the vehicle. Addition of tactical and non-tactical vehicle training operations to baseline environments that include civilian vehicle traffic vehicle noise would not result in changes to the existing noise environment or result in significant noise impacts. Blank weapons are not fired such that people that are not equipped with hearing protection would be exposed to peak noise levels that could be harmful to hearing (i.e., 140 dBP). Under Alternative 1, blank weapons fire at St. Juliens Creek Annex (Building 277), Cheatham Annex (Training Area F), and the Southern Branch of the Elizabeth River (blank-fire area) could generate noise levels at residences exceeding 104 dBP. These noise levels have a high likelihood of being disturbing particularly when they occur late at night. Blank-fire at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton, St. Juliens Creek Annex, NWS Yorktown, Cheatham Annex, and the Southern Branch of the Elizabeth River results in noise levels at residences of greater	There would be no significant impacts on ambient noise. Noise-generating training activities proposed under Alternative 2 would occur in the context of the Hampton Roads region, an area that has been exposed to similar training noise for decades. Use of equipment such as generators at NALF Fentress under Alternative 2 would generate noise levels off installation that are not sufficiently high to interrupt normal speech communication. Generators and other equipment would be used in the context of an active military installation where noise other equipment and vehicles (e.g., jet aircraft) generate noise on a regular basis as part of the baseline sound environment. Noise impacts would not be significant. The frequency of explosives training detonations would increase under Alternative 2 at JEB Fort Story EOD Range 1. Peak noise levels generated during detonations would not exceed those generated during detonations conducted under the No Action Alternative. Noise levels exceeding 140 dBP (which can be harmful to hearing) would remain within installation boundaries or portions of the Chesapeake Bay that are confirmed clear of non-participants prior to detonation. LCAC amphibious craft operations at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton under Alternative 2 result in temporary elevated noise levels at noise-sensitive locations that could be disturbing, but events are spatially distributed within training areas such that most LCAC amphibious craft training is conducted at locations in the training area that are much further away, generating lower noise levels. Vehicles other than LCAC amphibious craft are much less loud and generate elevated noise levels only in the immediate vicinity of the vehicle. Addition of tactical and non-tactical vehicle training operations to baseline environments that include civilian vehicle traffic vehicle noise would not result in changes to the existing noise environment or result in significant noise impacts. Blank weapons are not fired such that people that are not equipped with hearing protection would be exposed to peak noise levels that could be harmful to hearing (i.e., 140 dBP). Under Alternative 2, blank weapons fire at St. Juliens Creek Annex (Building 277), Cheatham Annex (Training Area F), and the Southern Branch of the Elizabeth River (blank-fire area) could generate noise levels at residences exceeding 104 dBP. These noise levels have a high likelihood of being disturbing particularly when they occur late at night. The noise level experienced at residences varies based on the specific location within the training area at which firing is conducted, and training is typically conducted towards the interior of the installation such that high noise levels at residences are infrequent. Blank-fire at JEB Little Creek, JEB Fort Story, Dam Neck Annex and Camp Pendleton, St. Juliens Creek Annex, NWS Yorktown, Cheatham Annex, and the Southern Branch of the Elizabeth River results in noise levels at residences of greater than 87 dBP; however, while noise levels between 87 and 104 dBP have some potential for disruption of common activities, noise levels exceeding 104 dBP have a greater potential for disturbance. At Dam Neck Annex and Camp Pendleton, the number of blank rounds fired annually would increase under Alternative 2, but no new or additional off-installation locations would be exposed to noise levels greater than 87 dBP. In addition, at JEB Fort Story and NALF Fentress, the number of blank rounds would increase under Alternative 2 and residences currently

Table 4.9-1. Summary of Potential Impacts to Resource Areas [Continued]

Resource Area	*No Action Alternative*	*Alternative 1*	*Alternative 2 (Preferred Alternative)*
Ambient Noise (continued)	the context of ongoing noise events, blank-fire under the No Action Alternative does not result in significant noise impacts. Shotgun slugs are used as part of EOD training and are typically conducted relatively far from installation boundaries in accordance with range safety regulations. Noise generated by the shotgun does not exceed 104 dBP; however, shotgun noise at JEB Fort Story could exceed 87 dBP at adjacent residences and when combined with other blank-fire noise at this same level, adjacent residences may experience noise levels greater than 87 dBP more frequently over several days. Paintballs are relatively quiet and would not result in noise impacts off-station. Use of practice grenades at the NWS Yorktown HSTL would affect small portions of the Colonial Parkway at peak noise levels exceeding 130 but not 140 dBP. The portion of the parkway affected by elevated noise levels is used primarily by people in motion in cars and is only moderately noise sensitive. Under the No Action Alternative, underwater noise in the Southern Branch of the Elizabeth River is generated by small vessel movement. Small boats produce low levels of noise at higher frequencies (up to several kHz). Underwater noise in this location is chronic and long-term due to the level of human activity. There are no anticipated impacts to the human environment due to underwater noise; impacts to aquatic species are discussed in Biological Resources.	than 87 dBP; however, while noise levels between 87 and 104 dBP have some potential for disruption of common activities, noise levels exceeding 104 dBP have a greater potential for disturbance. At JEB Fort Story, Dam Neck Annex and Camp Pendleton, the number of blank rounds fired annually would increase under Alternative 1, but no new or additional off-installation locations would be exposed to noise levels greater than 87 dBP. At NALF Fentress a small number residences currently exposed at below 87 dBP would be exposed to between 87 and 104 dBP. In the context of ongoing noise events, blank-fire under Alternative 1 would not result in significant noise impacts. Shotgun slugs (non-lethal training ammunition) are used as part of EOD training that is typically conducted relatively far from installation boundaries in accordance with range safety regulations. Noise generated by the shotgun does not exceed 104 dBP; however, shotgun noise at JEB Fort Story could exceed 87 dBP at adjacent residences and when combined with other blank-fire noise at this same level, adjacent residences may experience noise levels greater than 87 dBP more frequently over several days. Paintballs are relatively quiet and would not result in noise impacts off-station. Use of practice grenades at the NWS Yorktown HSTL would affect small portions of the Colonial Parkway at peak noise levels exceeding 130 but not 140 dBP. The portion of the parkway affected by elevated noise levels is used primarily by people in motion in cars and is only moderately noise sensitive. Underwater noise in the Southern Branch of the Elizabeth River would be the same as under the No Action Alternative.	exposed at below 87 dBP would be exposed to between 87 and 104 dBP. Given the context of ongoing noise events, blank-fire under Alternative 2 would not result in significant noise impacts. Non-lethal training ammunition would not result in significant noise impacts. Shotgun slugs are used as part of EOD training that is typically conducted relatively far from installation boundaries in accordance with range safety regulations. Noise generated by the shotgun does not exceed 104 dBP; however, shotgun noise at JEB Fort Story could exceed 87 dBP at adjacent residences and when combined with other blank-fire noise at this same level, adjacent residences may experience noise levels greater than 87 dBP more frequently over several days. Paintballs are relatively quiet and would not result in noise impacts off-station. Use of practice grenades at the NWS Yorktown HSTL would affect small portions of the Colonial Parkway at peak noise levels exceeding 130 but not 140 dBP. The portion of the parkway affected by elevated noise levels is used primarily by people in motion in cars and is only moderately noise sensitive. Underwater noise in the Southern Branch of the Elizabeth River would be the same as under the No Action Alternative.
Public Health and Safety	There are no significant impacts on public health and safety. Public interaction from vessel movement is unlikely under the No Action Alternative and public interaction from weapons firing – blank-fire does not occur under the No Action Alternative. Blank-fire training either occurs within Navy installation boundaries, or from Navy vessels only if non-participants are greater than 200 feet from the vessels. Vessel movement during training events is conducted by trained Navy personnel, practicing safe navigation.	There would be no significant impacts on public health and safety. Public interaction from vessel movement is unlikely under Alternative 1 and public interaction from weapons firing – blank-fire does not occur under Alternative 1. Blank-fire training would either occur within Navy installation boundaries, or from Navy vessels only if non-participants are greater than 200 feet from the vessels. Vessel movement during training events would be conducted by trained Navy personnel, practicing safe navigation.	There would be no significant impacts on public health and safety. Public interaction from vessel movement is unlikely under Alternative 2 and from weapons firing – blank-fire does not occur under Alternative 2. Blank-fire training would either occur within Navy installation boundaries or from Navy vessels if non-participants are greater than 200 feet from the vessels. Vessel movement during training events would be conducted by trained Navy personnel, practicing safe navigation.
Hazardous Materials and Wastes	There would be no impacts to hazardous materials, hazardous constituents, or Environmental Restoration Program sites. Installations would continue to use hazardous materials as part of routine operations. These materials would continue to be tracked and managed according to established procedures, including site-specific emergency response and contingency plans. Any releases or accidental discharges of hazardous materials would be immediately reported and mitigated, and no new regulatory thresholds would be exceeded. Environmental Restoration Program sites would also be managed as they are currently.	There would be no impacts to hazardous materials, hazardous constituents, or Environmental Restoration Program sites. Some of the proposed training activities would require the use of hazardous materials and would generate hazardous constituents. The additional training events would be expected to use the same types of hazardous materials as the No Action Alternative. These materials would be managed according to established procedures. No new regulatory thresholds would be exceeded and no new hazardous materials reporting would be required. Proposed activities would also not disturb Environmental Restoration Program sites or interfere with existing land use controls (if any) on these sites.	There would be no impacts to hazardous materials, hazardous constituents, or Environmental Restoration Program sites. Some of the proposed training activities would require the use of hazardous materials, and would generate hazardous constituents. The additional training events would be expected to use and generate the same types of hazardous materials as the No Action Alternative. These materials would be managed according to established procedures. No new regulatory thresholds would be exceeded and no new hazardous materials reporting would be required. Proposed activities would also not disturb Environmental Restoration Program sites or interfere with existing land use controls (if any) on these sites.

Table 4.9-1. Summary of Potential Impacts to Resource Areas [Continued]

Resource Area	*No Action Alternative*	*Alternative 1*	*Alternative 2 (Preferred Alternative)*
Socioeconomics	There are no significant impacts to socioeconomics. Navy vessel traffic is consistent with commercial and recreational vessel traffic within the Southern Branch of the Elizabeth River. In addition, the Navy adheres to SOPs during training activities involving weapons firing – blank-fire and vessel movement which reduce the potential for interaction between the public and the Navy. Therefore, noise and public interaction associated with vessel movement and blank weapons firing from USFF training along the Southern Branch of the Elizabeth River does not impact commercial and recreational traffic and fishing in the region. Noise from beach landings, equipment use, explosives on land, vehicle movement, vessel movement, weapons firing – blank-fire and weapons firing – non-lethal training ammunition primarily occur within Navy installation boundaries and therefore, is not anticipated to be disruptive to recreational users in the surrounding area. However, vehicle movement, vessel movement, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition occur on beach/dune training areas or in a water training area where recreational users of the adjacent waterways may hear noise associated with these training events. In general, the number of training events spread across the year in the region is small. In addition, recreational boaters are likely present offshore of beach/dune training areas for a brief period of time and are exposed to existing vessel traffic noise as part of the ambient noise environment; therefore, under the No Action Alternative, there is no significant impact to socioeconomic resources (commercial and recreational transportation and fishing and regional recreational activities).	There would be no significant impacts to socioeconomics. Navy vessel traffic would be consistent with commercial and recreational vessel traffic within the Southern Branch of the Elizabeth River. In addition, the Navy adheres to SOPs during training activities involving weapons firing – blank-fire and vessel movement, which reduce the potential for interaction between the public and the Navy. Therefore, noise and public interaction associated with vessel movement and blank weapons firing from USFF training along the Southern Branch of the Elizabeth River would not impact commercial and recreational traffic and fishing in the region. Noise from beach landings, equipment use, and vessel movement would be the same as under the No Action Alternative. Noise from increases in explosives on land, vehicle movement, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition would primarily occur within non-beach/dune training areas and therefore, is not anticipated to be disruptive to recreational users in the surrounding area. The Hampton Roads region is known for its large military presence and the majority of residents and local public surrounding Navy locations have experienced training events for decades. New residents, tourists, and visitors may be unfamiliar with the Navy presence and the noise associated with Navy training activities. However, training occurs within Navy installation boundaries and is typically temporary and sporadic and therefore, training does not result in significant noise levels that would impact recreational activities in the region (Section 4.5, Ambient Noise). Explosives on land and additional vehicle movement, weapons firing – blank-fire, and weapons firing – non-lethal training ammunition would occur on beach/dune training areas where recreational users of the adjacent waterways may hear noise associated with these training events. Recreational boaters are likely present in waters adjacent to beach/dune training areas for brief periods of time and are exposed to existing vessel traffic noise as part of the ambient noise environment; therefore, under Alternative 1, there would be no significant impact on recreational activities.	There would be no significant impacts to socioeconomics. Navy vessel traffic would be consistent with commercial and recreational vessel traffic within the Southern Branch of the Elizabeth River. In addition, the Navy adheres to SOPs during training activities involving weapons firing – blank-fire and vessel movement, which reduce the potential for interaction between the public and the Navy. Therefore, noise and public interaction associated with vessel movement and blank weapons firing from USFF training along the Southern Branch of the Elizabeth River would not impact commercial and recreational traffic and fishing in the region. Noise from vessel movement would be the same as under the No Action Alternative. Noise from increases in equipment use, explosives on land, vehicle movement, weapons firing – blank-fire and weapons firing – non-lethal training ammunition would primarily occur within non-beach/dune training areas and therefore, is not anticipated to be disruptive to recreational users in the surrounding area. The Hampton Roads region is known for its large military presence and the majority of residents and local public surrounding Navy locations have experienced training events for decades. Residents, tourists, and visitors may be unfamiliar with the Navy presence and the noise associated with Navy training activities. However, training occurs within Navy installation boundaries and is typically temporary and sporadic and therefore, training does not result in significant noise levels that would impact recreational activities in the region (Section 4.5, Ambient Noise). Explosives on land and additional vehicle movement, weapons firing – blank-fire and weapons firing – non-lethal training ammunition would occur on beach/dune training areas where recreational users of the adjacent waterways may hear noise associated with these training events. Recreational boaters are likely present in waters adjacent to beach/dune training areas for brief periods of time and are exposed to existing vessel traffic noise as part of the ambient noise environment; therefore, under Alternative 2, there would be no significant impact on recreational activities.

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5 CUMULATIVE IMPACTS

This section (1) defines cumulative impacts, (2) describes past, present, and reasonably foreseeable future actions relevant to cumulative impacts, (3) analyzes the incremental interaction that the Proposed Action may have with other actions, and (4) evaluates cumulative impacts potentially resulting from these interactions.

5.1 Definition of Cumulative Impacts

The approach taken in the analysis of cumulative impacts follows the objectives of the National Environmental Policy Act (NEPA), and Council on Environmental Quality (CEQ) regulations and guidance. Cumulative impacts are defined in 40 Code of Federal Regulations section 1508.7 as "the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The CEQ and the U.S. Environmental Protection Agency (USEPA) have published guidance addressing implementation of cumulative impact analyses—Guidance on the Consideration of Past Actions in Cumulative Effects Analysis (CEQ, 2005) and Consideration of Cumulative Impacts in USEPA Review of NEPA Documents (USEPA, 1999). CEQ guidance entitled Considering Cumulative Impacts Under NEPA (1997) states that cumulative impact analyses should "…determine the magnitude and significance of the environmental consequences of the proposed action in the context of the cumulative impacts of other past, present, and future actions...identify significant cumulative impacts…[and]…focus on truly meaningful impacts."

Cumulative impacts 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, relatively concurrent actions would tend to offer a higher potential for cumulative impacts. To identify cumulative impacts, the analysis needs to address the following three fundamental questions:

- 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?
- 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 from the other action?
- If such a relationship exists, then does an assessment reveal any potentially significant impacts not identified when the proposed action is considered alone?

For the Proposed Action to have a cumulatively significant impact to an environmental resource, two conditions must be met. First, the combined effects of all identified past, present, and reasonably foreseeable projects, activities, and processes on a resource, including the effects of the Proposed Action, must be significant. Second, the Proposed Action must make a contribution to that significant cumulative impact. Finally, if the effects of the Proposed Action alone would have a significant impact to an environmental resource within its region of influence, then the impacts of the Proposed Action in

combination with all other past, present, and reasonably foreseeable actions would normally be cumulatively significant.

5.2 Scope of Cumulative Impacts Analysis

The scope of the cumulative impacts analysis involves both the geographic extent of the effects and the time frame in which the effects could be expected to occur. For this Environmental Assessment (EA), the study area delimits the geographic extent of the cumulative impacts analysis. In general, the study area will include those areas previously described in Chapter 3 (Affected Environment) for the respective resource areas. The time frame for cumulative impacts centers on the timing of the Proposed Action. Since the Proposed Action includes ongoing and future training operations which are expected to continue indefinitely, the cumulative impacts analysis does not have a specific future timeframe. However, the uncertainty of reasonably foreseeable future actions limits the ability to analyze cumulative impacts indefinitely. It is assumed that the Navy will continue to evaluate training activities in an ongoing process and environmental planning documents will cover changes in training activities, including updates to cumulative impacts analysis.

Another factor influencing the scope of cumulative impacts analysis involves identifying other actions to consider. 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. Documents used to identify other actions include notices of intent for Environmental Impact Statements (EISs) and EAs, management plans, land use plans, and other planning related studies. Additionally, Navy staff provided information on local and regional actions, as well as previously completed, currently ongoing, and reasonably foreseeable future actions at each of the installations. Finally, websites such as the Virginia Department of Transportation and Hampton Roads Planning District Commission, were searched for planning actions that would need to be included in this analysis.

To be included in the cumulative analysis, the impacts on each resource area were reviewed. If the analysis determined no impacts would occur, the resource was not carried forward for cumulative impacts. As a result, hazardous materials and waste is not discussed further in this section since the impacts analysis determined no impacts would occur with implementation of the Proposed Action.

5.3 Past, Present, and Reasonably Foreseeable Actions

This section will focus on past, present, and reasonably foreseeable future projects at and near the training locations within the study area. In determining which projects to include in the cumulative impacts analysis, a preliminary determination was made regarding the past, present, or reasonably foreseeable action. Specifically, using the first fundamental question included in Section 5.1 (Definition of Cumulative Impacts), it was determined if a relationship exists such that the affected resource areas of the Proposed Action (included in this EA) might interact with the affected resource area of a past, present, or reasonably foreseeable action. If no such potential relationship exists, the project was not carried forward into the cumulative impacts analysis. In accordance with CEQ guidance, these actions considered but excluded from further cumulative effects analysis are not catalogued here as the intent is to focus the analysis on the meaningful actions relevant to inform decision-making. The actions carried forward for cumulative effects analyses were reviewed to determine, where available, the identified impacts on each resource area. Past, present, and reasonably foreseeable actions included in this cumulative impacts analysis are listed and briefly described in Table 5-1. In addition, study area regional programs, activities, and trends may interact with the affected resource areas of the Proposed Action; these programs and trends are briefly described in Table 5-2.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Cumulative Impacts

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Action Description*
Past, present, and foreseeable	U.S. Navy	Region	Atlantic Fleet Training and Testing	The action includes Navy at-sea training and testing activities such as anti-surface warfare, anti-submarine warfare, electronic warfare, mine warfare training and testing (mine countermeasures and neutralization) and may include the use of active sonar and explosives. The study area for the training and testing has primarily been within existing range complexes and testing ranges in the Atlantic Ocean off the east coast of the U.S., in the Gulf of Mexico, and in portions of the Caribbean Sea. As an ongoing activity that is in the process of being updated, the study area has been expanded to include inland water-based training areas, such as the lower Chesapeake Bay as well as the York and James Rivers.
Past, present, and foreseeable	U.S. Navy	Region	In-Water Pile Driving Activities at Navy Installations in Hampton Roads, Virginia	The action includes in-water pile driving activities at Navy installations. Pile-driving and pile-extraction activities occur on an ongoing basis as part of necessary repair/maintenance as well as new construction of piers, wharfs, mooring dolphins, bulkheads, cofferdams, and other structures dependent on the use of piles driven or extracted from waterways adjacent to and surrounding the installations. These activities would occur at Naval Station Norfolk, Craney Island Fuel Deport, Naval Support Activity Hampton Roads (Lafayette River Annex), Lamberts Point Deperming Station, Norfolk Magnetic Silencing Facility, Naval Medical Center Portsmouth, Norfolk Naval Shipyard (St. Juliens Creek Annex and St. Helena Annex), JEB Little Creek – Fort Story, Naval Air Station Oceana (Owls' Creek Annex), NWS Yorktown, Cheatham Annex, and Yorktown Fuel Depot.
Past, present, and foreseeable	DoD	Region	Rotary and Fixed-wing Aircraft Training	The action includes DoD and Homeland Security rotary and fixed-wing aircraft training in Hampton Roads. The training includes, but is not limited to, operations such as search and rescue with swimmers in the water and parachute operations. Fixed-wing aircraft landings occur at NALF Fentress; however, rotary-wing aircraft utilize landing zones at JEB Little Creek, JEB Fort Story, NALF Fentress, and NWS Yorktown. In addition military training routes are utilized by aircraft throughout the region.
Past, present, and foreseeable	DoD	JEB Little Creek – Fort Story and Dam Neck Annex	Marine Corps Forces Reserve Amphibious Assault Vehicle Training Exercises and Reserve Center	The action would relocate the Amphibious Assault Vehicle Company A, 4th Assault Amphibian Battalion from JEB Little Creek – Fort Story to Dam Neck Annex. The action includes construction of a Reserve Training Center Complex at Dam Neck Annex and associated amphibious assault vehicle in-water training. Dam Neck Annex North Beach would be used for amphibious assault vehicle training.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Cumulative Impacts [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Action Description*
Past, present, and foreseeable	U.S. Navy	JEB Little Creek –Fort Story	Joint Logistics Over-the-Shore Training at JEB Little Creek – Fort Story	The action is to conduct joint logistics over-the-shore training and associated unit-level field training events. The action occurs at two locations, JEB Little Creek-Fort Story and Marine Corps Base Camp Lejeune, North Carolina and includes events with the Navy, U.S. Marine Corps, and U.S. Army. The exercises involve the movement of cargo from ship-to-shore, the construction of temporary piers, the transfer of liquids to shore, and the establishment of tent encampments. These training exercises are conducted on the beaches and near-shore areas of JEB Little Creek-Fort Story.
Past, present, and foreseeable	DoD	JEB Little Creek	Military activities	As a major operating station for amphibious forces of the Navy, LCACs depart and return to JEB Little Creek as part of amphibious craft operations in the region. In addition, non-USFF units utilize the installation training areas for a variety of activities such as their use of the EOD Demolition pit on Normandy Beach; the maximum net explosive weight is 1.4 pounds. These same units also conduct training using pyrotechnics, smokes, and flash bangs along the beach/dune training areas. Military activities also include small arms range operations, rotary aircraft operations along with personnel, vehicle, and vessel movement.
Past, present, and foreseeable	U.S. Navy	JEB Little Creek	Establishment of a Permanent Homeport for the Riverine Squadron Training under the Navy Expeditionary Command	The action established a permanent homeport for the Riverine Force by relocating personnel, using and modifying existing facilities and using training areas on and off base. Several homeporting locations were considered including NWS Yorktown and JEB Little Creek. JEB Little Creek was selected for the action.
Past, present, and foreseeable	U.S. Navy	JEB Fort Story	Small Arms Testing and Evaluation Compound, U.S. Army Transportation Center	The project included construction and operation of a Small Arms Testing and Evaluation Compound. The facility supports testing and evaluation of weapons tactics and breaching systems in a simulated realistic urban combat environment. The facility includes a variety of multifunctional structures designed to look like an urban village. Insertion and extraction training includes the use of helicopters, vehicles, swimming ashore, and patrol to a training objective. Training ammunition analyzed in the EA included small arms, diversionary devices, and explosive charges (1- to 2-pound net explosive weight). A Finding of No Significant Impact was signed in 2006 for implementing the Proposed Action, which included the detonation of 1-pound explosive charges at the Small Arms Testing and Evaluation Compound.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Cumulative Impacts [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Action Description*
Past	U.S. Navy	JEB Fort Story	Tactical Vehicle Course Upgrades at JEB Little Creek- Fort Story	The project upgraded the tactical vehicle course within the Small Arms Testing and Evaluation Compound. Proposed Action includes the application of geotextile fabric to separate the existing sub-grade from the new aggregate base; the improved roads will support a maximum vehicle weight of 30,000 pounds.
Past, present, and foreseeable	DoD	JEB Fort Story	Military Activities	JEB Fort Story primarily provides joint service support (Navy and Army logistical training), including amphibious operations as well as explosive ordnance demolitions and special operations training. Military activities also include rotary aircraft operations along with personnel, vehicle, and vessel movement.
Past, present, and foreseeable	U.S. Navy	Dam Neck Annex	Repairs to the Shoreline Protection System at Dam Neck Annex	The project implemented a shoreline protection system to restore the level of protection from coastal flooding, currents, and wave action provided by the system when it was first constructed in 1996. The project was implemented between 2013 and 2016 and will recur every 3 to 10 years.
Past, present, and foreseeable	DoD	Dam Neck Annex	Military Activities	As a satellite installation of Naval Air Station Oceana, Dam Neck Annex supports military activities such as amphibious operations along with personnel, vehicle, and vessel movement. In addition, weapons firing with blank and non-lethal training ammunition is conducted within the installation boundary.
Present and foreseeable	State of Virginia	Camp Pendleton	Base improvement projects	Future projects that may be implemented if funding is available include stormwater drainage line improvements, construction of stormwater retention ponds, construction of a new learning center complex, construction of partial cover over the existing rifle range, and construction of a new hotel.
Past, present, and foreseeable	Community	NALF Fentress	Community Use of Installation	Scouts, church leagues, model rocket clubs, remote-control aircraft clubs, and home-school organizations use land for recreational activities. Local law enforcement agencies use the taxiways for vehicle training. They coordinate their operations with NALF Fentress to avoid conflicts.
Past	U.S. Navy	NALF Fentress	Implementation of an Airfield Obstructions Management Plan	The action implemented an Airfield Obstructions Management Plan designed to eliminate vegetative height obstructions and reduce safety risks to aircraft operations.
Past, present, and foreseeable	DoD	NALF Fentress	Military activities	As an auxiliary landing field for Naval Air Station Oceana and Naval Station Norfolk, fixed-wing aircraft use the airfield for operations such as field carrier landing practice and rotary aircraft use the airfield for various tactics and maneuver

Table 5-1. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Cumulative Impacts [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Action Description*
				training. In addition, Navy commands use the end of runways for Forward Arming and Refueling Point (approximately twice/year) and rescue training (blank rounds only up to 7.62 mm, 200 rounds 5.56 mm from helicopter, 200 rounds 7.62 mm and 600 rounds 5.56 mm from ground hover hoist, gun maneuvers). Weapons training is also conducted in designated areas along the western portion of the installation. Also, the U.S. Marine Corps conducts convoy training along the paved areas.
Past, present, and foreseeable	DoD	Northwest Annex	Military activities	The U.S. Marine Corps Small Arms Range is used by Navy and Marine Corps Commands for small, medium, and large caliber live-fire training. In addition, Northwest Annex supports military activities such as personnel and vehicle movement.
Past, present, and foreseeable	DoD	St. Juliens Creek Annex	Military activities	The Navy's Farrier Fire Fighting School Training Center is outside the gate for St. Juliens Creek Annex and used by the Navy as well as local fire fighters for various fire and emergency response training. The training areas within St. Juliens Creek Annex are used for tactical maneuvers in an urban environment training as well as simulated/carrier and battleship training.
Past, present, and foreseeable	Community	St. Juliens Creek Annex	Local law enforcement training	Local law enforcement uses the training areas within St. Juliens Creek Annex for tactical maneuvers in an urban environment training.
Present and foreseeable	Federal Highway Administration and Virginia Department of Transportation	NWS Yorktown and Cheatham Annex	Interstate 64 Peninsula Study	The project includes roadway improvements to Interstate 64 from approximately Exit 247 to Exit 242 (approximately 7 miles). The project is part of a larger roadway improvement effort with each section implemented in phases. The Interstate 64 section runs adjacent to NWS Yorktown. The widening began in winter 2016 and is proposed to end in 2019.
Past	U.S. Navy	NWS Yorktown	Small Arms Training Facility in the NWS Yorktown Area	The project includes construction of a Small Arms Range Training Facility in close proximity to 2nd Fleet Anti-terrorism Security Team Company Headquarters.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Cumulative Impacts [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Action Description*
Past, present and foreseeable	DoD	NWS Yorktown	Military activities	The Navy and U.S. Marine Corps conduct helicopter training at the landing zones within NWS Yorktown. In addition, the U.S. Marine Corps and U.S. Air Force conduct training in the Home Station Training Lanes. U.S. Marine Corps and U.S. Air Force training at the Home Station Training Lanes are similar to the ongoing USFF training operations (i.e., vehicle use and weapons use). The U.S. Marine Corps Fleet Antiterrorism Security Team conducts training in Training Area A. The training primarily consists of tactical maneuvering by personnel. In addition, the Navy conducts outdoor air-soft weapons training occurs at Training Area A and the Home Station Training Lanes and conducts live-fire weapons training within the small arms ranges. Additional military activities include rotary aircraft operations, including landing at designated landing zones and vessel movement along the shorelines.
Past, present, and foreseeable	Community	NWS Yorktown	Law Enforcement training	Special Weapons and Tactics are conducted in Training Area A by local law enforcement agencies.
Past, present, and foreseeable	DoD	NWS Yorktown	Construction and Operation of a Small Arms Range Facility	The Proposed Action would locate an accessible, multipurpose small arms range facility a short distance from the Marine Corps Security Force Regiment. Construction of the facility would result in approximately 26 acres of land disturbance (for both the pistol range and rifle range), and approximately 5 acres of land disturbance from the proposed transportation and utility system upgrades. The rifle range would be equipped with both fixed targets and a movable-target system (i.e., running man); the pistol range would include fixed target mounts.
Past, present, and foreseeable	DoD	NWS Yorktown	Marine Corps Security Force Regiment Consolidation	Consolidate four Marine Corps Security Force companies - 1,000 to 1,200 Marines with half deployed, combination of new construction and renovations of 412,000 SF and 480,000 SF of site improvements. NWS Yorktown was selected for the consolidation and relocation of Marine Corps Security Force Regiment personnel. This project is a multi-phased effort.
Past, present, and foreseeable	DoD	Cheatham Annex	Military activities	Military activities include small arms range operations along with personnel, vehicle, and vessel movement.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Cumulative Impacts [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Action Description*
Past, present, and foreseeable	VADCR	First Landing State Park	First Landing State Park Master Plan	The First Landing State Park Master Plan undergoes review every 5 years with scheduled updates every 10 years. The plan identifies improvements such as appropriate night lighting, boardwalks, trail maintenance, internal road network improvements, and fencing (VADCR, 2010).

Key: DoD = Department of Defense; EA = Environmental Assessment; EOD = Explosive Ordnance Disposal; JEB = Joint Expeditionary Base; LCAC = Landing Craft, Air Cushion; NALF = Naval Auxiliary Landing Field; NWS = Naval Weapons Station; SF = square feet; USFF = United States Fleet Forces; VADCR = Virginia Department of Conservation and Recreation.

Table 5-2. Regional Programs, Activities, and Trends

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Action Description*
Past, present, and foreseeable	Community	Region	Recreational boating in Hampton Roads	The number of registered recreational boats in Virginia decreased between 2007 and 2013 from approximately 251,000 to approximately 237,000 (Virginia Institute of Marine Science, 2014b).
Past, present, and foreseeable	Community	Region	Commercial boating in Hampton Roads	The Chesapeake Bay has important transportation routes for commercial vessels, with access to maritime traffic from north and south locations in the Atlantic Ocean and two of the east coast's most important commercial ports, Baltimore, Maryland, and the Port of Virginia. The Port of Virginia is ranked third in the U.S. for total exports by weight, and is made up of four cargo terminals: the Norfolk International Terminals (Elizabeth River), the marine ports of Portsmouth (Elizabeth River) and Newport News (James River), and the Virginia Inland Port at Front Royal. Vessels of every size and type use the port including the largest coal colliers and aircraft carriers to small commercial fishing boats and pleasure craft (USACE, 2000). In 2016, the Virginia Port Authority logged 1,919 ship calls that involved loading/ unloading of cargo at the Port of Virginia (Port of Virginia, 2017).
Past, present, and foreseeable	USFWS	Region	Back Bay National Wildlife Refuge Comprehensive Conservation Plan	The Back Bay National Wildlife Refuge is south of Dam Neck Annex and is managed by the U.S. Fish and Wildlife Service. The 2010 Plan provides long-term guidance (15 years) so that the refuge serves as a breeding ground and sanctuary for migratory birds and conserves and protects other wildlife including threatened and endangered species and wetlands (USFWS, 2010). The plan also includes guidance for the recovery of loggerhead and green sea turtles in the region.
Past, present, and foreseeable	Community	Region	Chesapeake Bay Preservation Area	The City of Chesapeake (Chesapeake Bay Preservation Area Board) provides guidelines for development within the Chesapeake Bay Preservation Area in compliance with the Chesapeake Bay Preservation Act. The guidelines are designed to improve water quality in the Chesapeake Bay and other waters by requiring use of effective land management and land use planning.
Past, present, and foreseeable	DoD	Region	DoD Chesapeake Bay Program	The DoD Chesapeake Bay Program is jointly managed by Commander, Navy Region Mid-Atlantic within the Regional Environmental Coordination office and led by the Deputy Assistant Secretary of the Navy for Environment. The

Table 5-2. Regional Programs, Activities, and Trends [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Action Description*
				Chesapeake Bay Program is a unique partnership that has been directing and conducting the restoration of the Chesapeake Bay through the Chesapeake Bay Agreement. DoD, USEPA, other federal agencies and the states, as well as the District of Columbia, with jurisdiction in the Chesapeake Bay watershed have partnered to restore the Chesapeake Bay and its tidal tributaries by 2025 through implementing pollution control measures that comply with the Chesapeake Bay TMDL. For instance, within the study area, NWS Yorktown maintains an active Readiness Environmental Protection Integration partnership (as part of the DoD Chesapeake Bay Program Workplan) to combat incompatible land uses, conserve landscapes, and protect mission readiness. DoD has promoted and hosted many volunteer-based events on military installations and in 2016, 67 percent of DoD installations in the Chesapeake Bay watershed reported participation in a volunteer program (DoD, 2016a).
Past, present, and foreseeable	DoD	Region	Oyster Reef Restoration Program	The USACE, Norfolk District Reef Restoration Program has a goal to restore oyster habitat and population in 20 tributaries of the Chesapeake Bay, including the Elizabeth River, by 2025. To achieve this goal, three initiatives have been implemented: (1) construct projects designed to establish sustainable breeding populations of native oysters in sanctuaries in Virginia; (2) create the Chesapeake Bay Oyster Recovery: Native Oyster Restoration Master Plan, Maryland and Virginia (2012); and (3) prepare a programmatic EIS for Oyster Restoration in the Chesapeake Bay (2009). The Master Plan did not identify specific projects but include a priority for the restoration efforts; the Elizabeth River was identified as a high priority region. The Record of Decision associated with the EIS, identified enhanced native oyster restoration efforts, doubling the oyster habitat over 10 years, no non-native oyster use, and a moratorium and expansion of native oyster aquaculture. (USACE, 2017).
Past, present, and foreseeable	Community	Elizabeth River	Elizabeth River Project	This action is a community effort to restore the Elizabeth River to the highest practical level of environmental quality. Past efforts included the Money Point Cleanup (located near St. Juliens Creek Annex) where 7 acres, including wetlands and forested shore, were restored and 12 acres of contaminated

Table 5-2. Regional Programs, Activities, and Trends [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Action Description*
				sediments were dredged (up to 6 feet depth). The Living River Restoration Trust provides incentives for participation in local conservation efforts, including cleanup of contaminated river bottoms. The 2016 Watershed Action Plan identifies goals for 2020 and 2025 such as increasing vegetated wetlands, creation or restoration of tidal and non-tidal wetlands, establishing contiguous wildlife habitat along a connected corridor, vegetated shoreline, or water trails, and increased native plant gardens on properties adjacent to the Elizabeth River (Elizabeth River Project, 2016).
Foreseeable	DoD/ Community	Elizabeth River	Elizabeth River and Southern Branch Navigation Improvements	The U.S. Army Corps of Engineers and the Virginia Port Authority are planning an Elizabeth River and Southern Branch Navigation Improvements General Reevaluation Study. As part of this effort, an EA will be prepared to evaluate the potential environmental impacts associated with the navigation improvements. The anticipated improvements include dredging the Southern Branch of the Elizabeth River.
Past, present, and foreseeable	Community	Elizabeth River	Virginia Outdoors Foundation Easement	The Virginia Outdoors Foundation maintains more than 800,000 acres of conservation land. Included in their managed land is the area along the Elizabeth River that is adjacent to the USFF blank-fire training location. The Virginia Outdoors Foundation manages this space by preserving it as undeveloped land.
Foreseeable	Federal Energy Regulatory Commission	Elizabeth River	Atlantic Coast Pipeline and Supply Header Project	The project would entail construction and operation of natural gas pipelines to areas in Virginia and North Carolina. In the Southern Branch of the Elizabeth River, the pipeline would be installed under the river using horizontal directional drilling.

Key: DoD = Department of Defense; EA = Environmental Assessment; EIS = Environmental Impact Statement; NWS = Naval Weapons Station; TMDL = total maximum daily limit; USACE = U.S. Army Corps of Engineers; USEPA = U.S. Environmental Protection Agency; USFF = United States Fleet Forces; USFWS = U.S. Fish and Wildlife Service

5.4 Cumulative Impact Analysis

For this analysis, quantifiable data was only available for past and ongoing activities that either already contributes to the existing environment or was short-term in duration; therefore, for the resources included for analysis, a qualitative analysis was undertaken or quantifiable data was provided to demonstrate a trend in the resource condition. In addition, where an analysis of potential environmental effects for future actions has not been completed, assumptions were made regarding cumulative impacts related to this EA where possible. The analytical methodology presented in Chapter 4 (Environmental Consequences), which was used to determine potential impacts to the various resources analyzed in this document, was also used to determine cumulative impacts. Specifically, significance requires considerations of both context and intensity.

5.4.1 Air Quality

5.4.1.1 Description of Geographic Study Area

The region of influence for cumulative impact analysis includes the Hampton Roads Intrastate Air Quality Control Region. Aircraft, vessels, vehicles, ordnance, and munitions associated with training activities contribute to pollutant emissions in the region.

5.4.1.2 Relevant Past, Present, and Future Actions

Past, present, or reasonably foreseeable actions that might interact with the affected air quality region of the Proposed Action are identified in Table 5-3.

Table 5-3. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Air Quality Cumulative Impacts

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	U.S. Navy	Region	Atlantic Fleet Training and Testing	o
Past, present, and foreseeable	U.S. Navy	Region	In-Water Pile Driving Activities at Navy Installations in Hampton Roads, Virginia	x
Past, present, and foreseeable	DoD	Region	Rotary and Fixed-wing Aircraft Training	x
Past, Present, and Foreseeable	DoD	JEB Little Creek – Fort Story and Dam Neck Annex	Marine Corps Forces Reserve Amphibious Assault Vehicle Training Exercises and Reserve Center	x
Past, present, and foreseeable	U.S. Navy	JEB Little Creek-Fort Story	Joint Logistics Over-the-Shore Training at JEB Base Little Creek – Fort Story	o
Past, present, and foreseeable	DoD	JEB Little Creek	Military activities	o
Past, present, and foreseeable	U.S. Navy	JEB Little Creek	Establishment of a Permanent Homeport for the Riverine Squadron Training under the Navy Expeditionary Command	o

Table 5-3. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Air Quality Cumulative Impacts [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	U.S. Navy	JEB Fort Story	Small Arms Testing and Evaluation Compound, U.S. Army Transportation Center	o
Past	U.S. Navy	JEB Fort Story	Tactical Vehicle Course Upgrades at JEB Little Creek- Fort Story	o
Past, present, and foreseeable	DoD	JEB Fort Story	Military activities	o
Past, present, and foreseeable	U.S. Navy	Dam Neck Annex	Repairs to the Shoreline Protection System at Dam Neck Annex	o
Past, present, and foreseeable	DoD	Dam Neck Annex	Military activities	o
Present and foreseeable	DoD	Camp Pendleton	Base improvement projects	x
Past, present, and foreseeable	Community	NALF Fentress	Community Use of Installation	x
Past	U.S. Navy	NALF Fentress	Implementation of an Airfield Obstructions Management Plan	o
Past, present, and foreseeable	DoD	NALF Fentress	Military activities	o
Past, present, and foreseeable	DoD	Northwest Annex	Military activities	o
Past, present, and foreseeable	DoD	St. Juliens Creek Annex	Military activities	o
Past, present, and foreseeable	Community	St. Juliens Creek Annex	Local law enforcement training	o
Present and foreseeable	Federal Highway Administration and Virginia Department of Transportation	NWS Yorktown and Cheatham Annex	Interstate 64 Peninsula Study	m
Past	U.S. Navy	NWS Yorktown	Small Arms Training Facility in the NWS Yorktown Area	o
Past, present and Foreseeable	DoD	NWS Yorktown	Military activities	o
Present and foreseeable	Community	NWS Yorktown	Law Enforcement training	x
Past, present, and foreseeable	DoD	NWS Yorktown	Construction and Operation of a Small Arms Range Facility	o
Past, present, and foreseeable	DoD	NWS Yorktown	Marine Corps Security Force Regiment Consolidation	o
Past, present and Foreseeable	DoD	Cheatham Annex	Military activities	o
Past, present, and foreseeable	VADCR	First Landing State Park	First Landing State Park Master Plan	x

Table 5-3. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Air Quality Cumulative Impacts [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	Community	Region	Recreational boating in Hampton Roads	x
Past, present, and foreseeable	Community	Region	Commercial boating in Hampton Roads	x

Key: DoD = Department of Defense; JEB = Joint Expeditionary Base; NALF = Naval Auxiliary Landing Field; NWS = Naval Weapons Station; VADCR = Virginia Department of Conservation and Recreation.

5.4.1.3 Cumulative Impact Analysis

Air Quality

Potential impacts include localized and temporarily elevated pollutant concentrations associated with construction projects or periodic recurring actions such as in-water pile driving, improvement projects, and shoreline repairs. Air quality is affected by regional climate (wind, temperature, sunlight, etc.), topography, and other factors, so pollutants released by any one activity are generally quickly dispersed and/or undergo chemical changes resulting from sunlight, mixture with water moisture in the air, etc. As a result, pollutants are unlikely to accumulate in the environment, and recovery is likely to occur relatively quickly as emissions disperse. The air environment is dynamic and pollutants are constantly redistributed and/or degraded naturally. Therefore, actions that are short in duration do not cumulatively impact air quality as they are short-term in duration with air emissions only occurring for the duration of the action.

Ongoing activities such as the Atlantic Fleet Training and Testing (AFTT), rotary aircraft training, small arms training, and commercial and recreational boating along with the Proposed Action contribute to the existing air quality in the region and are reflected in the National Emissions Inventory annually pollutant emissions. Table 5-4 reflects the most recent and two prior National Emissions Inventories for the counties/cities in the study area that includes the Proposed Action. The general trend is improvement in criteria pollutant emissions with the exception of particulate matter less than or equal to 10 microns in diameter and carbon dioxide equivalents.

Table 5-4. National Emissions Inventories for the Study Area

Year	*Annual Emissions (tons/year)*						
	Criteria Pollutants						*GHGs*
	CO	*NO_x*	*PM_{10}*	*$PM_{2.5}$*	*SO_2*	*VOCs*	*CO_2e*
ROI Total 2014	108,156	18,631	11,314	3,448	21,356	36,810	4,300,125
ROI Total 2011	102,955	24,900	9,584	3,553	33,213	38,874	3,435,910
ROI Total 2008	163,019	32,214	8,388	3,578	43,342	44,149	4,165,751

Source: (USEPA, 2016b; 2011; 2008)

Key: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; GHG = greenhouse gases; NO_x = nitrogen oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; SO_2 = sulfur dioxide; ROI = region of influence; VOC = volatile organic compound.

The impacts of the No Action Alternative have been ongoing for decades and along with present activities are part of the existing, monitored air quality environment in the region, which is classified as being in attainment. The recurring No Action Alternative highest criteria pollutant emissions are nitrogen oxides and carbon monoxide at 2.47 and 3.40 percent of the regional air emissions, respectively; the Preferred Alternative would result in a less than 0.2 percent increase in any criteria pollutant over the existing emissions. In addition, while the regional trends identified in Table 5-4 note increases in particulate matter less than or equal to 10 microns in diameter and carbon dioxide equivalents, the Proposed Action represents less than 0.6 percent of the regional emissions for those pollutants. When combined with ongoing and future actions, the overall trend in improved air quality in the region would be anticipated as reflected in Table 5-4.

Because pollutant-emitting activities are distributed over a large geographic region and over time, it is unlikely that the Proposed Action along with past, present, or future actions would accumulate in such a way that federal- or state-regulated levels would be exceeded. Additionally, the Proposed Action and many of the other past, present, and foreseeable actions involve mobile sources. While mobile source emissions are analyzed on an annual basis typically, mobile sources are short in duration (i.e., a vessel or vehicle does not operate continuously in the same way a newly constructed power plant might operate), so while a vessel may operate nearly continuously for a week, in the following weeks the vessel may be at port not producing any emissions, and during that time the pollutants emitted from prior operation undergo redistribution and chemical breakdown. Further, prevailing winds along the Atlantic coast generally trend west to east, increasing the likelihood that onshore and nearshore emissions would be dispersed offshore and away from the population. Likewise, activities contributing offshore emissions, such as many of the AFTT activities, would be unlikely to impact air quality control regions onshore. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects, would not result in significant cumulative impacts to air quality within the region of influence.

5.4.2 Water Resources

5.4.2.1 Description of Geographic Study Area

The region of influence for water resources includes tidal waters from the Offshore Virginia Coast and the Lower Chesapeake Bay along with installation surface waters that may receive stormwater runoff as well as the Atlantic Intracoastal Waterway, and wetlands present on the land-based training areas evaluated in the EA. Training areas within the region of influence are located primarily in densely developed urbanized areas with substantial land development, shoreline facilities, and vessel traffic.

5.4.2.2 Relevant Past, Present, and Future Actions

Past, present, or reasonably foreseeable actions that might interact with the affected water resources of the Proposed Action are identified in Table 5-5.

Table 5-5. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Water Resources Cumulative Impacts

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	U.S. Navy	Region	Atlantic Fleet Training and Testing	o
Past, present, and foreseeable	U.S. Navy	Region	In-Water Pile Driving Activities at Navy Installations in Hampton Roads, Virginia	x
Past, present, and foreseeable	DoD	JEB Little Creek – Fort Story and Dam Neck Annex	Marine Corps Forces Reserve Amphibious Assault Vehicle Training Exercises and Reserve Center	o
Past, present, and foreseeable	U.S. Navy	JEB Little Creek-Fort Story	Joint Logistics Over-the-Shore Training at JEB Little Creek – Fort Story	o
Past, present, and foreseeable	DoD	JEB Little Creek	Military activities	o
Past, present, and foreseeable	U.S. Navy	JEB Little Creek	Establishment of a Permanent Homeport for the Riverine Squadron Training under the Navy Expeditionary Command	o
Past, present, and foreseeable	U.S. Navy	JEB Fort Story	Small Arms Testing and Evaluation Compound, U.S. Army Transportation Center	o
Past	U.S. Navy	JEB Fort Story	Tactical Vehicle Course Upgrades at JEB Little Creek- Fort Story	o
Past, present, and foreseeable	DoD	JEB Fort Story	Military activities	o
Past, present, and foreseeable	U.S. Navy	Dam Neck Annex	Repairs to the Shoreline Protection System at Dam Neck Annex	o
Past, present, and foreseeable	DoD	Dam Neck Annex	Military activities	o
Present and foreseeable	DoD	Camp Pendleton	Base improvement projects	x
Past	U.S. Navy	NALF Fentress	Implementation of an Airfield Obstructions Management Plan	o
Past, present, and foreseeable	DoD	NALF Fentress	Military activities	o
Present and foreseeable	Federal Highway Administration and Virginia Department of Transportation	NWS Yorktown and Cheatham Annex	Interstate 64 Peninsula Study	m
Past	U.S. Navy	NWS Yorktown	Small Arms Training Facility in the NWS Yorktown Area	m

Table 5-5. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Water Resources Cumulative Impacts [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	DoD	NWS Yorktown	Construction and Operation of a Small Arms Range Facility	m
Foreseeable	DoD	NWS Yorktown	Marine Corps Security Force Regiment Consolidation	o
Past, present and Foreseeable	DoD	NWS Yorktown	Military activities	o
Past, present and Foreseeable	DoD	Cheatham Annex	Military activities	o
Past, present, and foreseeable	Community	Region	Recreational boating in Hampton Roads	x
Past, present, and foreseeable	Community	Region	Commercial boating in Hampton Roads	x
Past, present, and foreseeable	USFWS	Region	Back Bay National Wildlife Refuge Comprehensive Conservation Plan	+
Past, present, and foreseeable	Community	Region	Chesapeake Bay Preservation Area	+
Past, present, and foreseeable	DoD	Region	DoD Chesapeake Bay Program	+
Past, present, and foreseeable	DoD	Region	Oyster Reef Restoration Program	+
Past, present, and foreseeable	Community	Elizabeth River	Elizabeth River Project	+
Foreseeable	DoD/ Community	Elizabeth River	Elizabeth River and Southern Branch Navigation Improvements	x
Past, present, and foreseeable	Community	Elizabeth River	Virginia Outdoors Foundation easement	x
Foreseeable	Federal Energy Regulatory Commission	Elizabeth River	Atlantic Coast Pipeline and Supply Header Project	o

Key: DoD = Department of Defense; JEB = Joint Expeditionary Base; NALF = Naval Auxiliary Landing Field; NWS = Naval Weapons Station.

5.4.2.3 Cumulative Impact Analysis

Past uncontrolled land use and industrial activities have resulted in impacts to water resources including loss of wetlands and impacts to water quality from uncontrolled stormwater runoff and industrial pollution. Past, present and future actions to address point source and non-point source pollution to the waters within the region of influence have had, and will continue to have, substantial effects on improving water quality. This is accomplished through Virginia Pollutant Discharge Elimination System permits, Storm Water Pollution Prevention Plans (SWPPP), and regional water quality assessments (the

303(b) list) and development and implementation of TDMLs. Water quality affects sediment quality; site-specific remediation projects have had, and will continue to have, substantial effects on improving sediment quality. Improvements in water quality management will reduce the potential for degraded sediment quality conditions to develop in new areas in the future. Increased urbanization, shoreline development, and water-based traffic will increase existing threats to water and sediment quality in the region of influence. However, this will be occurring superimposed on the increased regulatory scrutiny involved with assessing and monitoring regional waters for Virginia Pollutant Discharge Elimination System permits and TMDLs, as well as increased use and refinement of best management practices (BMPs) to prevent pollution from various sources. In addition to these general cumulative impacts, projects identified in Table 5-5 contribute impacts to regional water resources and location-specific water resources, as discussed in more detail below.

Region (All Study Area Installations and Training Areas)

The AFTT, the in-water pile driving activities, and recreational and commercial boating all include vessel activities in the lower Chesapeake Bay and its tributaries. These activities may disturb sediments and temporarily increase turbidity; however, in general, sediments in these waters are primarily composed of sand that quickly resettles and the majority of vessel movement occurs in open water and/or designated vessel channels versus shallow water where sediments are likely to be disturbed. Shoreline disturbance from vessel wake may occur; however, the shorelines of training locations are actively managed by the Navy to maintain operational conditions that support training activities.

Regional programs such as the Chesapeake Bay Program, Virginia's Chesapeake Bay Preservation Act's area designation program, and Elizabeth River Project have established guidance and goals for improving water quality in the region. The most recent scorecard for the water quality in the Elizabeth River indicates improved overall health for all three branches of the river with the Southern Branch showing the most improving trends (Elizabeth River Steering Committee, 2014). This trend is anticipated to continue with community support and involvement with cleanup efforts along with local guidance/restrictions on development along shorelines and minimization of surface water runoff/discharges. In addition, the efforts by DoD directly contribute to providing Chesapeake Bay jurisdictions, including Virginia, with a robust accounting of DoD progress toward Chesapeake Bay TMDL implementation; over 92 percent of BMPs submitted by DoD installations are anticipated to receive credit for improving water quality (DoD, 2016a).

JEB Little Creek-Fort Story

Because the Joint Logistics Over-the-Shore training occurs at both of the non-contiguous sites of Joint Expeditionary Base (JEB) Little Creek—Fort Story, impacts are included under the joint base heading versus duplicating the discussion under the separate location headings. The Joint Logistics Over-the-Shore training at JEB Little Creek – Fort Story includes activities that may disturb sediments and beach/dune soils as well as the shoreline; however, the EA analysis for this project determined that no significant impacts would occur. The activities would be short in duration and, therefore, significant cumulative impacts to water resources would not occur.

JEB Little Creek

Navy activities on JEB Little Creek beach/dune training areas, such as Explosive Ordnance Disposal (EOD) training, includes activities that generate potential pollutants; however, explosive detonations are completed within a bermed area that captures debris and, as a result, this activity does not impact

water resources. Navy training includes vessel activities that may disturb sediments and increase turbidity in the lower Chesapeake Bay and its tributaries adjacent to JEB Little Creek. Because the sediments are primarily composed of sand that quickly resettles, these projects would not result in significant cumulative impacts to water resources when combined with the Proposed Action.

JEB Fort Story

The Small Arms Testing and Evaluation Compound and Tactical Vehicle Course Upgrades both included construction projects. Compliance with the Virginia Pollutant Discharge Elimination System permit and SWPPP resulted in no significant impacts to water resources. Military activities may periodically result in soil disturbance from personnel and/or vehicle movement; however, these activities are intermittent. In addition, these projects resulted in short-term soil disturbance in training areas and when combined with the Proposed Action would not result in significant cumulative impacts to water resources.

Dam Neck Annex and Camp Pendleton

Camp Pendleton infrastructure improvements would likely result in short-term soil disturbance; however, the project areas would not overlap with Proposed Action training areas. The repairs to the Shoreline Protection System at Dam Neck Annex resulted in positive impacts to the shoreline training area by stabilizing the beach/dune areas. In addition, the EA analysis for this project determined no significant impacts to water resources would occur. Military activities may periodically result in soil disturbance from personnel and/or vehicle movement; however, these activities are intermittent. The shoreline project along with ongoing management of the shoreline continues to address the cumulative impacts along the beach/dune areas at Dam Neck Annex and, therefore, no significant cumulative impacts to water resources would occur.

NALF Fentress

Military activities may periodically result in soil disturbance from personnel and/or vehicle movement; however, these activities are intermittent. The implementation of an Airfield Obstructions Management Plan included the determination that no significant impacts to water resources would occur. Part of the plan included the removal of trees on the installation; the removal of vegetation resulted in a temporary disturbance of soils. The disturbance was temporary and natural ground cover replaced the location of the removed trees; therefore, the erosion and runoff potential was not altered and no significant cumulative impacts to water resources occurred.

NWS Yorktown and Cheatham Annex

The Interstate 64 Peninsula Study identified the need for storm water management areas during and following the roadway upgrades along the boundaries of Naval Weapons Station (NWS) Yorktown and Cheatham Annex. The proposed construction project would result in ground disturbance outside the Navy installations; however, the establishment of storm water retention areas adjacent to the installation boundaries may change the overall flow of surface water in the area. The project design requirements would include management of all potential storm water flow and therefore, the cumulative impacts to water resources would not be significant.

NWS Yorktown

Small Arms Training Facility in the NWS Yorktown Area, Proposed Construction and Operation of a Small Arms Range Facility, Marine Corps Security Force Regiment Consolidation, and military activities all include disturbance of soils within NWS Yorktown. Requirements in the Virginia Pollutant Discharge Elimination System permit and SWPPP would be followed; however, the soil disturbance would create the need for storm water management during construction and updates to retention areas following the

completion of the construction projects. While the construction projects are short term, the modification of retention areas results in the need for updates to the storm water management system. All updates and management practices would be completed in compliance with existing permits and plans and, as a result, cumulative impacts to water resources would not occur because erosion and sedimentation effects would be temporary and localized as a result of implementation of standard construction site BMPs.

Cheatham Annex

Military activities may periodically result in soil disturbance from personnel and/or vehicle movement; however, these activities are intermittent. These activities result in short-term soil disturbance in training areas and when combined with the Proposed Action would not result in significant cumulative impacts to water resources.

Southern Branch of the Elizabeth River

The proposed pipeline project that would cross the Southern Branch of the Elizabeth River would be installed in accordance with construction and restoration plans, which outline common industry construction methods (Federal Energy Regulatory Commission, 2016). In addition, the horizontal drilling method planned for use would avoid direct impacts on water quality and a Horizontal Directional Drill Contingency Plan would be implemented at the Southern Branch of the Elizabeth River crossing to minimize and address issues (Federal Energy Regulatory Commission, 2016).

The heavily industrialized Southern Branch of the Elizabeth River is the most notoriously polluted section of the river; however, it is also where the Elizabeth River Project has organized its largest cleanup efforts (Elizabeth River Steering Committee, 2014). These efforts have resulted in improving trends for bacteria, bottom health (including contamination), and nitrogen but a declining trend for phosphorous. The ongoing efforts by the Elizabeth River Project are anticipated to continue the overall water and sediment quality and shoreline stabilization along the Southern Branch of the Elizabeth River. In addition, navigation improvements would remove sediments and increase water depth, thereby reducing the likelihood of sediment disturbance by vessel movement while also improving the water quality along the river by removing accumulated materials.

Summary

Cumulative water resources impacts from past, present, and future actions within the region of influence would be less than significant because of the following factors:

- Water quality impacts from increased pollutant discharges and from physical effects of erosion and sedimentation would not add appreciably to the levels analyzed in this EA.
- Shoreline protection actions help stabilize and protect shoreline resource areas for all the diverse functions that they provide, resulting in a benefit to water resources.
- Proposals for new training range areas and/or facilities such as piers will be subject to regulatory review to ensure adverse environmental impacts such as contamination of water resources are avoided and minimized to the maximum extent practicable. Training areas evaluated in this EA have had wetland fills and construction of structures in navigable waters in the past; these were either grandfathered activities (conducted prior to applicable regulations) or were authorized by the appropriate permits. No new areas of wetland fill and no new structures in navigable waters are proposed by the activities evaluated in this EA. Future proposals for wetlands impacts and new structures would receive the necessary permits.

Cumulative water resources impacts that would occur with implementation of the Proposed Action would include increases in potential pollutant discharges which would be managed through existing installation and facility Virginia Pollutant Discharge Elimination System permits and SWPPPs. There may be minor increases in sediment and shoreline disturbance from vessel use along the Southern Branch of the Elizabeth River but this would not contribute to shoreline erosion or altered sedimentation patterns. Resuspended sediments would tend to be composed of sand that would quickly settle and increases in water column turbidity would be short term.

Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects, would not result in significant cumulative impacts to water resources within the region of influence.

5.4.3 Biological Resources

5.4.3.1 Description of Geographic Study Area

The region of influence for biological resources includes the habitats within the multiple training locations of the Coastal Plain of Virginia, beach/dune areas within training locations along the Chesapeake Bay and Atlantic Ocean, non-beach/dune areas, and aquatic habitats in Jones Pond at Cheatham Annex and portions of the Southern Branch of the Elizabeth River.

5.4.3.2 Relevant Past, Present, and Future Actions

Past, present, or reasonably foreseeable actions that might interact with the affected biological resources of the Proposed Action are identified in Table 5-6. Past, present, and reasonably foreseeable military activities at Northwest Annex and St. Juliens Creek Annex are limited to personnel and vehicle movement on improved areas and, therefore, no cumulative impacts occur to biological resources.

Table 5-6. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Biological Resources Cumulative Impacts

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	U.S. Navy	Region	Atlantic Fleet Training and Testing	m
Past, present, and foreseeable	U.S. Navy	Region	In-Water Pile Driving Activities at Navy Installations in Hampton Roads, Virginia	x
Past, present, and foreseeable	DoD	Region	Rotary and Fixed-wing Aircraft Training	x
Past, present, and foreseeable	DoD	JEB Little Creek – Fort Story and Dam Neck Annex	Marine Corps Forces Reserve Amphibious Assault Vehicle Training Exercises and Reserve Center	x
Past, present, and foreseeable	U.S. Navy	JEB Little Creek-Fort Story	Joint Logistics Over-the-Shore Training at JEB Little Creek – Fort Story	m

Table 5-6. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Biological Resources Cumulative Impacts [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	DoD	JEB Little Creek	Military activities	o
Past, present, and foreseeable	U.S. Navy	JEB Fort Story	Small Arms Testing and Evaluation Compound, U.S. Army Transportation Center	o
Past	U.S. Navy	JEB Fort Story	Tactical Vehicle Course Upgrades at JEB Little Creek- Fort Story	o
Past, present, and foreseeable	DoD	JEB Fort Story	Military activities	o
Past, present, and foreseeable	U.S. Navy	Dam Neck Annex	Repairs to the Shoreline Protection System at Dam Neck Annex	m
Past, present, and foreseeable	DoD	Dam Neck Annex	Military activities	o
Present and foreseeable	DoD	Camp Pendleton	Base improvement projects	x
Past, present, and foreseeable	Community	NALF Fentress	Community Use of Installation	x
Past, present, and foreseeable	DoD	NALF Fentress	Military activities	o
Past	U.S. Navy	NWS Yorktown	Small Arms Training Facility in the NWS Yorktown Area	o
Past, present and foreseeable	DoD	NWS Yorktown	Military activities	o
Past, present, and foreseeable	Community	NWS Yorktown	Law Enforcement training	x
Past, present, and foreseeable	DoD	NWS Yorktown	Construction and Operation of a Small Arms Range Facility	o
Past, present, and foreseeable	DoD	NWS Yorktown	Marine Corps Security Force Regiment Consolidation	o
Past, present and foreseeable	DoD	Cheatham Annex	Military activities	o
Past, present, and foreseeable	VADCR	First Landing State Park	First Landing State Park Master Plan	x
Past, present, and foreseeable	Community	Region	Recreational boating in Hampton Roads	x
Past, present, and foreseeable	Community	Region	Commercial boating in Hampton Roads	x
Past, present, and foreseeable	USFWS	Region	Back Bay National Wildlife Refuge Comprehensive Conservation Plan	+

Table 5-6. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Biological Resources Cumulative Impacts [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	Community	Region	Chesapeake Bay Preservation Area	+
Past, present, and foreseeable	DoD	Region	Oyster Reef Restoration Program	+
Past, present, and foreseeable	Community	Elizabeth River	Elizabeth River Project	+
Foreseeable	DoD/ Community	Elizabeth River	Elizabeth River and Southern Branch Navigation Improvements	+
Past, present, and foreseeable	Community	Elizabeth River	Virginia Outdoors Foundation easement	+
Foreseeable	Federal Energy Regulatory Commission	Elizabeth River	Atlantic Coast Pipeline and Supply Header Project	o

Key: DoD = Department of Defense; JEB = Joint Expeditionary Base; NALF = Naval Auxiliary Landing Field; NWS = Naval Weapons Station; VADCR = Virginia Department of Conservation and Recreation.

5.4.3.3 Cumulative Impact Analysis

The overall health of most metropolitan areas and their various surrounding communities like the greater Hampton Roads area and the Coastal Plain of Virginia have declined due to human-encroachment into natural habitats. This has resulted in habitat loss, habitat fragmentation, habitat degradation, and the introduction of invasive species as some of the main threats to biological resources.

Region (All Study Area Installations and Training Areas)

Habitats and Vegetation

No regional activities or programs would overlap with the Proposed Action installation habitats and vegetation region of influence. Where certain other Service military training occurs at a variety of installations throughout the region, these other Service training activities are discussed within the individual installation cumulative impacts analysis. Regional activities within the Southern Branch of the Elizabeth River (e.g., oyster restoration efforts) would overlap with Proposed Action training events, but because these activities would only overlap in the Southern Branch of the Elizabeth River, they are discussed under that heading.

Mammals

Ongoing training activities which have resulted in increased human presence and airborne noise within the region of influence may cause displacement of some mammals. However, since the activities included in the No Action Alternative are already taking place, their impacts are currently factored into

existing conditions along with those of other actions cumulatively affecting mammals. In fact, biological surveys completed at several of the installations (Navy, 2010a; Navy, 2017c; Navy, 2017d; Navy, 2017e; Navy, 2017f) indicate an abundant coexistence of mammals with existing anthropogenic activities, suggesting that cumulative effects have not been significant.

The additional activities associated with the action alternatives would result in increased frequency of human presence and airborne noise within the region of influence; however, any impact to mammals is expected to generate only short-term and minimal impacts. Implementation of Integrated Natural Resources Management Plans (INRMPs) (Navy, 2010a; Navy, 2017c; Navy, 2017d; Navy, 2017e; Navy, 2017f) and other ecosystem based management tools would serve to integrate conservation, restoration, and enhancement strategies for mammals into the military mission, operation, and security requirements. No long-term permanent impacts on mammals are expected, either as a result of the Proposed Action or cumulatively when combined with other past, present, and reasonably foreseeable actions.

Invertebrates

Ongoing training activities which have resulted in increased human presence within the region of influence may cause displacement of some invertebrates. However, since the activities included in the No Action Alternative are already taking place, their impacts are currently factored into existing conditions along with those of other actions cumulatively affecting invertebrates. A wide variety of invertebrates are found on installations coexisting with existing anthropogenic activities, thus suggesting that cumulative effects have not been significant.

The additional activities associated with the Action Alternatives would result in increased frequency of human presence within the region of influence; however, any impact to invertebrates is expected to generate only short-term and minimal impacts. Implementation of INRMPs (Navy, 2010a; Navy, 2017c; Navy, 2017d; Navy, 2017e; Navy, 2017f) and other ecosystem based management tools would serve to integrate conservation, restoration, and enhancement strategies for invertebrates into the military mission, operation, and security requirements. No long-term permanent impacts on invertebrates are expected, either as a result of the Proposed Action or cumulatively when combined with other past, present, and reasonably foreseeable actions.

Reptiles and Amphibians

Ongoing training activities which have resulted in increased human presence within the region of influence may cause displacement of some reptiles and amphibians. However, since the activities included in the No Action Alternative are already taking place, their impacts are currently factored into existing conditions along with those of other actions cumulatively affecting reptiles and amphibians. A wide variety of reptiles and amphibians are found on installations coexisting with existing anthropogenic activities, thus suggesting that cumulative effects have not been significant.

The additional activities associated with the Action Alternatives would result in increased frequency of human presence within the region of influence; however, any impact to reptiles and amphibians is expected to generate only short-term and minimal impacts. Implementation of INRMPs (Navy, 2010a; Navy, 2017c; Navy, 2017d; Navy, 2017e; Navy, 2017f) and other ecosystem based management tools would serve to integrate conservation, restoration, and enhancement strategies for reptiles and amphibians into the military mission, operation, and security requirements. No long-term permanent

impacts on reptiles and amphibians are expected, either as a result of the Proposed Action or cumulatively when combined with other past, present, and reasonably foreseeable actions.

Birds

Ongoing training activities which have resulted in increased human presence within the region of influence may cause displacement of some birds. However, since the activities included in the No Action Alternative are already taking place, their impacts are currently factored into existing conditions along with those of other actions cumulatively affecting birds. A wide variety of birds are found on installations coexisting with existing anthropogenic activities, thus suggesting that cumulative effects have not been significant.

The additional activities associated with the Action Alternatives would result in increased frequency of human presence within the region of influence; however, any impact to birds is expected to generate only short-term and minimal impacts. Implementation of INRMPs (Navy, 2010a; Navy, 2017c; Navy, 2017d; Navy, 2017e; Navy, 2017f) and other ecosystem based management tools would serve to integrate conservation, restoration, and enhancement strategies for birds into the military mission, operation, and security requirements. No long-term permanent impacts on birds are expected, either as a result of the Proposed Action or cumulatively when combined with other past, present, and reasonably foreseeable actions.

Federally Protected Species and Critical Habitats

Federally protected species have been identified as occurring within the region of influence:

- Piping plover, red knot, and roseate tern have the potential to occur along shorelines of JEB Fort Story, JEB Little Creek, and Dam Neck Annex/Camp Pendleton; however, these species only migrate through the area. No nesting pairs of any one of the three bird species have been observed within the region of influence. It is likely that any individuals observed on-site would be rare occurrences and considered transient individuals. Rare transient individuals at these installations may be startled by noise and movements associated with other past, present and reasonably foreseeable projects such as Navy aircraft training flights, other military service beach vehicle use, and small arms range gunfire. Given the short term and intermittent nature of the Proposed Action training activities there would little additive effect, and therefore, no significant cumulative impacts would occur to listed shore bird species.
- Potential small whorled pogonia habitat is present at NWS Yorktown and Cheatham Annex; however, no individuals of this species have been identified on either installation to date. Signs and fencing to limit access to sensitive areas would be utilized so that training would avoid potential habitat areas. As a result, no impacts to this species would occur and therefore, no significant cumulative impacts would occur to small whorled pogonia.
- Northern long-eared bats have been confirmed as present on several installations and likely occur at other installations where suitable habitat is present but has not been surveyed. Protections afforded to the northern long-eared bat under the Endangered Species Act (ESA) 4(d) rule have to do primarily with restrictions on the removal of maternal roost trees and hibernation areas. No tree clearing is proposed for the Proposed Action. Northern long-eared bats at study area installations may be startled by noise associated with other past, present and reasonably foreseeable projects such as Navy aircraft training flights, and other military service training activities involving small arms gunfire, vehicle noise, and explosives. Given the short term and intermittent nature of the

Proposed Action training activities there would little additive effect, and therefore, no significant cumulative impacts would occur to Northern long-eared bats.

- Atlantic sturgeon and shortnose sturgeon have been documented in the lower Chesapeake Bay; however, neither sturgeon species has been documented in the Southern Branch of the Elizabeth River. Only the Atlantic sturgeon is possibly present in the Southern Branch of the Elizabeth River. Atlantic sturgeon in the Southern Branch of the Elizabeth River may be negatively impacted via strike or physical habitat disturbance by other past, present and reasonably foreseeable projects in and along that body of water such as recreational fishing, commercial shipping, private vessel transportation, water-dependent industrial activities, non-point source pollution, and the establishment of buried utility lines. Given the short term and intermittent nature of the Proposed Action training activities there would little additive effect, and therefore, no significant cumulative impacts would occur to Atlantic sturgeon.
- Atlantic bottlenose dolphin and West Indian manatee may be present within the Southern Branch of the Elizabeth River Proposed Action training area. As a result, potential cumulative impacts to these species are addressed under the Southern Branch of the Elizabeth River heading.
- Hauled-out harbor seals may be present on the Proposed Action beach/dune training areas of JEB Little Creek, JEB Fort Story, First Landing State Park, and Dam Neck Annex. Therefore, potential cumulative impacts to this species are addressed in the discussions for each of these locations.
- Nesting loggerhead, green, and Kemp's ridley sea turtles may be present on the Proposed Action beach/dune training areas of JEB Little Creek, JEB Fort Story, and Dam Neck Annex/Camp Pendleton. Therefore, potential cumulative impacts to these species are addressed in the discussions for each of these locations.

No cumulative impacts to critical habitats from past, present, and future actions would occur since no critical habitat for federally protected species have been identified within the region of influence.

The AFTT activities do not occur in the same training areas as the Proposed Action; however, species move throughout the region and therefore could be influenced by activities analyzed in both documents. In particular, marine mammals and sea turtles are expected to move throughout the AFTT study area as well as the VACAPES inland training study area. Hauled-out seals and nesting sea turtles may return to the water (AFTT study area) due to VACAPES inland training activities on the beach/dune training areas, while AFTT activities may result in marine mammals and sea turtles moving onto shore. However, these shifts would be temporary and would be consistent with typical movement between land and water habitats.

Department of Defense (DoD) aircraft training operations would primarily influence bird species; however, other wildlife may also move away from aircraft operations. The level of response depends on a number of factors, including the life-history characteristics of the species, characteristics of the aircraft and flight activities, habitat type, and the species' previous exposure to the noise source. Most noise events would be localized and occur for a relatively short period of time (minutes to hours).

JEB Little Creek-Fort Story

Because the Joint Logistics Over-the-Shore training occurs at both of the non-contiguous sites of JEB Little Creek—Fort Story, impacts are included under the joint base heading versus duplicating the discussion under the separate location headings.

Habitats and Vegetation

The Navy evaluated potential impacts to habitats and vegetation associated with the Joint Logistics Over-the-Shore training and determined no significant impacts would occur due to minimal presence of vegetation in the training areas. Due to the intermittent nature of this training combined with the Proposed Action training, no significant cumulative impacts would occur because aggregate impacts are expected to be short-term, localized, and temporary.

Mammals

The implementation of the Joint Logistics Over-the-Shore training could be expected to result in short-term minor impacts to local mammal populations lasting only the duration of the exercise. Navy training under the Proposed Action would introduce additional temporary, minor impacts to mammals but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to mammals at JEB Little Creek-Fort Story.

Invertebrates

The implementation of the Joint Logistics Over-the-Shore training could be expected to result in short-term minor impacts to local invertebrate populations lasting only the duration of the exercise. Navy training under the Proposed Action would introduce additional temporary, minor impacts to invertebrates but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to invertebrates at JEB Little Creek-Fort Story.

Reptiles and Amphibians

The implementation of the Joint Logistics Over-the-Shore training could be expected to result in short-term minor impacts to local reptiles and amphibian populations lasting only the duration of the exercise. Navy training under the Proposed Action would introduce additional temporary, minor impacts to reptiles and amphibians but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to reptiles and amphibians at JEB Little Creek-Fort Story.

Birds

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to birds on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of birds. Navy training under the Proposed Action would introduce additional temporary, minor impacts to birds but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to birds at JEB Little Creek.

Federally Protected Species and Critical Habitats

Joint Logistics Over-the-Shore training and Marine Corps Forces Reserve amphibious assault vehicle training exercises would impact hauled-out harbor seals as they may react to the presence or noise of people and vehicles by temporarily returning to the water. Because the species is likely to return to the

water when people or vehicles are present or approaching, this disturbance is unlikely to result in more than short-term interference with resting activities of seals. Given the duration of Joint Logistics Over-the-Shore training of up to 60 days, and when combined with the Proposed Action training activities, seals may relocate to other areas in the region with less activity (i.e., less presence of people and vessels); however, significant cumulative impacts would not occur as all activities are ongoing and no significant adverse changes to the presence of hauled-out seals has been identified. Additionally, harbor seal occurrence in the lower Chesapeake Bay has been increasing with possible preferred haul-out areas located several nautical miles away from JEB Little Creek-Fort Story (Rees et al., 2016).

Joint Logistics Over-the-Shore training could impact nesting sea turtles during construction activities associated with floating causeways by producing additional artificial lighting from vehicles and equipment, temporary loss of habitat, temporary water quality effects, and increased noise from vessels, vehicles and equipment. Intermittent occurrence of pile driving could result in physiological or behavioral impacts; however, they would be limited in duration, intensity, and continuity. In addition Joint Logistics Over-the-Shore training would last up to 60 days annually and given the low levels of sea turtle nesting activities combined with the seasonal occurrence of sea turtles, the likelihood of encountering a sea turtle during training activities is considered low. As a result, the Navy determined that no significant impacts to nesting sea turtles would occur with implementation of this project.

In addition, the Proposed Action would result in no significant impacts to nesting loggerhead, green, and Kemp's ridley sea turtles at JEB Fort Story as there has been a very low density of historical loggerhead and Kemp's ridley sea turtle nesting and no green sea turtle nests have been documented in the study area. While offshore occurrences of these species have been documented implementation of standard operating procedures (SOP) are expected to provide additional protection. As a result, no significant cumulative impacts to nesting sea turtles would occur.

JEB Little Creek

Habitats and Vegetation

Ongoing Navy training on the beach/dune training areas occurs within unvegetated areas. As a result, when combined with the Proposed Action training, no significant cumulative impacts would occur.

Mammals

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to mammals on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of mammals. Navy training under the Proposed Action would introduce additional temporary, minor impacts to mammals but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to mammals at JEB Little Creek.

Invertebrates

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to invertebrates on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of invertebrates. Navy training under the Proposed Action would introduce additional temporary, minor impacts to invertebrates but would not adversely affect populations on the

installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to invertebrates at JEB Little Creek.

Reptiles and Amphibians

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to reptiles and amphibians on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of reptiles and amphibians. Navy training under the Proposed Action would introduce additional temporary, minor impacts to reptiles and amphibians but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to reptiles and amphibians at JEB Little Creek.

Birds

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to birds on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of birds. Navy training under the Proposed Action would introduce additional temporary, minor impacts to birds but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to birds at JEB Little Creek.

Federally Protected Species and Critical Habitats

The Proposed Action when combined with other past, present, and reasonably foreseeable actions is not expected to affect any federally protected species or critical habitats at JEB Little Creek; therefore, no cumulative impacts would occur.

JEB Fort Story

Habitats and Vegetation

No past, present, or future projects overlap with the Proposed Action training locations and therefore, no cumulative impacts would occur.

Mammals

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to mammals on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of mammals. Navy training under the Proposed Action would introduce additional temporary, minor impacts to mammals but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to mammals at JEB Fort Story

Invertebrates

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to invertebrates on the

installation as these activities occur primarily in developed areas or established training areas relatively devoid of invertebrates. Navy training under the Proposed Action would introduce additional temporary, minor impacts to invertebrates but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to invertebrates at JEB Fort Story.

Reptiles and Amphibians

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to reptiles and amphibians on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of reptiles and amphibians. Navy training under the Proposed Action would introduce additional temporary, minor impacts to reptiles and amphibians but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to reptiles and amphibians at JEB Fort Story.

Birds

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to birds on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of birds. Navy training under the Proposed Action would introduce additional temporary, minor impacts to birds but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to birds at JEB Fort Story.

Federally Protected Species and Critical Habitats

Ongoing military training would impact hauled-out harbor seals as they may react to the presence or noise of people and vehicles by temporarily returning to the water. Because the species is likely to return to the water when people or vehicles are present or approaching, this disturbance is unlikely to result in more than short-term interference with resting activities of seals. When combined with the Proposed Action training activities, seals may relocate to other areas in the region with less activity (i.e., less presence of people and vessels); however, significant cumulative impacts would not occur as all activities are ongoing and no significant adverse changes to the presence of hauled-out seals has been identified. Additionally, harbor seal occurrence in the lower Chesapeake Bay has been increasing with possible preferred haul-out areas located several nautical miles away from JEB Little Creek-Fort Story (Rees et al., 2016).

Ongoing military training could impact nesting sea turtles during beach landings, personnel and vehicle movement, and increased noise from vessels, vehicles and equipment. Given the seasonality of sea turtle nesting activities compared to annual training events, the potential for impacts is considered low.

In addition, the Proposed Action would result in no significant impacts to nesting loggerhead, green, and Kemp's ridley sea turtles at this location as there has been a very low density of historical loggerhead and Kemp's ridley sea turtle nesting and no green sea turtle nests have been documented in the study area. While offshore occurrences of these species have been documented implementation of SOPs are

expected to provide additional protection. As a result, no significant cumulative impacts to nesting sea turtles would occur.

Dam Neck Annex and Camp Pendleton

Habitats and Vegetation

The Camp Pendleton improvements would not overlap with the Proposed Action training locations. However, the shoreline repair effort overlaps the Proposed Action training area; the Navy determined that the impacts to vegetation would be minor and mitigated by restoring the dune areas with native species following the sand replenishment. As a result, when combined with the Proposed Action, no significant cumulative impacts would occur as the area is dominated by wind and wave influence and the Navy's continued management of the dune area periodically restores the habitat.

In addition, regional conservation efforts such as the Back Bay National Wildlife Refuge Comprehensive Conservation Plan serve to protect and enhance local habitats while preserving protected species. Because the Back Bay National Wildlife Refuge is in close proximity to Dam Neck Annex and Camp Pendleton, conservation efforts at the refuge are likely to provide undisturbed habitat for species that may also periodically be present at Dam Neck Annex and Camp Pendleton. In addition, the close proximity of the refuge provides the opportunity for shared conservation efforts with the Navy such a patrols and marking of sea turtle nesting.

Mammals

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to mammals on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of mammals. Navy training under the Proposed Action would introduce additional temporary, minor impacts to mammals but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to mammals at Dam Neck Annex and Camp Pendleton.

Invertebrates

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to invertebrates on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of invertebrates. Navy training under the Proposed Action would introduce additional temporary, minor impacts to invertebrates but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to invertebrates at Dam Neck Annex and Camp Pendleton.

Reptiles and Amphibians

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to reptiles and amphibians on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of reptiles and amphibians. Navy training under the Proposed Action would introduce

additional temporary, minor impacts to reptiles and amphibians but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to reptiles and amphibians at Dam Neck Annex and Camp Pendleton.

Birds

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to birds on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of birds. Navy training under the Proposed Action would introduce additional temporary, minor impacts to birds but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to birds at Dam Neck Annex and Camp Pendleton.

Federally Protected Species and Critical Habitats

The U.S. Marine Corps is proposing to relocate the Amphibious Assault Vehicle Company, 4th Assault Amphibian Battalion from JEB Little Creek/Fort Story to Dam Neck Annex. Amphibious assault vehicle training would employ between 3 and 10 amphibious assault vehicles, with up to 18 passengers per vehicle, per exercise. Amphibious assault vehicles are typically in the water for about three to four hours per exercise. On-land maneuvers would be limited to transit from amphibious assault vehicle shelters along existing roads to the northernmost portion of the Dam Neck Annex beach leading to the shoreline. Amphibious assault vehicle operations would occur a maximum of 144 hours per year during daylight and a maximum of 24 hours per year during nighttime.

U.S. Marine Corps amphibious assault vehicle training as well as the shoreline repair effort would potentially impact hauled-out harbor seals as they may react to the presence or noise of people, amphibious craft, and equipment by temporarily returning to the water. Marine Corps training at Dam Neck Annex and Camp Pendleton beaches are similar to beach landings from amphibious craft analyzed under the Proposed Action. As noted above, amphibious assault vehicle training can last several hours, and amphibious assault vehicle operations would occur a maximum of 144 hours per year during daylight and a maximum of 24 hours per year during nighttime. Since the species is likely to return to the water when people, amphibious craft, and equipment are present or approaching, this disturbance is unlikely to result in more than short-term interference with resting activities of seals. When cumulative actions such as the U.S. Marine Corps training is combined with the Proposed Action training activities, seals may relocate to other areas in the region with less activity (i.e., less presence of people and vessels); however, significant cumulative impacts would not occur as the Proposed Action training is ongoing, shoreline repair would be short-term and intermittent, and no significant adverse changes to the presence of hauled-out seals has been identified. Additionally, harbor seal occurrence in the lower Chesapeake Bay has been increasing, with possible preferred haul-out areas located several nautical miles away from Dam Neck Annex and Camp Pendleton (Rees et al., 2016).

U.S. Marine Corps amphibious assault vehicle training and repairs to shoreline may impact nesting sea turtles. Since U.S. Marine Corps amphibious assault vehicle training primarily consist of military activities similar to the Proposed Action and include beach landings from amphibious vehicles, potential impacts from physical strike and disturbance to nesting sea turtles, nests, and hatchlings are similar to those described in Section 4.3.3.6.7 (Impacts Common to All Locations Under All Alternatives, Sea Turtles). The

Navy determined that the Marine Corps Amphibious Assault Vehicle Training activities may affect but is not likely to adversely affect, green, Kemp's ridley, and loggerhead sea turtles (Navy, 2016c). Training events associated with the Proposed Action that occur in beach areas have the potential to impact sea turtle nesting habitat as well as nesting female sea turtles and hatchlings. Impacts to sea turtles would be temporary and minor, mostly resulting from either physical disturbance or behavioral reactions from noise.

Noise from Landing Craft, Air Cushion (LCAC) operations associated with the Proposed Action are expected to be the source of greatest noise levels; however, these training activities would generate localized temporary increases in noise levels, up to a 92-dBA sound exposure level at a distance of 400 feet, which would not exceed levels known to potentially affect wildlife, including nesting sea turtles. These in-air noise sources may result in a behavioral response including a startle response by nesting females or hatchlings, disruption of nesting activities, or avoidance of a potential nesting area. In addition, effects from vehicle noise, both with the Proposed Action and the Marine Corps amphibious assault vehicle, may consist of a startle response by nesting females or hatchlings or avoidance of an area, which could preclude a female from laying a nest. However, training activities involving vehicle movements would have to occur at the same time, within the vicinity of a sea turtle approaching the beach, and generate enough noise to elicit a response in order for a potential impact to occur. Noise levels associated with Proposed Action blank firing and non-lethal training ammunition are not expected to result in physiological impacts. Potential behavioral impacts would only be expected if a sea turtle is very close to blank-fire and non-lethal ammunition training activities. If an event has a longer duration, such as firing events with multiple bursts of blank rounds, sea turtles may exhibit a response beyond an initial startle, such as actively avoiding the area. Furthermore, training events involving firing of blanks and non-lethal training ammunition on beach areas would occur infrequently under the Proposed Action and the likelihood of a sea turtle being in close proximity to weapons firing activities is also considered low; no additional weapons firing activities would be associated with the Marine Corps amphibious assault vehicle training. Given the seasonality of sea turtle nesting activities compared to annual training events, the potential for impacts is considered low. Beach landings from amphibious craft, personnel movements, and vehicle movements on the beach may alter nesting habitat; however, historical nesting data indicates a very low level of sea turtle nesting activity on beaches within the study area since data collection efforts began in 1970. In addition, the repairs to shorelines would occur intermittently and be short in duration with nesting season taken into consideration to avoid conflicts with nesting sea turtles. Given that there is a very low density of sea turtle nests historically at Dam Neck Annex, the implementation of SOPs for sea turtles as required in the INRMP (Navy, 2015; USFWS, 2016c; Navy, 2017d) and summarized in Section 4.3.3 (Impacts Common to All Locations Under All Alternatives), is expected to reduce potential impacts to sea turtles. Therefore no significant cumulative impacts from past, present, and reasonably foreseeable actions at Dam Neck Annex would occur.

NALF Fentress

Habitats and Vegetation

No past, present, or future projects overlap with the Proposed Action training locations and therefore, no cumulative impacts would occur.

Mammals

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to mammals on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of mammals. Navy training under the Proposed Action would introduce additional temporary, minor impacts to mammals but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to mammals at Naval Auxiliary Landing Field (NALF) Fentress.

Invertebrates

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to invertebrates on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of invertebrates. Navy training under the Proposed Action would introduce additional temporary, minor impacts to invertebrates but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to invertebrates at NALF Fentress.

Reptiles and Amphibians

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to reptiles and amphibians on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of reptiles and amphibians. Navy training under the Proposed Action would introduce additional temporary, minor impacts to reptiles and amphibians but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to reptiles and amphibians at NALF Fentress.

Birds

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to birds on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of birds. Navy training under the Proposed Action would introduce additional temporary, minor impacts to birds but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to birds at NALF Fentress.

Federally Protected Species and Critical Habitat

The only federally protected species with potential presence at NALF Fentress is the northern long-eared bat. The cumulative impacts to this species at NALF Fentress are the same as those described in the Region section.

NWS Yorktown

Habitats and Vegetation

No past, present, or future projects overlap with the Proposed Action training locations and therefore, no cumulative impacts would occur.

Mammals

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to mammals on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of mammals. Navy training under the Proposed Action would introduce additional temporary, minor impacts to mammals but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to mammals at NWS Yorktown.

Invertebrates

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to invertebrates on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of invertebrates. Navy training under the Proposed Action would introduce additional temporary, minor impacts to invertebrates but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to invertebrates at NWS Yorktown.

Reptiles and Amphibians

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to reptiles and amphibians on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of reptiles and amphibians. Navy training under the Proposed Action would introduce additional temporary, minor impacts to reptiles and amphibians but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to reptiles and amphibians at NWS Yorktown.

Birds

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to birds on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of birds. Navy training under the Proposed Action would introduce additional temporary, minor impacts to birds but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to birds at NWS Yorktown.

Federally Protected Species and Critical Habitat

The only federally protected species with potential presence at NWS Yorktown is the northern long-eared bat. The cumulative impacts to this species at NWS Yorktown are the same as those described in the Region section.

Cheatham Annex

Habitats and Vegetation

No past, present, or future projects overlap with the Proposed Action training locations and therefore, no cumulative impacts would occur.

Mammals

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to mammals on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of mammals. Navy training under the Proposed Action would introduce additional temporary, minor impacts to mammals but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to mammals at Cheatham Annex.

Invertebrates

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to invertebrates on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of invertebrates. Navy training under the Proposed Action would introduce additional temporary, minor impacts to invertebrates but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to invertebrates at Cheatham Annex.

Reptiles and Amphibians

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to reptiles and amphibians on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of reptiles and amphibians. Navy training under the Proposed Action would introduce additional temporary, minor impacts to reptiles and amphibians but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to reptiles and amphibians at Cheatham Annex.

Birds

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this installation could be expected to result in short-term minor impacts to birds on the installation as these activities occur primarily in developed areas or established training areas relatively devoid of birds. Navy training under the Proposed Action would introduce additional temporary, minor impacts to

birds but would not adversely affect populations on the installation. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to birds at Cheatham Annex.

Federally Protected Species and Critical Habitat

The only federally protected species with potential presence at Cheatham Annex is the northern long-eared bat. The cumulative impacts to this species at NWS Yorktown are the same as those described in the Region section.

First Landing State Park

Habitats and Vegetation

No impacts would occur with implementation of the Proposed Action and, as a result, no cumulative impacts would occur.

Mammals

No impacts to mammals would occur with implementation of the Proposed Action at First Landing State Park and, as a result, no cumulative impacts to mammals would occur

Invertebrates

No impacts to invertebrates would occur with implementation of the Proposed Action at First Landing State Park and, as a result, no cumulative impacts to invertebrates would occur

Reptiles and Amphibians

No impacts to reptiles and amphibians would occur with implementation of the Proposed Action at First Landing State Park and, as a result, no cumulative impacts to reptiles and amphibians would occur

Birds

No impacts to birds would occur with implementation of the Proposed Action at First Landing State Park and, as a result, no cumulative impacts to birds would occur

Federally Protected Species and Critical Habitat

No impacts to northern long-eared bat would occur with implementation of the Proposed Action at First Landing State Park and, as a result, no cumulative impacts to northern long-eared bat would occur.

Southern Branch of the Elizabeth River

As noted under Section 5.4.2 (Water Resources), the proposed pipeline project that would cross the Southern Branch of the Elizabeth River would be installed in accordance with construction and restoration plans, which outline common industry construction methods (Federal Energy Regulatory Commission, 2016). In addition, the horizontal drilling method planned for use would avoid direct impacts on aquatic life and a Horizontal Directional Drill Contingency Plan would be implemented at the Southern Branch of the Elizabeth River crossing to minimize and address issues (Federal Energy Regulatory Commission, 2016).

Habitats and Vegetation

Past, present, and foreseeable actions that, along with the Proposed Action, could result in cumulative impacts in the Southern Branch of the Elizabeth River include in-water pile driving activities at Navy

installations in Hampton Roads and recreational and commercial boating. St. Juliens Creek Annex is located on a section of the Elizabeth River that Proposed Action vessels would transit. This area may also experience in-water pile driving. In-water pile driving impacts to aquatic habitats and vegetation at this location would result in minor and temporary increases in water column turbidity due to the piles being driven into the river bottom either by impact or vibratory hammers. Cumulative impacts would not result from pile driving and the Proposed Action. The piles would have to be driven at the same time as the Proposed Action vessels transit past them in order for any disturbed sediments to interact cumulatively (increased turbidity/longer duration of increased turbidity due to resuspension). In addition, the shoreline in areas where pile driving would occur primarily consists of sheltered man-made structure.

Over 12,000 vessel transits occur annually on the Elizabeth River/Atlantic Intracoastal Waterway (Drawbridge Operation Regulations, 2010). Because the waterway is generally shielded from wind driven wave events, shoreline erosion, which can increase water column turbidity and damage tidal wetlands, is primarily caused by boat wakes. Portions of the Atlantic Intracoastal Waterway have experienced major shoreline erosion from boat wakes (Fonseca & Malhotra, 2012; Price, 2005); however, there are no visible or documented erosion problems on the Southern Branch of the Elizabeth River (City of Chesapeake, 2014). Commercial and recreational boating includes temporary increases in water column turbidity from vessel movement. Cumulative impacts would not be distinguishable from impacts resulting from the thousands of boat transits that occur annually in the Elizabeth River.

Uncaptured expended blank-fire rounds (brass casings) on the Southern Branch of the Elizabeth River could convert areas of soft mud bottom into hard artificial substrate. Due to the annual reoccurring nature of the training, the impacts from expended cartridges would not be temporary and it would be likely that, over time, the cartridge casings would accumulate. However, this accumulation would occur in a localized area and would not affect the majority of the Southern Branch of the Elizabeth River.

Implementation of several regional programs such as the Oyster Reef Restoration Program, Elizabeth River Project, and Elizabeth River and Southern Branch Navigation Improvements would improve the habitat environment along the Southern Branch of the Elizabeth River. In addition, the conservation of the Virginia Outdoors Foundation easement provides protected habitat and vegetation along the shoreline. Therefore cumulative habitat and vegetation impacts from past, present, and future actions would not be significant.

Mammals

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this waterway could be expected to result in short-term minor impacts to aquatic mammals (e.g., muskrats or nutria) on the waterway as these activities occur in an environmental setting less than optimal for mammal presence. Navy training under the Proposed Action would introduce additional temporary, minor impacts to such mammals but would not adversely affect populations on the waterway. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to mammals on the Southern Branch of the Elizabeth River.

Invertebrates

Past, present, and reasonably foreseeable actions that, along with the Proposed Action, could result in cumulative impacts to invertebrates in the Southern Branch of the Elizabeth River consist of recreational

and commercial boating. Frequent boat use results in strike and noise disturbance potential for invertebrates located near the surface. Compared to overall population levels, the number of individual invertebrates struck by vessels is considered low. Relatively few large invertebrates occur near the surface, and zooplankton and invertebrate larvae experience high natural mortality rates. Noise likely disturbs relatively few invertebrates, and affected individuals probably resume normal activities soon after the noise disturbance ceases. Therefore cumulative impacts to invertebrates from past, present, and future actions within the region of influence would not be significant.

Regional programs such as Oyster Reef Restoration Program may result in an increase in oyster population along the Elizabeth River. While beds have not been prevalent in the Proposed Action training area, habitat improvements under the purview of the Elizabeth River Project and the U.S. Army Corps of Engineers could result in expansion into these areas. Oyster beds are typically marked for navigation purposes and, as a result, are unlikely to be struck intentionally due to the potential for boat damage as well as impacts to the resource.

Fish

Past, present, and reasonably foreseeable actions that, along with the Proposed Action, could result in cumulative impacts to fish in the Southern Branch of the Elizabeth River consist of pile driving, commercial and recreational boating, and navigation improvements. Due to the highly mobile nature of many fish species, individuals that experience noise from Navy vessel operation could potentially also be exposed to pile driving noise in the Hampton Roads area. Pile driving may cause physiological or behavioral reactions in fish that are similar to those caused by vessel noise. Although some individuals could be affected by multiple noise sources, impacts would be temporary and would not be expected to result in significant cumulative impacts at the population level.

Future navigation improvements may influence the presence and/or behavior of fish species. Short-term impacts may occur during dredging activities and long-term impacts may occur with changes in water depths and quality. The displacement of fish species during dredging would likely be temporary; changes in water depth and quality may result in shifts of fish populations. However, cumulative impacts due to vessel operation are expected to not be significant as most fish swim away from operating vessels.

Reptiles and Amphibians

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this waterway could be expected to result in short-term minor impacts to reptiles and amphibians on the waterway as these activities occur in an environmental setting less than optimal for reptile and amphibian presence. Navy training under the Proposed Action would introduce additional temporary, minor impacts to reptiles and amphibians but would not adversely affect populations on the waterway. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to reptiles and amphibians on the Southern Branch of the Elizabeth River.

Birds

The implementation of other past, present and reasonably foreseeable future projects listed in Table 5-6 for this waterway could be expected to result in short-term minor impacts to birds on the waterway as these activities occur in an environmental setting less than optimal for bird presence given suboptimal but improving habitat conditions. Navy training under the Proposed Action would introduce additional

temporary, minor impacts to birds but would not adversely affect populations on the waterway. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects would not result in significant impacts to birds on the Southern Branch of the Elizabeth River.

Federally Protected Species and Critical Habitats

The ESA-listed Atlantic sturgeon is less mobile than some smaller fish and are therefore comparatively more susceptible to vessel strikes; however, Atlantic sturgeons are not documented to occur in the Southern Branch of the Elizabeth River and therefore are not likely to be adversely affected by high-speed vessel operation in that area.

Past, present, and reasonably foreseeable actions that, along with the Proposed Action, could result in cumulative impacts to Atlantic sturgeon in the Southern Branch of the Elizabeth River consist of pile driving, commercial and recreational boating, and navigation improvements. Due to the highly mobile nature the species, individuals that experience noise from Navy vessel operation could potentially also be exposed to pile driving noise in the Hampton Roads area. Pile driving may cause physiological or behavioral reactions in sturgeon that are similar to those caused by vessel noise. Although some individuals could be affected by multiple noise sources, impacts would be temporary and would not be expected to result in significant cumulative impacts at the population level.

Commercial and recreational boating in the Southern Branch of the Elizabeth River exposes fish to noise disturbance and strike potential. Annual boat use in the affected area is substantially greater than that associated with the 30 United States Fleet Forces (USFF) training events in the Southern Branch of the Elizabeth River, and cumulative impacts due to Navy activities would therefore not likely be distinguishable. Navy training has been conducted for decades in the Southern Branch of the Elizabeth River with no documented associated mortality to Atlantic sturgeons.

Past, present, and reasonably foreseeable actions that, along with the Proposed Action, could result in cumulative impacts to marine mammals in the Southern Branch of the Elizabeth River consist of pile driving, commercial and recreational boating, and navigation improvements. Pile driving may cause physiological or behavioral reactions in marine mammals that are similar to those caused by vessel noise. Although some individuals could be affected by multiple noise sources, impacts would be temporary, as pile driving would be temporary, and would not be expected to result in significant cumulative impacts at the population level.

Commercial and recreational boating in the Southern Branch of the Elizabeth River exposes marine mammals to noise disturbance and strike potential. Annual boat use in the affected area is substantially greater than that associated with the 30 USFF training events in the Southern Branch of the Elizabeth River, and cumulative impacts due to Navy activities would therefore not likely be distinguishable. Navy training has been conducted for decades in the Southern Branch of the Elizabeth River and Navy vessel operators are trained to lookout for marine mammals and objects in the water, travel at a safe speed, and take proper action to avoid collisions.

Future navigation improvements may influence the presence and/or behavior of marine mammals. Short-term impacts may occur during dredging activities and long-term impacts may occur with changes in water depths and quality. The displacement of marine mammals during dredging would likely be temporary; changes in water depth and quality may result in shifts of marine mammal populations. In addition, regional programs, activities, and trends such as the Chesapeake Bay Preservation Area and

Elizabeth River Project provide guidance and goals to improve water quality and habitat. As a result, marine mammal presence may shift due to changes in water quality and sources of food. Cumulative impacts due to vessel operation are expected to be not significant since, regardless of population density, vessel operators are required to practice safe navigation practices and avoid objects in the water.

Summary

Cumulative biological resources impacts from past, present, and future actions within the region of influence are not expected to have a significant impact because of the following factors:

Natural resource SOPs employed to protect habitats and vegetation would continue to be implemented at all study area installations and include use of signage and physical barriers to limit access when appropriate, restricting vehicles to existing trails and roadways, and including any restrictions in installation planning documents and maps (e.g., INRMPs, Range Management Plans, and Installation Master Plans). In addition, installation natural resource managers monitor conditions on installations to identify potential issues before they become a problem.

While Proposed Action training and past, present, and future actions have the potential to disturb individual plants and soils, which could degrade habitats over time, training that utilizes beach habitats would be restricted to unvegetated portions of the beach and vehicles training at inland areas would be restricted to utilizing existing roads and trails.

Noise associated with training activities and past, present, and future actions have the potential to disturb wildlife to varying degrees. Most noise events would be localized and occur for a relatively short period of time (minutes to hours).

JEB Fort Story and Dam Neck Annex/Camp Pendleton implement sea turtle management in accordance with their INRMPs and USFWS consultations. The Navy conducts beach surveys for sea turtle nesting and strandings at Dam Neck Annex and Camp Pendleton daily during the summer nesting season. Sea turtle nest monitoring and management guidelines for JEB Fort Story and Dam Neck Annex/Camp Pendleton would continue. In addition, noise from Proposed Action training along with present, and future actions noise sources may result in a behavioral response including a startle response, disruption of nesting activities, avoidance of a potential nesting area. However, these actions would need to occur at the same time as nesting behavior, which is considered unlikely.

Generally, birds are very responsive, alert, and mobile and should easily avoid Proposed Action training and present and future actions by relocating to another area.

Although some individual fish could be affected by multiple noise sources, impacts would be temporary and would not be expected to result in significant cumulative impacts at the population level.

The ESA-listed Atlantic sturgeon is less mobile than some smaller fish and are therefore comparatively more susceptible to vessel strikes; however, Atlantic sturgeons are not documented to occur in the Southern Branch of the Elizabeth River and therefore are not likely to be adversely affected by high-speed vessel operation in that area.

While Atlantic bottlenose dolphin and West Indian manatee may occur in areas of vessel activity, the Navy uses highly qualified operators on small vessels to maintain awareness of the surrounding environment, including observance of the waterway for marine mammals as well as objects in the water. In addition, the Navy vessel operators practice safe navigation, travel at a safe speed, and are trained to take proper action to avoid collisions. In addition, it is likely that protected marine mammal

species found in the study area would have relatively minor behavioral reactions to vessels that maintain a reasonable distance.

Hauled-out harbor seals at JEB Little Creek, JEB Fort Story, First Landing State Park, and Dam Neck Annex may react to the presence of people, amphibious craft, and vehicles by temporarily returning to the water. Since the species is likely to return to the water when people, amphibious craft, or vehicles are present or approaching, disturbance associated with the Proposed Action and present and future actions is unlikely to result in more than short-term interference with resting activities of seals.

5.4.4 Cultural Resources

5.4.4.1 Description of Geographic Study Area

The region of influence for cultural resources within which potential impacts from the Proposed Action could interact with changes that have resulted from past, present, and future actions consists of the areas of each Navy installation or non-Navy owned training location, where existing and planned training activities will be conducted that have the potential to affect historic properties.

5.4.4.2 Relevant Past, Present, and Future Actions

Past, present, or reasonably foreseeable actions that might interact with the affected cultural resources of the Proposed Action are identified in Table 5-7. Past, present, and reasonably foreseeable military activities at Northwest Annex and St. Juliens Creek Annex are limited to personnel and vehicle movement on improved areas and, therefore, no cumulative impacts occur to cultural resources.

Table 5-7. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Cultural Resources Cumulative Impacts

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	DoD	Region	Rotary and Fixed-wing Aircraft Training	x
Past, present, and foreseeable	DoD	JEB Little Creek – Fort Story and Dam Neck Annex	Marine Corps Forces Reserve Amphibious Assault Vehicle Training Exercises and Reserve Center	x
Past, present, and foreseeable	U.S. Navy	JEB Little Creek-Fort Story	Joint Logistics Over-the-Shore Training at JEB Little Creek – Fort Story	o
Past, present, and foreseeable	DoD	JEB Little Creek	Military activities	o
Past, present, and foreseeable	DoD	JEB Fort Story	Military activities	o
Past, present, and foreseeable	DoD	Dam Neck Annex	Military activities	o
Present and foreseeable	DoD	Camp Pendleton	Base improvement projects	x

Table 5-7. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Cultural Resources Cumulative Impacts [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	DoD	NALF Fentress	Military activities	o
Present and foreseeable	Federal Highway Administration and Virginia Department of Transportation	NWS Yorktown and Cheatham Annex	Interstate 64 Peninsula Study	m
Past	U.S. Navy	NWS Yorktown	Small Arms Training Facility in the NWS Yorktown Area	o
Past, present and foreseeable	DoD	NWS Yorktown	Military activities	o
Past, present, and foreseeable	DoD	NWS Yorktown	Construction and Operation of a Small Arms Range Facility	o
Past, present, and foreseeable	DoD	NWS Yorktown	Marine Corps Security Force Regiment Consolidation	o
Past, present and foreseeable	DoD	Cheatham Annex	Military activities	o

Key: DoD = Department of Defense; EIS = Environmental Impact Statement; EOD = Explosive Ordnance Disposal; JEB = Joint Expeditionary Base; NALF = Naval Auxiliary Landing Field; NEPA = National Environmental Policy Act; NWS = Naval Weapons Station; OEIS = Overseas Environmental Impact Statement.

5.4.4.3 Cumulative Impact Analysis

The following analysis is organized according to the location in Table 5-7 of the area past, present, or reasonably foreseeable actions that might interact with the affected cultural resources of the Proposed Action. For each location, the analysis begins with a summary statement of the impacts to cultural resources identified for the Proposed Action and Alternatives, including No Action, followed by a brief summary of the impacts analyzed for the past, present, or reasonably foreseeable actions. The discussion then concludes with a summary of the combined impacts of the projects.

Region (All Study Area Installations and Training Areas)

Rotary aircraft landing zones are present at NWS Yorktown, JEB Little Creek, JEB Fort Story, and NALF Fentress. As a result, these locations experience noise associated with rotary aircraft movement that is part of the existing ambient noise environment. With the long history of military activities at NWS Yorktown, JEB Little Creek, JEB Fort Story, and NALF Fentress, noise associated with rotary aircraft movement along with Proposed Action training activities has long been an element of the setting of the National Register of Historic Places (NRHP)-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for NRHP listing. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources are expected to result from the noise generated by training activities.

JEB Little Creek-Fort Story

Because the Joint Logistics Over-the-Shore training occurs at both of the non-contiguous sites of JEB Little Creek-Fort Story, impacts are included under the joint base heading versus duplicating the discussion under the separate location headings. The existing and proposed USFF training at JEB Little Creek-JEB Fort Story would have no adverse effects on significant cultural resources, including the NRHP-eligible Fort Story Historic District.

The Joint Logistics Over-the-Shore training region of influence includes JEB Little Creek-Fort Story, which is within the region of influence for this EA. Both actions involve the operations of ground vehicles. As noted in Section 4.4.3 (Impacts Common to All Locations Under All Alternatives, Noise subsections), Section 4.4.4 (JEB Little Creek), and Section 4.4.5 (JEB Fort Story), surface vehicle operations at JEB Little Creek-Fort Story may be audible at NRHP-listed or -eligible architectural and archaeological resources but will not result in any direct or indirect impacts. Pile driving conducted as part of Joint Logistics Over-the-Shore activities generates impulsive noise in the same areas affected by impulsive explosives noise, and consists of impact installation and vibratory extraction of steel pipe piles. The Navy determined that Joint Logistics Over-the-Shore Action Alternative activities at JEB Little Creek-Fort Story would have no adverse effect on NRHP-eligible or -listed architectural resources at Fort Story. For all alternatives considered for this EA, acoustic and physical disturbance stressors at JEB Little Creek-JEB Fort Story would have no adverse effects on significant cultural resources. The combined actions are not anticipated to result in significant cumulative impacts to cultural resources.

Dam Neck Annex and Camp Pendleton

The existing and proposed USFF training at Dam Neck Annex would have no adverse effects on significant cultural resources, including the NRHP-listed Camp Pendleton State Military Reservation Historic District.

In addition to the Proposed Action, the beaches at Dam Neck Annex would support the U.S. Marine Corps Amphibious Assault Vehicle Training activities. Marine Corps training at Dam Neck Annex beaches are similar to beach landings from amphibious vessels analyzed under the Proposed Action.

The infrastructure improvement projects may result in ground disturbance at the project site; however, the Proposed Action would not impact these same areas. The Proposed Action training activities evaluated in this EA would have no adverse effects on significant cultural resources, including the NRHP-listed Camp Pendleton State military Reservation Historic District nor would the increased training activities on the beach/dunes proposed under Alternatives 1 and 2. Therefore, the combined actions would not result in cumulative impacts to cultural resources.

NALF Fentress

There are no NRHP-listed or -eligible architectural resources within the area of potential effects of the Proposed Action at the installation, so there would be no impacts on cultural resources.

As a result, there would be no cumulative impacts to cultural resources at NALF Fentress.

NWS Yorktown

The existing and proposed USFF training at NWS Yorktown evaluated in this EA would have no adverse effects on significant cultural resources, including the Colonial Parkway, a contributing element of the Colonial National Historic Park.

Roadway improvements to Interstate 64 adjacent to NWS Yorktown would generate temporary noise level increases along the roadway during construction, long term very minor changes in noise distribution (i.e., traffic paths slightly adjusted), ground disturbance during construction and viewscape changes associated with the Interstate expansion. Throughout the length of its proposed expansion corridor, National Historic Preservation Act Section 106 consultation resulted in determination that there would be no adverse effects to the two NRHP-listed historic sites and districts, including the Colonial Parkway, no adverse effects to eight battlefields, and adverse effects to five of six known archaeological sites in the area of potential effects. A Programmatic Agreement was executed among the Virginia State Historic Preservation Officer, Virginia Department of Transportation, Federal Highway Administration, and National Park Service. The Programmatic Agreement outlines the process by which historic properties potentially affected by the undertaking should be handled during final design and/or construction in order to avoid adverse effects to the two NRHP-listed historic sites and districts, including the Colonial Parkway and eight battlefields, as well as resolve the adverse effects to archaeological sites. For all alternatives considered for this EA, acoustic and physical disturbance stressors at NWS Yorktown would have no adverse effects on significant cultural resources, including the Colonial Parkway. The combined actions are not anticipated to result in cumulative impacts to cultural resources.

The construction of a Small Arms Range Training Facility in close proximity to 2nd Fleet Anti-terrorism Security Team Company Headquarters at NWS Yorktown was considered in Section 4.4.10 (NWS Yorktown), as part of the existing conditions, or No Action, at NWS Yorktown. Ongoing operations on NWS Yorktown by non-Navy units are part of the existing noise and physical disturbance stressor environment and, as such were considered as part of cultural resources impacts assessment. Noise generated during construction and operation of a multipurpose small arms range facility a short distance from the Marine Corps Security Force Regiment is being considered in an ongoing EA. The Navy determined that adverse effects to the one significant archaeological site within the proposed small arms range would be avoided through careful removal of vegetation, and that routine firing activities during training would not disturb or impact the site. The existing and proposed USFF training at NWS Yorktown evaluated in this EA would also have no adverse effects on significant cultural resources, including the Colonial Parkway. The combined actions are not anticipated to result in cumulative impacts to cultural resources.

Ongoing DoD training activities primarily includes rotary aircraft use of the landing zones. As noted under the Region section, noise associated with rotary aircraft movement along with Proposed Action training activities has long been an element of the setting of the NRHP-listed or -eligible architectural and archaeological resources, including when they were evaluated and determined eligible for NRHP listing. Therefore, no indirect impacts on NRHP-listed or -eligible architectural and archaeological resources are expected to result from the noise generated by training activities.

The Marine Corps Security Force Regiment Consolidation region of influence is in the southeast portion of NWS Yorktown, which is within the region of influence for this EA. The undertaking includes the consolidation and relocation of Marine Corps Security Force Regiment personnel, a combination of new construction (to replace buildings with structural, safety, and logistical deficiencies) and renovation of existing buildings and use of existing training ranges (on- and off-base). The Navy determined that there would be no effect to significant cultural resources. The existing and proposed USFF training at NWS Yorktown evaluated in this EA would also have no adverse effects on significant cultural resources,

including the Skiffe's Creek Historic District, which is in the Marine Corps Security Force Regiment Consolidation region of influence. The combined actions would not result in cumulative impacts to cultural resources.

Foreseeable actions, such as those listed in Table 5-3 which have not been subject to sufficient planning to analyze potential impacts, are not expected to result in significant adverse impacts to cultural resources, either individually or cumulative through the Navy's adherence to standard procedures to comply with National Historic Preservation Act Section 106 (see Section 4.4.2, Methodology).

Cumulative impacts to cultural resources from past, present, and future actions within the region of influence would be less than significant because past and present actions in the region of influence have had no adverse effects on historic properties, and foreseeable projects are not expected to result in significant adverse impacts. Furthermore, no adverse effects on historic properties are expected to result from the Proposed Action at the installations where there is a potential interaction with past, present, and future actions. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects, would not result in significant cumulative impacts to cultural resources within the region of influence.

Cheatham Annex

Military activities with a potential ground disturbance component conducted at Cheatham Annex training locations include personnel and vehicle movement. However, these training activities are limited to existing roadways and trails, are not conducted in the immediate vicinity of the archaeological sites, and are not anticipated to have any adverse impact on any of the known archaeological sites. In addition, military activities with a potential ground disturbance component will also continue to be conducted in areas identified by the Navy as having the potential to contain undiscovered intact archaeological resources. The subsurface disturbance potential of these activities will not exceed pre-military plow zone depth in any areas that have not been impacted by previous military training. In the event that previously unrecorded or unevaluated cultural resources are encountered, the Navy would manage these resources in accordance with the National Historic Preservation Act and other federal and state laws, Navy, and DoD regulations and instructions, and DoD American Indian and Alaska Native Policy. Furthermore, no adverse effects on historic properties are expected to result from the Proposed Action at the installations where there is a potential interaction with past, present, and future actions. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects, would not result in significant cumulative impacts to cultural resources within the region of influence.

5.4.5 Ambient Noise

5.4.5.1 Description of Geographic Study Area

The region of influence for ambient noise includes all training areas as well as adjacent areas.

5.4.5.2 Relevant Past, Present, and Future Actions

Past, present, or reasonably foreseeable actions that might interact with the affected ambient noise of the Proposed Action are identified in Table 5-8.

Table 5-8. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Ambient Noise Cumulative Impacts

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	DoD	Region	Rotary and Fixed-wing Aircraft Training	x
Past, present, and foreseeable	DoD	JEB Little Creek – Fort Story and Dam Neck Annex	Marine Corps Forces Reserve Amphibious Assault Vehicle Training Exercises and Reserve Center	x
Past, present, and foreseeable	U.S. Navy	JEB Little Creek-Fort Story	Joint Logistics Over-the-Shore Training at JEB Little Creek – Fort Story	o
Past, present, and foreseeable	DoD	JEB Little Creek	Military activities	x
Past, present, and foreseeable	U.S. Navy	JEB Little Creek	Establishment of a Permanent Homeport for the Riverine Squadron Training under the Navy Expeditionary Command	o
Past, present, and foreseeable	U.S. Navy	JEB Fort Story	Small Arms Testing and Evaluation Compound, U.S. Army Transportation Center	m
Past	U.S. Navy	JEB Fort Story	Tactical Vehicle Course Upgrades at JEB Little Creek- Fort Story	o
Past, present, and foreseeable	DoD	JEB Fort Story	Military activities	o
Past, present, and foreseeable	U.S. Navy	Dam Neck Annex	Repairs to the Shoreline Protection System at Dam Neck Annex	o
Past, present, and foreseeable	DoD	Dam Neck Annex	Military activities	o
Present and foreseeable	DoD	Camp Pendleton	Base improvement projects	x
Past	U.S. Navy	NALF Fentress	Implementation of an Airfield Obstructions Management Plan	o
Past, present, and foreseeable	DoD	NALF Fentress	Military activities	x
Past, present, and foreseeable	DoD	Northwest Annex	Military activities	o
Past, present, and foreseeable	DoD	St. Juliens Creek Annex	Military activities	o
Present and foreseeable	Federal Highway Administration and Virginia Department of Transportation	NWS Yorktown and Cheatham Annex	Interstate 64 Peninsula Study	o

Table 5-8. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Ambient Noise Cumulative Impacts [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past	U.S. Navy	NWS Yorktown	Small Arms Training Facility in the NWS Yorktown Area	o
Past, present and foreseeable	DoD	NWS Yorktown	Military activities	x
Past, present, and foreseeable	Community	NWS Yorktown	Law Enforcement training	x
Present and foreseeable	DoD	NWS Yorktown	U.S. Marine Corps Antiterrorism Security Team training	x
Past, present, and foreseeable	DoD	NWS Yorktown	Construction and Operation of a Small Arms Range Facility	o
Past, present, and foreseeable	DoD	NWS Yorktown	Marine Corps Security Force Regiment Consolidation	o
Past, present and Foreseeable	DoD	Cheatham Annex	Military activities	o
Past, present, and foreseeable	VADCR	First Landing State Park	First Landing State Park Master Plan	x
Past, present, and foreseeable	Community	Region	Recreational boating in Hampton Roads	x
Past, present, and foreseeable	Community	Region	Commercial boating in Hampton Roads	x
Past, present, and foreseeable	Community	Elizabeth River	Virginia Outdoors Foundation easement	x

Key: DoD = Department of Defense; JEB = Joint Expeditionary Base; NALF = Naval Auxiliary Landing Field; NWS = Naval Weapons Station; VADCR = Virginia Department of Conservation and Recreation.

5.4.5.3 Cumulative Impact Analysis

Region (All Study Area Installations and Training Areas)

Ongoing aircraft training in the region contributes to the existing ambient noise environment. Rotary aircraft landing zones are present at NWS Yorktown, JEB Little Creek, JEB Fort Story, and NALF Fentress. As a result, these locations experience noise associated with rotary aircraft movement as part of the ambient noise environment. In addition, recreational and commercial boating in the region also contribute to the existing ambient noise environment, especially at training areas adjacent to the lower Chesapeake Bay (JEB Little Creek and JEB Fort Story) and offshore Virginia coast (Dam Neck Annex and Camp Pendleton). Military training at all installations in the study area has been occurring in the region for decades and, as a result, the majority of residents and local public surrounding Navy locations have experienced these noise events for years. New residents, tourists, and visitors may be unfamiliar with the Navy presence and the noise associated with Navy training activities. The majority of Proposed Action training events would not result in elevated noise levels beyond the installation boundaries.

When combined with the regional noise activities, the occurrence of elevated noise associated with Proposed Action would not be significant.

JEB Little Creek

The proposed increase in amphibious assault vehicle operations tempo at TA Mud Flats and Anzio Beach would occur in the same areas affected by the Proposed Action and alternatives. Amphibious Assault Vehicles generate temporary, localized increases in noise levels, and their noise would not be expected to cause disturbances off-installation either alone or in conjunction with the Proposed Action and alternatives. Assault amphibious vehicles produce underwater noise similar to the surface vessels analyzed in this EA. An increase in activity tempo may increase the amount of time noise levels are elevated in the region of influence. However, TA Mud Flats and Anzio Beach are areas with high levels of vessel traffic year round. Therefore, the increase in noise levels is not expected to significantly alter the underwater noise regime.

The Joint Logistics Over-the-Shore training involves the operations of ground vehicles. Pile driving conducted as part of Joint Logistics Over-the-Shore activities generates impulsive noise in the same areas affected by impulsive explosives noise, and these sounds could be annoying to some people in the area. Pile driving occurring during Joint Logistics Over-the-Shore exercises takes place over one to three weeks, and consists of impact installation and vibratory extraction of steel pipe piles. The impulsive noise generated during impact pile driving differs from the anthropogenic noises expected during the training activities analyzed in this EA. Impulsive sound may cause injury to animals (particularly fishes) at close range and may induce short-term behavioral responses from animals further away. However, due to the short duration of pile driving activities and the mitigation measures in place during pile driving, no cumulative impacts are anticipated.

The continuing Navy activities on JEB Little Creek beach/dune training areas generates noise in the same area that would be affected by Navy Explosive Ordnance Disposal under Alternative 1 of this EA. Ongoing use is limited to 1.4 pounds net explosive weight or less while explosives used under Alternative 1 would be as large 1.25 pounds net explosive weight. Similarly, use of flash-bangs along the shoreline areas by non-USFF units would continue to occur in the same areas used in the Proposed Action. While this training would occur in the same area as under the Proposed Action, the Proposed Action would add only two training events per year; therefore, no significant cumulative impacts would occur.

JEB Fort Story

Construction and operations of the Small Arms Testing and Evaluation Compound on JEB Fort Story generates additional noise in TA Small Arms Testing and Evaluation Compound, which overlaps with blank-round firing noise and ground vehicle noise generated by the Proposed Action. Operations at the Small Arms Testing and Evaluation Compound have increased the number of explosive events of JEB Fort story by 400 per year. A noise monitoring program was implemented and a set of safety lights installed along Atlantic Avenue to assist in warning people of Small Arms Testing and Evaluation Compound explosive training exercises. In addition, staff on JEB Fort Story are provided with hearing protection as needed in compliance with the DoD Hearing Conservation Program. Firing of breaching rounds and other relatively small explosive events as part of the Proposed Action would generate noise in the same area, but not at the same intensity as the explosives used in Small Arms Testing and Evaluation Compound. No complaints have been received in recent years regarding explosives noise.

Dam Neck Annex and Camp Pendleton

In addition to the Proposed Action, the beaches at Dam Neck Annex would support the U.S. Marine Corps Amphibious Assault Vehicle Training activities. Marine Corps training at Dam Neck Annex beaches are similar to beach landings from amphibious craft analyzed under the Proposed Action. Boaters hearing amphibious craft operations may be annoyed. However, boaters do not often stay in one place for long periods of time, and so are only be exposed to elevated noise levels briefly. Amphibious craft pilots generally avoid operating close to non-participating vessels to minimize collision risk and as part of being a good neighbor. The greater separation distance results in reduced noise levels for the civilian vessels. The Proposed Action amphibious craft combined with U.S. Marine Corps amphibious craft operations would not result in significant cumulative impacts since these vessels are typically operated to maintain distance from non-participating vessels, thereby minimizing public exposure to elevated noise levels.

The infrastructure improvements and repairs at Dam Neck Annex and Camp Pendleton may generate short-term noise associated with the use of construction equipment. However, this type of activity is typically short in duration and intermittent. Therefore, no significant cumulative impacts would occur.

NALF Fentress

Since NALF Fentress is an auxiliary landing field for Naval Air Station Oceana and Naval Station Norfolk, the noise environment is dominated by ongoing fixed-wing and rotary aircraft operations. Additional vehicle training also occurs at this location; however, vehicle noise would primarily occur within the installation boundary. Noise associated with the Proposed Action is audible at the closest residences, but not at levels considered disturbing. Therefore, the Proposed Action in combination with past, present, and future actions would not result in cumulative noise impacts.

NWS Yorktown

Roadway improvements to Interstate 64 adjacent to NWS Yorktown would generate temporary noise level increases along the roadway during construction and long term very minor changes in noise distribution (i.e., traffic paths slightly adjusted).

The construction of a Small Arms Range Training Facility in close proximity to 2nd Fleet Anti-terrorism Security Team Company Headquarters at NWS Yorktown generated short-term noise impacts related to the use of construction equipment. Ongoing operations on NWS Yorktown are part of the existing noise environment (i.e., rotary aircraft and small arms range operations) and, as such were considered as part of the existing noise environment. Noise generated during construction and operation of a multipurpose small arms range facility a short distance from the Marine Corps Security Force Regiment was determined to have no significant impacts. The Proposed Action in combination with the ongoing activities at NWS Yorktown would not result in significant cumulative impacts since noise levels would not disturb the closest noise-sensitive locations.

First Landing State Park

Noise associated with park improvements would be expected to occur over short-durations and be intermittent, consistent with construction projects. The Proposed Action does not result in significant noise impacts as the actions are limited to personnel movement; therefore, no significant cumulative impacts would occur.

Southern Branch of the Elizabeth River

Recreational and commercial boating along the Southern Branch of the Elizabeth River is ongoing and is part of the existing ambient noise environment. Continuation of military surface vessel activity in the context of similar ongoing recreational and commercial boating activity would not result in substantive disturbances or annoyance to people nearby.

The Virginia Outdoors Foundation easement is present adjacent to the Proposed Action blank-fire training area. As a result, the land is managed as a conservation area and development would not occur. The lack of development limits the potential for noise levels to impact the public in this area. Therefore, the Proposed Action combined with the past, present, and future actions would not result in significant cumulative impacts as blank-fire training would be relatively infrequent (i.e., 30 events per year).

Where there is an overlap in the noise regions of influence between the Proposed Action and past, present, and future actions, noise impacts would be less than significant. Past, present, and reasonably foreseeable future project regions of influence that overlap with the Proposed Action region of influence occur in intensities, durations, and contexts at which their impacts are not significant either alone or in cumulatively with the Proposed Action.

5.4.6 Public Health and Safety

5.4.6.1 Description of Geographic Study Area

The region of influence for public health and safety includes training locations where Navy training coexists with the public (First Landing State Park and the Southern Branch of the Elizabeth River). Since analysis presented in Section 4.6 (Public Health and Safety), determined that no public health and safety impacts would occur due to use of the park trails, only the Southern Branch of the Elizabeth River is analyzed for cumulative impacts on public health and safety.

5.4.6.2 Relevant Past, Present, and Future Actions

Past, present, or reasonably foreseeable actions that might interact with the affected public health and safety of the Proposed Action are identified in Table 5-9.

Table 5-9. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Public Health and Safety Cumulative Impacts

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	Community	Region	Recreational boating in Hampton Roads	x
Past, present, and foreseeable	Community	Region	Commercial boating in Hampton Roads	x
Foreseeable	DoD/ Community	Elizabeth River	Elizabeth River and Southern Branch Navigation Improvements	x

Key: DoD = Department of Defense.

5.4.6.3 Cumulative Impact Analysis

As noted in Section 3.6 (Public Health and Safety), there would be no potential hearing impacts to the public resulting from Navy training; resulting off-installation training-related noise would not occur at levels that could result in hearing loss. In addition, the public would not be exposed to hazardous materials and waste, thus no impacts to public health would occur from implementation of the Proposed Action and no cumulative impacts to public health would occur.

As described in Section 3.6 (Public Health and Safety), the Navy practices safe navigation. SOPs require that Navy vessel operators are alert at all times, travel at a safe speed for the prevailing conditions, observe no wake zones, use state-of the-art satellite navigational systems, and are trained to take proper action to avoid collisions.

The Navy also uses highly qualified operators on small vessels to maintain awareness of the surrounding environment. The presence of recreational and commercial boating along the Elizabeth River is an ongoing activity that is an opportunity for public interaction with military training. Continued implementation of SOPs and practices minimizes the potential for interaction between Navy vessels and other vessels. In addition, the implementation of navigation improvements (Table 5-9) would enhance vessel movement throughout the Southern Branch of the Elizabeth River; therefore, no significant cumulative impacts on public safety would occur.

The Proposed Action includes the firing of blank rounds that result in expended brass casings in close proximity to the firing weapon. At a designated area on the Southern Branch of the Elizabeth River, the majority of these expended casings are captured within Navy vessels. Since in-water Navy training events include SOPs that preclude blank-fire activities within the Southern Branch of the Elizabeth River if non-participants are present within 200 feet of small vessels, no cumulative impacts associated with public interaction of the public with expended brass casings would occur. Consequently, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future actions, would not result in significant cumulative impacts to public health and safety within the region of influence.

5.4.7 Socioeconomics

5.4.7.1 Description of Geographic Study Area

The region of influence for socioeconomics includes Navy installations and non-Navy owned training locations included in this EA.

5.4.7.2 Relevant Past, Present, and Future Actions

Past, present, or reasonably foreseeable actions that might interact with the affected socioeconomics (recreational activities and commercial and recreational transportation and fishing) of the Proposed Action are identified in Table 5-10.

Table 5-10. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Socioeconomics Cumulative Impacts

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	U.S. Navy	Region	Atlantic Fleet Training and Testing	o
Past, present, and foreseeable	U.S. Navy	Region	In-Water Pile Driving Activities at Navy Installations in Hampton Roads, Virginia	x
Past, present, and foreseeable	DoD	Region	Rotary and Fixed-wing Aircraft Training	x
Past, present, and foreseeable	U.S. Navy	JEB Little Creek-Fort Story	Joint Logistics Over-the-Shore Training at JEB Little Creek – Fort Story	o
Past, present, and foreseeable	DoD	JEB Little Creek	Military activities	x
Past, present, and foreseeable	DoD	JEB Fort Story	Military activities	o
Past, present, and foreseeable	DoD	Dam Neck Annex	Military activities	o
Past, present, and foreseeable	Community	NALF Fentress	Community Use of Installation	x
Past, present, and foreseeable	DoD	NALF Fentress	Military activities	o
Present and foreseeable	Federal Highway Administration and Virginia Department of Transportation	NWS Yorktown and Cheatham Annex	Interstate 64 Peninsula Study	o
Past	U.S. Navy	NWS Yorktown	Small Arms Training Facility in the NWS Yorktown Area	o
Past, present and foreseeable	DoD	NWS Yorktown	Military training activities	o
Past, present, and foreseeable	VADCR	First Landing State Park	First Landing State Park Master Plan	+
Past, present and Foreseeable	DoD	Cheatham Annex	Military activities	o
Past, present, and foreseeable	Community	Region	Recreational boating in Hampton Roads	x
Past, present, and foreseeable	Community	Region	Commercial boating in Hampton Roads	x
Past, present, and foreseeable	USFWS	Region	Back Bay National Wildlife Refuge Comprehensive Conservation Plan	+

Table 5-10. Past, Present, and Reasonably Foreseeable Actions that May Contribute to Socioeconomics Cumulative Impacts [Continued]

Action timeframe (past, present, or foreseeable)	*Agency or Proponent*	*Location*	*Action Name*	*Impacts*
Key: + (positive impacts), m (mitigated impacts), o (no significant impacts), x (potential but not determined/analyzed impacts)				
Past, present, and foreseeable	Community	Region	Chesapeake Bay Preservation Area	+
Past, present, and foreseeable	DoD	Region	Oyster Reef Restoration Program	+
Past, present, and foreseeable	Community	Elizabeth River	Elizabeth River Project	+
Foreseeable	DoD/ Community	Elizabeth River	Elizabeth River and Southern Branch Navigation Improvements	+
Past, present, and foreseeable	Community	Elizabeth River	Virginia Outdoors Foundation easement	+

Key: DoD = Department of Defense; JEB = Joint Expeditionary Base; NALF = Naval Auxiliary Landing Field; NWS = Naval Weapons Station; VADCR = Virginia Department of Conservation and Recreation.

5.4.7.3 Cumulative Impact Analysis

Impacts associated with the Proposed Action and past, present, and future activities in the Hampton Roads Region include continued use of waterways and lands for training activities by the military. The military has been training in the Hampton Roads region for decades and therefore, certain noise and vessel traffic associated with the military's past and present activities are familiar to most local recreational and commercial users. Activities such as fixed-wing and rotary aircraft operations are ongoing in the region and the noise associated with these activities are reflected in the existing environment. In addition, Proposed Action training that includes explosives on land and weapons firing (blank-fire and non-lethal training ammunition) in beach/dune training areas along with the operation of amphibious craft in support of beach landings may generate noise off-installation, including on adjacent waterways. These actions, when combined with past, present, and future activities such as recreational and commercial boating, small arms training, and short-term construction projects, generate noise that would be minor compared to the existing environment and would not significantly impact recreational activities in the region.

Commercial and recreational boating along the Elizabeth River is an ongoing activity that is an opportunity for public interaction with military training. However, Navy vessel traffic is consistent with commercial and recreational vessel traffic within the Southern Branch of the Elizabeth River. In addition, the Navy adheres to SOPs during training activities involving weapons firing – blank-fire and vessel movement which reduce the potential for interaction between the public and the Navy. Therefore, public interaction associated with vessel movement along the Southern Branch of the Elizabeth River does not impact commercial and recreational traffic in the region.

Community activities conducted at NALF Fentress, and other similar proposed future actions, would be managed to avoid user conflicts. In addition, the Hampton Roads Joint Land Use Study identified zoning guidance to minimize conflicts between NALF Fentress and adjacent land uses, including recreational activities.

Regional programs such as the Back Bay National Wildlife Refuge Comprehensive Conservation Plan, community management of the Chesapeake Bay Preservation Area and Elizabeth River Project, and implementation of the Oyster Reef Restoration Program and Elizabeth River Navigation Improvements strive to improve recreational use of the region by improving water quality and conserving the natural environment. In addition, the Virginia Outdoors Foundation easement present along the Southern Branch of the Elizabeth River serves to maintain the area as conservation land, thus providing an overall positive impact on the region's recreational use. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects, would not result in significant cumulative impacts to socioeconomic resources within the region of influence.

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6 OTHER CONSIDERATIONS REQUIRED BY NEPA

6.1 Consistency with Other Federal, State, and Local Laws, Plans, Policies, and Regulations

In accordance with 40 Code of Federal Regulations section 1502.16(c), analysis of environmental consequences shall include discussion of possible conflicts between the Proposed Action and the objectives of federal, regional, state and local land use plans, policies, and controls. Activities associated with the Proposed Action would comply with applicable requirements with respect to the human environment. Table 6-1 identifies the principal federal and state laws and regulations that are applicable to the Proposed Action, and describes briefly how compliance with these laws and regulations would be accomplished.

Table 6-1. Principal Federal and State Laws Applicable to the Proposed Action

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
National Environmental Policy Act (NEPA) (42 U.S.C. section 4321 et seq.); CEQ NEPA implementing regulations (40 CFR parts 1500–1508; Navy procedures for Implementing NEPA (32 CFR part 775 and OPNAVINST 5090.1D)	The Navy has prepared this EA to evaluate the potential impacts of conducting the Proposed Action. This EA was prepared in accordance with NEPA, CEQ NEPA implementing regulations, and Navy procedures for implementing NEPA.
Clean Air Act (42 U.S.C. section 7401 et seq.)	Hampton Roads is in attainment for National Ambient Air Quality Standards. A formal General Conformity analysis is not required (Section 4.1, Air Quality).
Clean Water Act (33 U.S.C. section 1251 et seq.)	The Navy concluded that there would be no adverse effects on water quality as a result of the Proposed Action (Section 4.2, Water Resources).
Coastal Zone Management Act (16 U.S.C. section 1451 et seq.)	Virginia Coastal Consistency Determination has been completed for the Proposed Action (Appendix B, Coastal Consistency Determination). The Virginia Department of Environmental Quality concurred with the Navy's determination that the Proposed Action is consistent to the maximum extent practicable with the Coastal Zone Management Program, provided all applicable permits and approvals are obtained.
National Historic Preservation Act (Section 106, 54 U.S.C. section 300101 et seq.)	The Navy has consulted with the Virginia State Historic Preservation Officer (Section 4.4, Cultural Resources) and the Virginia State Historic Preservation Officer has concurred that the project would have no adverse effect on historic resources.
Endangered Species Act (16 U.S.C. section 1531 et seq.)	The Navy has determined that the Proposed Action would have no effect on the small whorled pogonia, roseate tern, and West Indian manatee. The Navy has determined that the Proposed Action may affect, but is not likely to adversely affect, piping plover, red knot, northern long-eared bat, Atlantic sturgeon, nesting loggerhead sea turtle, nesting Kemp's ridley sea turtle, and nesting green sea turtle; therefore, consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service was initiated. The USFWS Information for Planning and Conservation (IPaC) Consultation (Consultation Code: 05E2VA00-2015-SLI-3232) for this project was completed and submitted to the USFWS with a self-certification letter and project review package on August 25, 2017. After this submittal, the Navy was

Table 6-1. Principal Federal and State Laws Applicable to the Proposed Action [Continued]

Federal, State, Local, and Regional Land Use Plans, Policies, and Controls	*Status of Compliance*
	advised that a Memorandum of Understanding between the Navy and USFWS for sea turtle management at JEB Fort Story was being canceled for the upcoming 2018 season. Therefore, the Navy is updating its USFWS consultation to account for this change. Via letter dated December 19, 2017, NMFS concurred with the Navy's determination that VACAPES inland training activities are not likely to adversely affect any NMFS ESA-listed species, and NMFS clarified that effects from a temporary increase in turbidity are not likely to adversely affect sturgeon because any effects on sturgeon caused by the temporary disturbance of habitat are extremely unlikely, and, therefore, discountable.
Marine Mammal Protection Act (16 U.S.C. section 1361 et seq.)	The Navy has determined that the Proposed Action would not result in the reasonably foreseeable "take" of a marine mammal species (Atlantic bottlenose dolphin, West Indian manatee, and harbor seal) by harassment, injury, or mortality as defined under the Marine Mammal Protection Act; therefore, an application for takings under the Marine Mammal Protection Act is not required.
Migratory Bird Treaty Act (16 U.S.C. sections 703–712)	The Navy has determined that the Proposed Action (i.e., PTEA – explosives on land) may result in the "take" of migratory birds. The Proposed Action, however, is a military readiness activity; therefore, "take" is in compliance with the MBTA. Under the MBTA regulations applicable to military readiness activities (50 CFR Part 21), the USFWS has promulgated a rule that authorizes the incidental take of migratory birds provided they do not result in a significant adverse effect on a population of a migratory bird species. These proposed training activities would not result in a significant adverse impact on a population of a migratory bird species.
Magnuson-Stevens Fishery Conservation and Management Reauthorization Act	The Navy determined that the Proposed Action would result in minimal adverse effects to EFH and HAPC found within the Southern Branch of the Elizabeth River. Therefore, consultation with National Marine Fisheries Service (NMFS) was undertaken. Via letter dated December 8, 2017, NMFS concurred with the Navy's determination that VACAPES inland training activities along the Southern Branch of the Elizabeth River will not substantially adversely affect EFH, or sandbar shark and summer flounder habitat areas of particular concern and had no conservation recommendations to provide.
Executive Order 13175, Consultation and Coordination with Indian Tribal Governments	The Navy has initiated government-to-government consultation with potentially affected federally recognized tribes, regarding their concerns about potential impacts on Tribal rights or Tribal resources under the proposed training activities evaluated in this EA.

Key: CEQ = Council on Environmental Quality; OPNAVINST = Office of Chief of Naval Operations Instruction; CFR = Code of Federal Regulations; JEB = Joint Expeditionary Base; MBTA = Migratory Bird Treaty Act; NWS = Naval Weapons Station; PTEA = primary training event activity; TBD = to be determined; U.S.C. = United States Code; USFWS = U.S. Fish and Wildlife Service.

6.1.1 Coastal Zone Management

Through the Coastal Zone Management Act of 1972, Congress established national policy to preserve, protect, develop, restore, or enhance resources in the coastal zone. This Act encourages coastal states

to properly manage use of their coasts and coastal resources, prepare and implement coastal management programs, and provide for public and governmental participation in decisions affecting the coastal zone. To this end, the Coastal Zone Management Act imparts an obligation upon federal agencies whose actions or activities affect any land or water use or natural resource of the coastal zone to be carried out in a manner consistent to the maximum extent practicable with the enforceable policies of federally approved state coastal management programs. However, Federal lands, which are "lands the use of which is by law subject solely to the discretion of the Federal Government, its officers, or agents," are statutorily excluded from the State's "coastal uses or resources." If, however, the proposed federal activity affects coastal uses or resources beyond the boundaries of the federal property (i.e., has spillover effects), the Coastal Zone Management Act Section 307 federal consistency requirement applies. As a federal agency, the Navy is required to determine whether its proposed activities would affect the coastal zone. This takes the form of a consistency determination, a negative determination, or a determination that no further action is necessary.

The Virginia Coastal Zone Management Program lays out the policy to guide the use, protection, and development of land and ocean resources within the state's coastal zone. Potential impacts to applicable resources that are subject to the State's program have been addressed in the respective Environmental Consequences sections of this document. In addition, the Navy has determined that the Proposed Action will be fully consistent with Virginia's Coastal Zone Management Program. The Navy delivered the Coastal Consistency Determination for Alternative 2 to the Virginia Department of Environmental Quality via letter dated August 17, 2017, and invited concurrence from the Commonwealth of Virginia (Appendix B, Coastal Consistency Determination). On October 25, 2017, the Virginia Department of Environmental Quality concurred with the Navy's determination that the Proposed Action is consistent to the maximum extent practicable with the Coastal Zone Management Program provided all applicable permits and approvals are obtained.

6.1.2 Relationship between Short-Term Use of the Environment and Long-Term Productivity

NEPA requires an analysis of the relationship between a project's short-term impacts on the environment and the effects that these 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 refers to the possibility that choosing one development site reduces future flexibility in pursuing other options, or that using a parcel of land or other resources often eliminates the possibility of other uses at that site.

Implementation of the Proposed Action would not result in any environmental impacts that would narrow the range of beneficial uses of the study area. The Proposed Action would not represent a new short-term use and would not impact the productivity of the natural environment.

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