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**ENVIRONMENTAL ASSESSMENT for
Gambo Creek Bridge Replacement
at Naval Support Facility Dahlgren
Dahlgren, Virginia**

February 2020



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Abstract

Designation: Environmental Assessment

Title of Proposed Action: Gambo Creek Bridge Replacement

Project Location: Naval Support Facility Dahlgren, Virginia

Lead Agency for the EA: Department of the Navy

Affected Region: Dahlgren, Virginia

Action Proponent: Naval Support Activity South Potomac

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Date: February 2020

Naval Support Activity South Potomac (NSASP), a command of the United States Navy, has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA), as implemented by the Council on Environmental Quality Regulations and Navy Regulations for implementing NEPA. The Proposed Action would provide a bridge that carries Tisdale Road traffic over Gambo Creek at Naval Support Facility Dahlgren in the vicinity of the current Gambo Creek Bridge (#158). The proposed bridge would meet current Federal Highway Administration engineering standards for widths and load ratings to safely and adequately support mission activities and safety requirements. The proposed bridge would be located either on the same footprint of the current bridge, or just south of it. Furthermore, under two of the action alternatives, the existing bridge would be demolished. The Proposed Action would include replacing utilities (i.e., electric, water, sewer, and communications), constructing new foundation pilings, and realigning the roadway if required. This EA evaluates the potential environmental impacts associated with three action alternatives and the No Action Alternative on the following resource areas in detail: air quality, water resources, geological resources, cultural resources, biological resources, infrastructure, and hazardous materials and wastes.



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Executive Summary

ES.1 Proposed Action

Naval Support Activity South Potomac (NSASP), a command of the United States (U.S.) Navy (hereinafter, jointly referred to as the Navy), proposes to provide a bridge that carries Tisdale Road traffic over Gambo Creek at Naval Support Facility (NSF) Dahlgren. The current Gambo Creek Bridge (#158) was built in 1940 for internal installation support and shows advanced deterioration. Current conditions of the structure have resulted in vehicle weight restrictions that prohibit installation fire trucks from crossing the bridge. The replacement bridge would meet current Federal Highway Administration (FHWA) engineering standards to safely and adequately support mission activities and safety requirements. The proposed bridge would be located either on the same footprint of the current bridge, or just south of the current alignment. The Proposed Action would include replacing utilities (i.e., electric, water, sewer, and communications) that are located on the current bridge. New foundation pilings would be required, and the existing bridge would be demolished under two of the action alternatives. Construction activities are anticipated to begin in fiscal year 2021.

ES.2 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to provide a bridge meeting FHWA engineering standards to carry Tisdale Road traffic over Gambo Creek. Gambo Creek Bridge (#158) is not able to meet current FHWA engineering standards for widths and load ratings to support fire trucks, delivery trucks, and other utility trucks and equipment that provide critical services 24 hours per day, seven days a week for the installation community and mission.

The Proposed Action is needed because the existing physical bridge structure is deteriorating. The last inspection concluded that the bridge was structurally deficient, functionally obsolete by current FHWA standards, and in poor condition overall. The report affirmed that the structure had deteriorated to a point that makes it unsafe for its originally designed load capacity. The inspection report recommended that the speed limit be reduced to 20 miles per hour across the bridge and the load rating reduced from 20 tons to 9 tons. As a result, the weight restrictions have prohibited fire trucks from crossing the bridge. In addition to the weight restrictions, Gambo Creek Bridge does not meet current FHWA engineering standards for widths to adequately support fire trucks. The bridge is considered functionally obsolete as a two-lane vehicular facility according to current FHWA standards because it is too narrow.

ES.3 Alternatives Considered

Alternatives were developed for analysis based upon the following reasonable alternative screening factors:

- The bridge must be aligned to connect Tisdale Road on both sides of Gambo Creek.
- The bridge should not be on a curved horizontal alignment.
- The bridge should not be located in a sump (low point) in the roadway profile as bridge deck sumps result in an area where water collects and can lead to safety and maintenance issues.
- The location should have a low potential for unexploded ordnance (UXO).
- The excavation of undisturbed, natural habitat should be limited to the extent possible.

The Navy is considering three action alternatives that meet the purpose of and need for the Proposed Action and a No Action Alternative. Under Alternative 1 (Preferred Alternative), the existing bridge would be completely demolished and then rebuilt on the existing footprint. Under Alternative 2, the bridge would be built to the south of the existing footprint. Once the new bridge is completed, the existing bridge would be demolished. Under Alternative 3, the existing bridge would be repaired, and a parallel bridge would be built to the south of the existing footprint. Under the No Action Alternative, the Proposed Action would not be implemented. Two utility options are analyzed with each alternative. Under Option A, aboveground utilities, the utility lines would be reattached to the new bridge or the existing bridge. Under Option B, the utility lines would be removed from the existing bridge and installed underground across Gambo Creek.

ES.4 Summary of Environmental Resources Evaluated in the Environmental Assessment

Council on Environmental Quality (CEQ) regulations, National Environmental Policy Act (NEPA), and Navy instructions for implementing NEPA, specify that an Environmental Assessment (EA) should address those resource areas potentially subject to impacts. In addition, the level of analysis should be commensurate with the anticipated level of environmental impact.

Important resources analyzed in the EA include water, cultural, and biological resources; and hazardous materials and wastes. All alternatives would result in impacts on wetlands, an increase in impervious surface, potential impacts on cultural resources, and a loss of trees. In addition, the project site is adjacent to several installation restoration (IR) sites. NSF Dahlgren is within Virginia's coastal zone; therefore, a Federal Consistency Determination will be submitted to the Virginia Department of Environmental Quality (DEQ).

The following resource areas have been addressed in detail in this EA: air quality, water resources, geological resources, cultural resources, biological resources, infrastructure, and hazardous materials and wastes. Because potential impacts were considered to be negligible or nonexistent, the following resources were not evaluated in detail in this EA: land use, visual resources, noise, transportation, public health and safety, socioeconomics, and environmental justice.

ES.5 Summary of Potential Environmental Consequences of the Action Alternatives and Major Mitigating Actions

Table ES-1 provides a tabular summary of the potential impacts on the resources associated with the No Action Alternative and the three action alternatives. Table ES-2 compares the potential impacts of implementing either of the utility options, one of which would be selected under any of the action alternatives. The impacts described in Table ES-2 would be in addition to those described in Table ES-1. These additional impacts from either utility option would not change the overall conclusion of the effects determination presented for each alternative and resource area.

Table ES-1 Summary of Potential Impacts on Resource Areas

<i>Resource Area</i>	<i>No Action Alternative</i>	<i>Alternative 1: Existing Bridge Alignment (Preferred Alternative)</i>	<i>Alternative 2: Southern Bridge Alignment</i>	<i>Alternative 3: Parallel Bridge Alignment</i>
Air Quality	Minor regional increases from growth in the county. No significant impacts.	Short-term, minor emissions from operating heavy equipment during site preparation, construction, and demolition activities. No increases in the long term. No significant impacts.	Short-term, minor emissions from operating heavy equipment during site preparation, construction, and demolition activities. No increases in the long term. No significant impacts.	Short-term, minor emissions from operating heavy equipment during site preparation, construction, and demolition activities. No increases in the long term. No significant impacts.
Water Resources	No change in baseline conditions. No significant impacts.	Short-term, minor impacts on jurisdictional wetlands and water bodies from construction disturbance. New abutments and bridge aprons would require fill within jurisdictional wetlands. Any fill within jurisdictional wetlands would be permitted and mitigated in accordance with Section 404 of the Clean Water Act. With mitigations and Section 404 permitting for impacts on jurisdictional wetlands, no significant impacts.	Similar to Alternative 1, but with increased impacts on jurisdictional wetlands and surface waters due to the larger footprint. With mitigations and Section 404 permitting for impacts on jurisdictional wetlands, no significant impacts.	Similar to Alternative 1, but with increased impacts on jurisdictional wetlands and surface waters due to the larger footprint. With mitigations and Section 404 permitting for impacts on jurisdictional wetlands, no significant impacts.
Geological Resources	No change in baseline conditions. No significant impacts.	Short- and long-term, minor effects from construction and increases in impervious surface. No significant impacts.	Short- and long-term, minor effects from construction and increases in impervious surface. No significant impacts.	Short- and long-term, minor effects from construction and increases in impervious surface. No significant impacts.

Resource Area	No Action Alternative	Alternative 1: Existing Bridge Alignment (Preferred Alternative)	Alternative 2: Southern Bridge Alignment	Alternative 3: Parallel Bridge Alignment
Cultural Resources	Long-term, minor, adverse effect on the Dahlgren Mainside Historic District due to bridge deterioration. No significant impacts.	Long-term, minor, adverse effect on the Dahlgren Mainside Historic District due to bridge demolition. Long-term, minor adverse effect on Site 44KG0157 due to bridge construction. With the execution of mitigation measures between the Navy and the SHPO in an MOA, no significant impacts.	Long-term, minor, adverse effect on the Dahlgren Mainside Historic District due to bridge demolition. Long-term, minor adverse effect on Site 44KG0157 due to bridge and road construction. With the execution of mitigation measures between the Navy and the SHPO in an MOA, no significant impacts.	Beneficial effects on the bridge due to planned repairs. Long-term, minor, adverse effect on Site 44KG0157 due to bridge and road construction. With the execution of mitigation measures between the Navy and the SHPO in an MOA, no significant impacts.
Biological Resources	No change in baseline conditions. No significant impacts.	Short-term, negligible impacts on terrestrial wildlife, Atlantic and shortnose sturgeon, bald eagle, northern long-eared bat, tri-colored bat, little brown bat, and peregrine falcon; these resources would be only temporarily or indirectly affected, if at all, during construction activities. Short-term, minor impacts on vegetation, aquatic habitats, SAV, alewife, blueback herring, red hake, and monarch butterfly; these resources could occur within the project area and be affected by construction but affected habitat and duration would be minimal. No significant impacts.	Short-term, negligible impacts on Atlantic and shortnose sturgeon, northern long-eared bat, tri-colored bat, little brown bat, and peregrine falcon; these resources would be only temporarily or indirectly affected, if at all, during construction activities. Short-term, minor impacts on aquatic habitats, SAV, alewife, blueback herring, red hake, and bald eagle; these resources could occur within the project area and be affected by construction but affected habitat and duration would be minimal. Long-term, negligible impacts on vegetation, terrestrial wildlife, and monarch butterfly. No significant impacts.	Short-term, negligible impacts on Atlantic and shortnose sturgeon, northern long-eared bat, tri-colored bat, little brown bat, and peregrine falcon; these resources would be only temporarily or indirectly affected, if at all, during construction activities. Short-term, minor impacts on SAV, alewife, and blueback herring, and red hake. Long-term, negligible impacts on bald eagle and terrestrial wildlife; these resources could occur within the project area and be affected by construction but affected habitat and duration would be minimal. Long-term minor impacts on vegetation, aquatic habitats, and monarch butterfly. No significant impacts.

Resource Area	No Action Alternative	Alternative 1: Existing Bridge Alignment (Preferred Alternative)	Alternative 2: Southern Bridge Alignment	Alternative 3: Parallel Bridge Alignment
Infrastructure	Ongoing minimal maintenance could result in bridge closure and loss of utility services. Major impacts are possible.	Short-term, minor impacts on utility service. Long-term beneficial effects from a safer, more reliable bridge. No significant impacts.	Short-term, minor impacts on utility service; possible relocation of communications panels or lines. Long-term beneficial effects from a safer, more reliable bridge. No significant impacts.	Short-term, minor impacts on utility service; possible relocation of communications panels or lines. Improvements over No Action for long-term safety and reliability, but less beneficial than Alternatives 1 or 2. No significant impacts.
Hazardous Materials and Wastes	Continued operation with existing management plans and policies that govern hazardous materials and wastes. No significant impact.	Short-term impacts associated with increased use of hazardous materials and generation of hazardous wastes. Demolished bridge components may contain special hazards; wastes would be characterized and disposed of appropriately. Short-term potential to encounter hazards associated with the active range and contamination from Installation Restoration Site 001; surveys and clearing/remediation prior to beginning construction activities would occur. No significant impacts.	Similar to but greater than Alternative 1 because of the larger project site, which increases use of hazardous materials and generation of hazardous waste, and the potential to encounter munitions-related hazards and contamination. No significant impacts.	Similar to but slightly less than Alternative 2 because the bridge would not be demolished, which decreases potential for hazardous waste or special hazards. No significant impacts.

Key: MOA = Memorandum of Agreement; SAV = submerged aquatic vegetation; SHPO = State Historic Preservation Office.

Table ES-2 Summary of Potential Impacts for Options for Bridge Utilities

<i>Resource Area</i>	<i>Option A: Aboveground Utilities</i>	<i>Option B: Underground Utilities</i>
Air Quality	Negligible emissions during utility installation. No significant impacts when combined with any of the action alternatives described in Table ES-1.	Short-term, negligible-to-minor emissions from trenching and drilling equipment and associated fugitive dust during construction. No significant impacts when combined with any of the action alternatives described in Table ES-1.
Water Resources	Short-term, minor impacts. No significant impacts when combined with any of the action alternatives described in Table ES-1.	Short-term, minor impacts. Trenching and drilling for utilities would occur outside of and below wetlands. No significant impacts when combined with any of the action alternatives described in Table ES-1.
Geological Resources	Negligible impacts during construction. No significant impacts when combined with any of the action alternatives described in Table ES-1.	Short-term, minor impacts during construction. No significant impacts when combined with any of the action alternatives described in Table ES-1.
Cultural Resources	No adverse effects; no significant impacts when combined with any of the action alternatives described in Table ES-1.	If trenching or drilling for utilities avoids known archaeological sites, there is no need for mitigation measures. No significant impacts when combined with any of the action alternatives described in Table ES-1.
Biological Resources	Short-term, negligible impacts on biological resources. No significant impacts when combined with any of the action alternatives described in Table ES-1.	Short-term, negligible impacts on biological resources. No significant impacts when combined with any of the action alternatives described in Table ES-1.
Infrastructure	Short-term, minor impacts on utility service. No significant impacts when combined with any of the action alternatives described in Table ES-1.	Short-term, minor impacts on utility service. No significant impacts when combined with any of the action alternatives described in Table ES-1.
Hazardous Materials and Wastes	Negligible additional impacts when combined with any of the action alternatives described in Table ES-1.	Minor additional impacts from increased potential for munitions-related hazards and contamination and increased hazardous materials use during construction. No significant impacts when combined with any of the action alternatives described in Table ES-1.

ES.6 Public Involvement

The Navy will prepare and circulate a Draft EA to inform the public of the Proposed Action and to allow the opportunity for public review and comment. The review period will begin with a Notice of Availability published in the *Free Lance-Star*. The Draft EA will be available on a Navy website.

The Navy will coordinate or consult with agencies including the U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA), Virginia DEQ, and Virginia Department of Historic Resources (VDHR) regarding the Proposed Action. The Navy will also consult with seven federally recognized Native American Tribes in Virginia who may have an interest in this location.

All public agency coordination, comments, and responses are provided in Appendix B.

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ENVIRONMENTAL ASSESSMENT
Gambo Creek Bridge Replacement
Naval Support Facility Dahlgren, Dahlgren, Virginia
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Abbreviations and Acronyms

Acronym	Definition	Acronym	Definition
ACM	asbestos-containing material	NEPA	National Environmental Policy Act
AHPA	Archeological and Historic Preservation Act	NHPA	National Historic Preservation Act
AIRFA	American Indian Religious Freedom Act	NOAA	National Oceanic and Atmospheric Administration
APE	area of potential effect	NPDES	National Pollutant Discharge Elimination System
ARPA	Archaeological Resources Protection Act	NRHP	National Register of Historic Places
BMP	best management practice	NSASP	Naval Support Activity South Potomac
CEQ	Council on Environmental Quality	NSF	Naval Support Facility
CFR	Code of Federal Regulations	PCB	polychlorinated biphenyl
CO ₂ e	carbon dioxide equivalent	PM _{2.5}	fine particulate matter less than or equal to 2.5 micrometers in diameter
CZMA	Coastal Zone Management Act	PM ₁₀	suspended particulate matter less than or equal to 10 micrometers in diameter
CZMP	Coastal Zone Management Program	ppt	parts per thousand
DEQ	Department of Environmental Quality	RCRA	Resource Conservation and Recovery Act
DERP	Defense Environmental Restoration Program	RDT&E	research, development, test, and evaluation
DoD	United States Department of Defense	SAV	submerged aquatic vegetation
EA	Environmental Assessment	SHPO	State Historic Preservation Office
EEA	Explosives Experimental Area	SWPPP	Stormwater Pollution Prevention Plan
EFH	Essential Fish Habitat	TSCA	Toxic Substances Control Act
EO	Executive Order	U.S.	United States
EXWC	Engineering and Expeditionary Warfare Center	U.S.C.	United States Code
FHWA	Federal Highway Administration	USACE	U.S. Army Corps of Engineers
GHG	greenhouse gas	USEPA	U.S. Environmental Protection Agency
IR	installation restoration	USFWS	U.S. Fish and Wildlife Service
LBP	lead-based paint	UXO	unexploded ordnance
mNSR	minor New Source Review	VDHR	Virginia Department of Historic Resources
MOA	Memorandum of Agreement		
NAAQS	National Ambient Air Quality Standards		
NAGPRA	Native American Graves Protection and Repatriation Act		
NAVFAC	Naval Facilities Engineering Command		

1 Purpose of and Need for the Proposed Action

1.1 Introduction

Naval Support Activity South Potomac (NSASP), a command of the United States (U.S.) Navy (hereinafter, jointly referred to as the Navy), proposes to provide a bridge that carries Tisdale Road traffic over Gambo Creek at Naval Support Facility (NSF) Dahlgren. The current Gambo Creek Bridge (#158) was built in 1940 for internal installation support and shows advanced deterioration. Current conditions of the structure have resulted in vehicle weight restrictions that prohibit installation fire trucks from crossing the bridge. The replacement bridge would meet current Federal Highway Administration (FHWA) engineering standards to safely and adequately support mission activities and safety requirements. The proposed bridge would be located either on the same footprint of the current bridge, or just south of the current alignment. The Proposed Action would include replacing utilities (i.e., electric, water, sewer, and communications) that are located on the current bridge. In addition, new foundation pilings would be required. Furthermore, under two of the action alternatives, the existing bridge would be demolished. Tisdale Road may require realignment on either side of the bridge span. Construction activities are anticipated to begin in fiscal year 2021.

The Navy has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA), as implemented by the Council on Environmental Quality (CEQ) Regulations and Navy Regulations for implementing NEPA.

1.2 Background

NSF Dahlgren was founded in 1918 as the Naval Proving Ground. It was initially established on 4,000 acres bounded by the Potomac River and Machodoc Creek in King George County as a remote extension of Maryland's Indian Head Proving Ground for testing naval guns. The site was named the Lower Station, Dahlgren Naval Proving Ground in honor of Rear Admiral John Adolphus Dahlgren. The location on the Potomac River was specifically chosen for the development of a long ballistic range, required for the testing of modern, high-powered munitions.

In 2003, Commander, Navy Installations Command (CNIC) officially stood up with the sole charter of providing shore installation management services to all Navy activities. As part of CNIC, all naval installations within the National Capital Region are aligned with Naval District Washington. In November 2005, Naval Support Activity South Potomac was commissioned as a component of Naval District Washington with responsibility for shore installation management for the Dahlgren base, which was renamed NSF Dahlgren (CNIC, 2019). Over the past 100 years, activities at NSF Dahlgren have expanded to include research and development of weapons systems, development of fire control and targeting software, satellite geodesy, and development of new ammunition and gun systems.

Gambo Creek Bridge (#158) currently carries Tisdale Road traffic over Gambo Creek at NSF Dahlgren. The bridge is a reinforced concrete structure that was built in 1940 primarily as a railroad trestle for the movement of 16-inch guns mounted on flatcars. When rail car movement was phased out, it became a vehicular bridge. The bridge spans 493 feet and has 120 wooden piles. A bridge inspection conducted in 2018 concluded that Gambo Creek Bridge was structurally deficient, functionally obsolete by current FHWA standards, and in poor condition overall. The report affirmed that the structure had deteriorated to a point that it is unsafe for its originally designed load capacity. The inspection report recommended

that the speed limit be reduced to 20 miles per hour across the bridge and the load rating reduced from 20 tons to 9 tons.

1.3 Location

NSF Dahlgren is in King George County, Virginia, along the western bank of the Potomac River approximately 23 miles east of Fredericksburg and 55 miles south of Washington, DC (Figure 1-1). NSF Dahlgren is divided into two land masses by Upper Machodoc Creek: (1) Mainside; and (2) the Explosives Experimental Area (EEA; also known as Pumpkin Neck). Most of the development at NSF Dahlgren is on Mainside, which consists of 2,677 acres and 4.2 miles of shoreline along the western bank of the Potomac River and the northern bank of Upper Machodoc Creek. Development on Mainside primarily consists of operational and support activities and military housing. The EEA, a critical testing area, consists of 1,641 acres and 6.1 miles of shoreline along the western bank of the Potomac River and the southern bank of Upper Machodoc Creek. The Proposed Action would occur on the Mainside of NSF Dahlgren.

1.4 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to provide a bridge meeting FHWA engineering standards to carry Tisdale Road traffic over Gambo Creek. Gambo Creek Bridge (#158) is not able to meet current FHWA engineering standards for widths and load ratings to support fire trucks, delivery trucks, and other utility trucks and equipment that provide critical services 24 hours per day, seven days a week for the installation community and mission. The bridge is an important transportation route that connects the northern and southern parts of Mainside. The bridge provides the most efficient route between the work centers at the southern part of Mainside (Public Works, Naval Surface Warfare Center Dahlgren Division ranges, community support) and the northern part of Mainside (Naval Surface Warfare Center Dahlgren Division Terminal Range, Joint Warfare Analysis Center, and other Naval Surface Warfare Center Dahlgren Division facilities).

The Proposed Action is needed because the existing physical bridge structure is deteriorating. The last inspection—conducted by Naval Facilities Engineering Command (NAVFAC) Engineering and Expeditionary Warfare Center (EXWC) on June 15, 2018—concluded that bridge #158 was structurally deficient, functionally obsolete by current FHWA standards, and in poor condition overall. The report affirmed that the structure had deteriorated to a point that makes it unsafe for its originally designed load capacity. Examples of deterioration cited in the report include exposed and heavily corroded steel reinforcing components, deep honeycombing, severe spalling on piles and piers (up to six feet long by six inches wide and two inches deep), section loss on exposed concrete piles (up to 20 percent), longitudinal cracking in structural beams (up to a quarter inch wide), and deep alligator cracking and chipping on the deck (up to one inch deep).

The inspection report recommended that the speed limit be reduced to 20 miles per hour across the bridge and the load rating reduced from 20 tons to 9 tons. As a result, the weight restrictions have prohibited fire trucks from crossing the bridge. There are two bridges (#158 and #159) that cross Gambo Creek. Both bridges can be used to travel between the northern and southern parts of Mainside, but Gambo Creek Bridge (#158) offers a shorter route. The weight restriction means that trucks must use bridge #159, which is a longer route that increases the emergency response time and the risk of a negative outcome in the event of a fire or other life-threatening emergency. Per Department of Defense (DoD) Instruction 6055.06, *DoD Fire and Emergency Services Program*, the Fire Department's first arriving company needs to be on scene within seven minutes of dispatch. The current emergency



Figure 1-1 Location Map

response time using bridge #159 is nine minutes (Navy, 2018), which exceeds the seven-minute response time requirement stated in DoD Instruction 6055.06. Furthermore, bridge #159 is sometimes closed due to firing range and explosives operations and has traffic from the morning and evening rush hours; both of these factors can increase the travel time between the fire station on the western portion of Mainside and destinations on the eastern portion. In addition to the weight restrictions, Gambo Creek Bridge does not meet current FHWA engineering standards for widths to adequately support fire trucks. The bridge is considered functionally obsolete as a two-lane vehicular facility according to current FHWA standards because it is too narrow. The bridge provides only the bare minimum clearance for two lanes of motor traffic (18 feet), and vehicles cross the bridge as if it were a one-way crossing even though it is not demarcated as such.

1.5 Scope of Environmental Assessment

This EA includes an analysis of potential environmental impacts associated with three action alternatives and the No Action Alternative. The environmental resource areas analyzed in detail in this EA include air quality, water resources, geological resources, cultural resources, biological resources, infrastructure, and hazardous materials and waste. The study area for each resource analyzed may differ due to how the Proposed Action interacts with or affects the resource. For instance, the study area for geological resources might only include the construction footprint of the bridge whereas the study area for air quality would expand out to include areas that may be affected by construction emissions.

The Navy has prepared this EA based on federal and state laws, statutes, regulations, and policies pertinent to the implementation of the Proposed Action, which are listed in Appendix A. A description of the Proposed Action's consistency with these laws, policies, and regulations, as well as the names of regulatory agencies responsible for their implementation, is also presented in Appendix A.

1.6 Public and Agency Participation and Intergovernmental Coordination

Regulations from the CEQ direct agencies to involve the public in preparing and implementing their NEPA procedures. All public involvement and agency correspondence materials will be added to Appendix B as they occur.

The Navy will publish a Notice of Availability of the Draft EA for three consecutive days in the *Free Lance-Star*. The notice will describe the Proposed Action, solicit public comments on the Draft EA, provide dates of the public comment period, and announce where a copy of the EA is available for review.

The Navy will coordinate or consult with agencies regarding the Proposed Action, to include the U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA), Virginia Department of Environmental Quality (DEQ), and Virginia Department of Historic Resources (VDHR). The Navy will also consult with seven federally recognized Native American Tribes in Virginia who may have an interest in this location.

2 Proposed Action and Alternatives

2.1 Proposed Action

The Navy proposes to provide a bridge to carry Tisdale Road traffic over Gambo Creek at Naval Support Facility (NSF) Dahlgren. Gambo Creek Bridge (#158), the existing bridge, is a reinforced concrete structure that was built in 1940 primarily as a railroad trestle for the movement of 16-inch guns mounted on flatcars. When rail car movement was phased out, it became a vehicular bridge. The bridge spans 493 feet and has 120 wooden piles.

The proposed bridge would be constructed of steel pile foundations and a prestressed concrete spread box beam structure. It would be sized for two-way traffic and capable of supporting a minimum of a 50,500-pound (25.25-ton) truck, which is the heaviest vehicle in the fire department's fleet. Although the height of the proposed bridge is unknown at this time, it would likely be similar to the height of the existing bridge, which is 13 feet 3 inches from the bottom of concrete pier (pile caps) to the top of concrete decking (approximately 15 feet above mean sea level). The bridge would meet FHWA engineering standards.

Each pier (pile cap) of the existing bridge contains approximately 10 piles each, and there are 23 piers; both the east and west abutments each contain approximately 14 piles each. Existing deteriorated pilings would not likely be removed due to the excessive force needed to pull them out; they would be cut at the mud line and left in place. For the purposes of this EA, it is assumed that a comparable number of pilings and piers would be used at the proposed bridge, though the footprint and piling locations would be determined during project design.

Proposed site improvements would include a bridge structure, steel piles, guardrails, concrete abutments, concrete wingwalls, and traffic control fencing and gates. Site preparation would include the excavation and the temporary shoring for abutments and piers. During construction, cofferdams would be used when work below the waterline is required. The design of and materials for the cofferdam would be chosen during the bridge design. It is likely that steel beams would be driven into the mud; then corrugated steel or fiberglass panels would be used with a sealant to prevent water leaking through the corrugations at the fastener locations. For the purposes of this EA, it is assumed that cofferdams would be used to the extent necessary along portions of Gambo Creek and would not completely block flow during construction activities.

A temporary access road for construction would be built along with an approach roadway. A laydown area would be located on the western side of the existing bridge in an area used to house equipment; this area would be cleared for storage associated with the proposed bridge. The laydown area is approximately 78,400 square feet. This area consists mostly of gravel and mowed grass (see photograph, Figure 2-1); it does not overlap with wetlands, floodplains, or cultural sites, and it would not disturb nearby Installation Restoration (IR) Site 006.

The project site boundary for each alternative includes an area 100 feet north of the existing bridge to include land, surface water, wetlands, and IR Site 001 (an old bombing range). This area could be used to create a temporary construction road that would be accessed from the laydown area west of the bridge. Cofferdams would likely be installed in this region of Gambo Creek.



Figure 2-1 Photograph of Proposed Laydown Area

Any discharge of dredge or fill into jurisdictional wetlands under the Proposed Action would be mitigated in accordance with Section 404 of the Clean Water Act.

Utility lines would be relocated during construction. The following utilities run either under or on the bridge structure and would be relocated under the Proposed Action: three-phase electrical lines and conduit; 6-inch cast iron drainage piping for storm drain for the bridge deck; 25-pair telephone coaxial cable and jacketing; 100-pair telephone coaxial cable inside a rigid galvanized steel conduit; 2- to 8-inch galvanized steel conduits with sealed joints containing protected network fiber optic lines; 4-inch cast iron sanitary sewer force main; and 10-inch cast iron potable waterline with insulation and jacketing. The Navy is considering reattaching utilities to the proposed bridge or boring utilities underneath Gambo Creek using a technique such as horizontal directional drilling.

This area of the installation has the potential for some unexploded ordnance (UXO) underneath the surface. Areas that have not been previously disturbed must be scanned and cleared of UXO before the ground can be excavated. The region north of the current bridge location would need exploratory sweeping to determine the extent of UXO present.

Construction activities are anticipated to begin in fiscal year 2021. Depending on the alternative selected, the bridge would be closed either intermittently or continuously for approximately two years during construction activities, and traffic would be diverted. Tisdale Road, which leads to the Gambo Creek Bridge, would be closed between River Bank Road (on the western side) and Small Caliber Drive (on the eastern side) to vehicle traffic. The detour route during construction would divert traffic around

using Caskey Road, Bennion Road, Blandy Boulevard near B-Gate and around to the C-Gate Area (e.g., Buildings 1480, 1490, 1450, 1450T, 1452, 1470, and 1480).

2.2 Screening Factors

NEPA's implementing regulations provide guidance on the consideration of alternatives to a federally proposed action and require rigorous exploration and objective evaluation of reasonable alternatives. Only those alternatives determined to be reasonable and to meet the purpose and need require detailed analysis.

Potential location alternatives that meet the purpose and need were evaluated against the following screening factors:

- The bridge must be aligned to connect Tisdale Road on both sides of Gambo Creek.
- The bridge should not be on a curved horizontal alignment.
- The bridge should not be located in a sump (low point) in the roadway profile as bridge deck sumps result in an area where water collects and can lead to safety and maintenance issues.
- The location should have a low potential for unexploded ordnance (UXO).
- The excavation of undisturbed, natural habitat should be limited to the extent possible.

Various alternatives were evaluated against the screening factors. The alternatives considered for detailed analysis that meet the above screening criteria include:

- No Action Alternative
- Existing Bridge Alignment (Alternative 1, the Navy's Preferred Alternative)
- Southern Bridge Alignment (Alternative 2)
- Parallel Bridge Alignment (Alternative 3)

2.3 Alternatives Carried Forward for Analysis

Based on the reasonable alternative screening factors and meeting the purpose and need for the Proposed Action, three action alternatives were identified and will be analyzed within this Environmental Assessment (EA). Summaries of the maximum estimated areas for each action alternative are shown in Table 2-1.

Table 2-1 Summary of Calculations for Action Alternatives

<i>Project Component</i>	<i>Alternative 1: Existing Bridge Alignment (Preferred Alternative)</i>	<i>Alternative 2: Southern Bridge Alignment</i>	<i>Alternative 3: Parallel Bridge Alignment</i>
Bridge Demolition	8,730	8,730	No change
New Bridge	20,100	20,100	9,980
Area of Disturbance	80,080	131,340	117,520
Land Disturbance	4,880	55,820	47,330
Increase in Impervious Surface	2,920	30,040	22,210
Surface Water	11,330	13,450	12,480
Wetland Disturbance ¹	63,860	75,520	70,190
Tree Loss	3,340	10,790	8,290

Notes: All projects sizes are in square feet. Project sizes were primarily estimated using GIS data. No design plans are available, so these numbers are approximations only. ¹Wetland disturbance includes temporary impacts.

2.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur. This alternative consists of continued use of the current bridge with minimal maintenance. Due to continued deterioration and resulting weight limit restrictions, fire department vehicle use is prohibited, which negatively affects emergency response times (as discussed in Section 1.4).

The deterioration of the bridge deck and support components would continue under the No Action Alternative, ultimately resulting in bridge failure and eventual closure. This would pose a higher level of risk for life and property in the event of an emergency. In addition, critical research, development, test, and evaluation (RDT&E) missions, facilities, and operations would also be exposed to increased risk from the failure of electric power and water supply lines. Structural failure would also result in the loss of utility services to various portions of the installation. The No Action Alternative would not meet the purpose of and need for the Proposed Action; however, the No Action Alternative is carried forward for analysis in this EA to establish a comparative baseline for analysis.

2.3.2 Alternative 1: Existing Bridge Alignment (Preferred Alternative)

Under Alternative 1, the existing bridge would be completely demolished and then rebuilt on the existing footprint. Demolition would include the bridge deck, deck beams and columns, spandrel columns and structure, and concrete pier footing. The timber piles would be cut at the mudline to keep Gambo Creek flowing as normally as possible due to tidal surges.

Building the new bridge on the same footprint would ensure that the alignment requirements discussed in Section 2.2 would be met. This would minimize the amount of roadwork needed on either side of the bridge since it is the straightest line connecting Tisdale Road. The bridge would be built to carry two-way traffic and capable of supporting a 50,500-pound truck, at a minimum. The Alternative 1 bridge alignment is shown Figure 2-2 and Figure 2-3.

Approximately 10,600 cubic feet of soil would be excavated, and 141,300 cubic feet of fill material would be brought to the site. The new bridge would be outside IR Site 001, which is north of the existing bridge, though temporary activities for construction access could occur in this site as described in Section 2.1. IR Site 061B, which is adjacent to Tisdale Road and the existing bridge, is closed and has no development restrictions.

As previously mentioned, this area of the installation has the potential for some UXO below the surface. However, using the same bridge footprint would minimize the need for UXO clearance.



Figure 2-2 Alternative 1 (Existing) Alignment, Aerial View

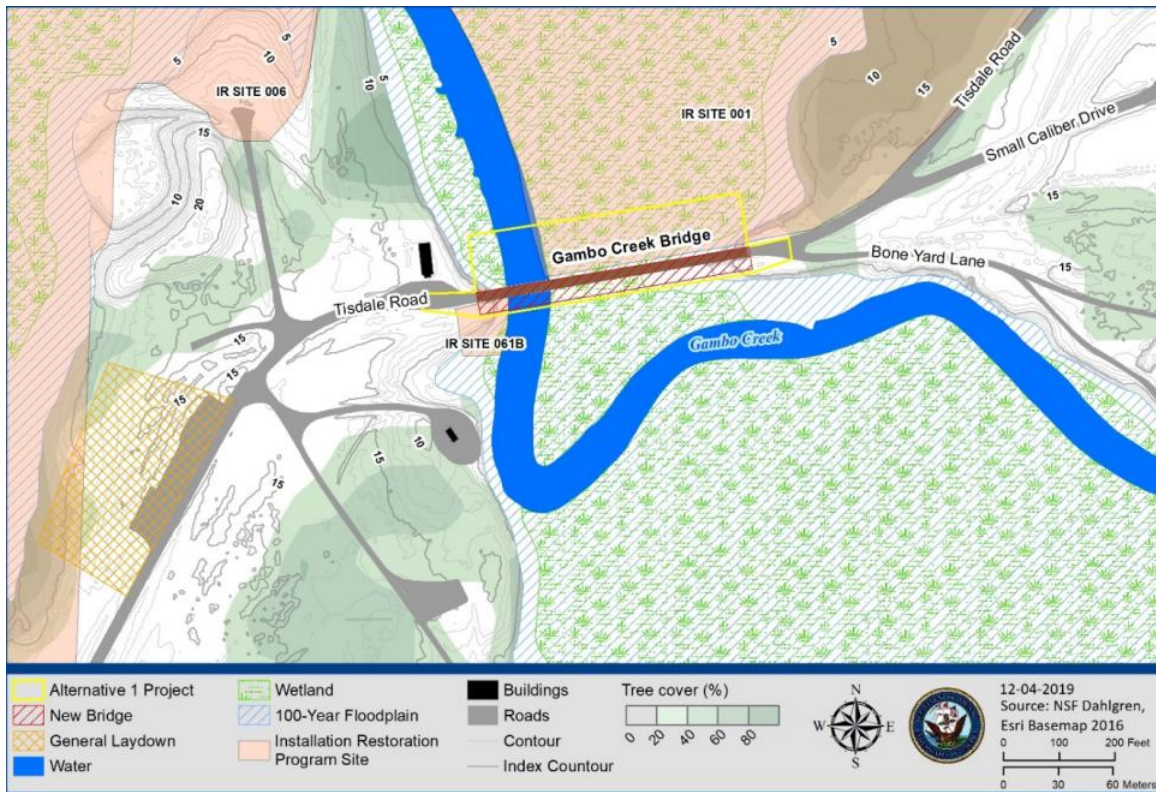


Figure 2-3 Alternative 1 (Existing) Alignment, Map View

2.3.3 Alternative 2: Southern Bridge Alignment

Under Alternative 2, the bridge would be built to the south of the existing footprint. The demolition of the bridge would be completed as discussed under Alternative 1. The new bridge would be constructed to the specifications outlined in Section 2.1. Once the new bridge is completed, the existing bridge would be demolished, leaving the existing bridge operational during the majority of construction. The new southern alignment would require additional roadwork on both sides of the approach to the bridge. Laydown and construction access roads would be the same as described in Section 2.1.

Since this footprint has not been previously disturbed, Alternative 2 would require more scanning and clearance of UXO as compared to Alternative 1. In addition, there would be impacts on wetlands and cultural resources. The Alternative 2 bridge alignment is shown in Figure 2-4 and Figure 2-5 (note that locations of archaeological resources are sensitive and not public information). The Southern Alignment could also conflict with communications lines that currently run on the southern edge of the existing bridge decking. The fiber runs for these cables from the termination panels (one located near North Range Road and one located just on the eastern side of the bridge near Bone Yard Lane) are at the maximum pull distance for 32-count and 64-count fiber lines. The eastern side termination would need to be relocated farther east and pulling the fiber strands would be challenging.



Figure 2-4 Alternative 2 (Southern) Alignment, Aerial View

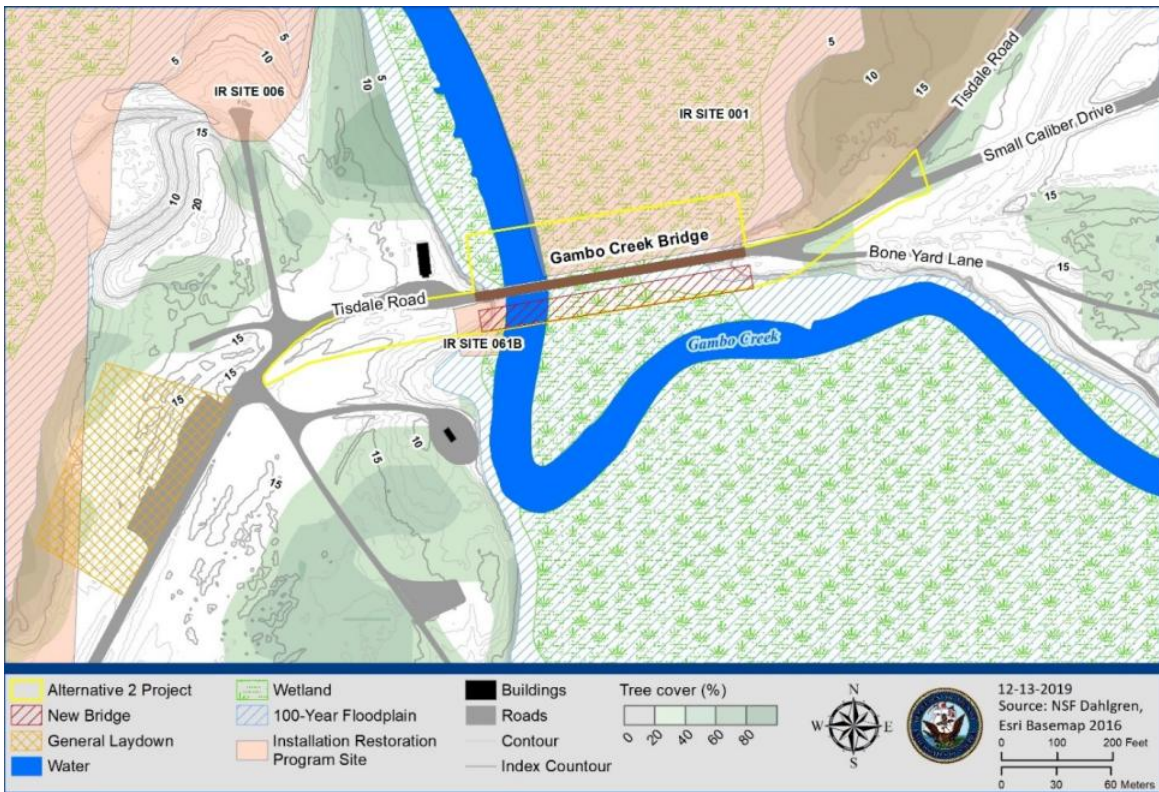


Figure 2-5 Alternative 2 (Southern) Alignment, Map View

2.3.4 Alternative 3: Parallel Bridge Alignment

Under Alternative 3, the existing bridge would not be demolished. The existing bridge would be repaired, and a parallel bridge would be built to the south of the existing footprint (shown in Figure 2-6 and Figure 2-7), which is similar to the alignment for Alternative 2. Laydown and construction access roads would be the same as described in Section 2.1. The width of the existing bridge would not be expanded, and the new bridge to the south would have the width of a single lane. The resulting parallel bridge configuration would allow traffic to cross Gambo Creek in both directions at the same time, with a separate bridge for each direction of traffic flow.

Given the advanced state of deterioration present on the existing bridge, it cannot be feasibly repaired to return it to its original weight limits. Consequently, the current weight restrictions that prohibit fire trucks from crossing the bridge would not be lifted. However, fire trucks would be able to use the new bridge to the south in one direction with contraflow lane reversal when traveling between the northern and southern parts of Mainside. It is anticipated that extensive repairs would provide an estimated five-to ten-year lifespan to the existing bridge, and that further repairs would be needed every ten years to keep the current bridge usable.

Similar to Alternative 2, the new southern bridge would require additional roadwork on both sides of the approach. In addition, the area would need to be scanned for UXO, and there would be impacts on wetlands and cultural resources. Communications lines would also require relocating to the east and pulling these fiber strands farther would be very difficult.



Figure 2-6 Alternative 3 (Parallel) Alignment, Aerial View

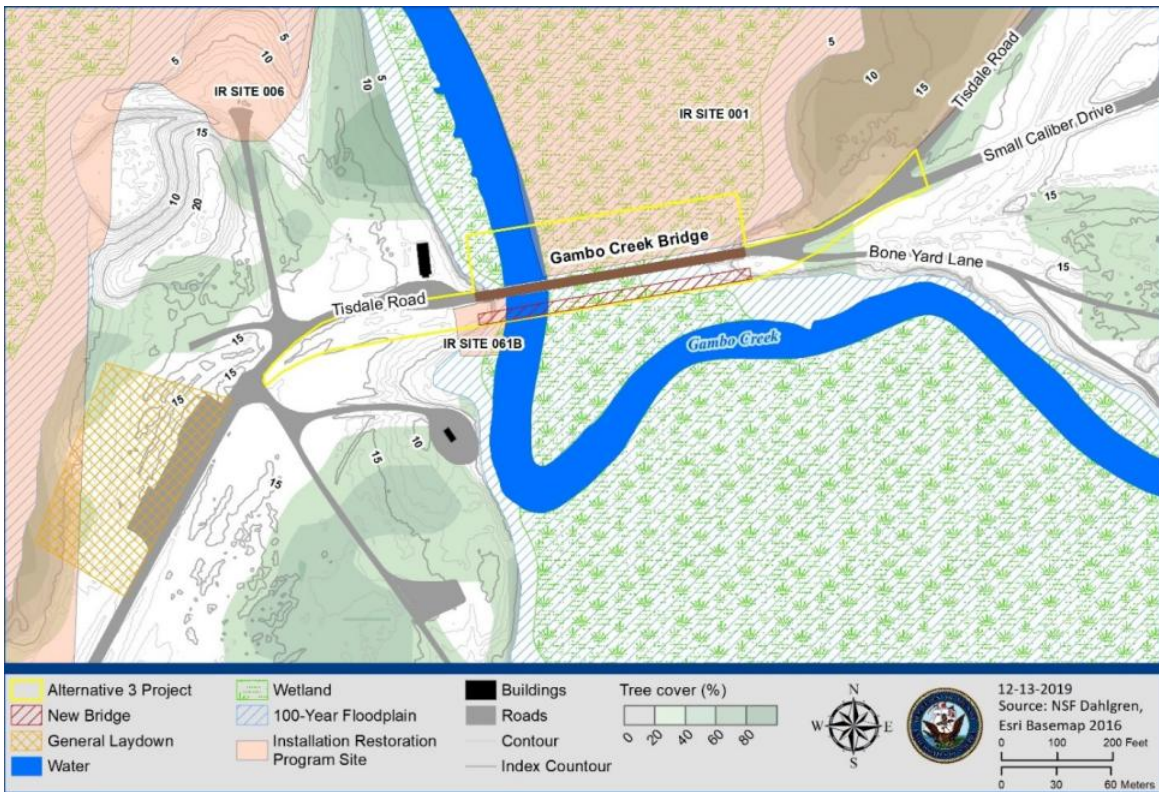


Figure 2-7 Alternative 3 (Parallel) Alignment, Map View

2.3.5 Options for Bridge Utilities

The current Gambo Creek Bridge has utility lines attached to the structure that include water, sanitary sewer, power lines, and telecommunication. Depending on the type of utility, the length for the repair and reattachment of utility lines would generally be between 1,300 to 3,950 linear feet. These utility lines would need to be reattached or relocated for any of the action alternatives. The utility options listed below apply to all three action alternatives. As part of the decision-making process, the Navy will evaluate if there are substantial differences or notable environmental impacts associated with aboveground or belowground utilities for this Proposed Action.

2.3.5.1 Option A: Aboveground Utilities

Under Option A, the utility lines would be reattached to the new bridge once it is constructed. Under Alternative 3, the utility lines would be reattached to the existing bridge that would be repaired.

It is common practice to attach utilities to bridge structures, which is how the existing utilities are along the current Gambo Creek Bridge #158. Aboveground utilities are generally easier to install and maintain than underground utilities. However, the presence of utility conduit on bridges in the long term can make maintenance of the structure more difficult as the utilities must be avoided or protected during heavy equipment operations. Aboveground utilities may also be more vulnerable to damage. Utilities can be installed on bridges by hanging the utility infrastructure, installing it within the deck or railing, or passing it through the bents/supports; the method of attaching the utilities to the bridge under Option A would be a consideration of the design-build process.

2.3.5.2 Option B: Underground Utilities

Under Option B, the utility lines would be removed from the existing bridge and installed underground across Gambo Creek. The study area for Option B spans from the northern point of the level of disturbance for the existing alignment to the southern point of the limit of disturbance for the southern alignment.

Placing utilities underground provides increased protection of those infrastructure components from weather and accidents, which increases long-term utility reliability and safety. Underground utilities are also often less affected by temperature and humidity because these are more constant underground. However, if the utilities need to be repaired, the procedure can be more challenging as compared to aboveground utilities. Some utility trenching would likely be required on land under Option B, but underground utilities would be bored well below the existing creek bed using a technique such as horizontal directional drilling to avoid dredging or using cofferdams during utility construction. However, due to the ground disturbance possible in aquatic habitats, underground utilities could require more permitting conditions.

2.4 Alternatives Considered but not Carried Forward for Detailed Analysis

The following alternatives were considered, but not carried forward for detailed analysis in this EA as they did not meet the purpose and need for the project, nor satisfy the reasonable alternative screening factors presented in Section 2.2.

2.4.1 Restoration and Modernization Alternative

The Restoration and Modernization Alternative consists of repairing the bridge to extend its life by five to ten years. However, due to the current advanced state of deterioration, the bridge could not be restored to meet the vehicle weight limits that the installation mission requires. Therefore, the fire department trucks would not be allowed to cross the bridge in either direction even after the repairs were made. This alternative does not meet the purpose and need for the Proposed Action. As a result, this alternative was considered but is not being carried forward for detailed analysis in the EA.

2.4.2 Northern Bridge Alignment Alternative

Under this alternative, the bridge would be built to the north of the existing footprint and the existing bridge would be demolished. There are several factors in the area of the northern alignment that are not conducive for a vehicle bridge. A building is currently being used within the roadway approach on the western side of Gambo Creek that would require sharp turns on the approach and departure to the bridge or demolition and relocation of that function. As shown in Figure 2-3, Figure 2-5, and Figure 2-7, IR Site 001—an old bombing range—is north of the existing bridge. Remediation activities at this contaminated site have been deferred while test ranges are still operational, and soil contaminants within IR Site 001 would require remediation and cleanup prior to any development. Furthermore, this area has not had previous UXO sweeps and could contain munitions and explosive concerns. For these reasons, this alternative is not being carried forward for detailed analysis in the EA.

2.5 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. BMPs are existing policies, practices, and measures that the Navy would adopt 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 2-2 includes a list of BMPs.

Table 2-2 Best Management Practices

<i>Best Management Practice</i>	<i>Description and Examples</i>	<i>Impacts Reduced/Avoided</i>
Construction equipment	Good housekeeping measures for construction equipment containing petroleum, oil, and/or lubricants, and minimizing sediment transport.	Prevent leeching of construction-related contaminants into groundwater and surface water.
Construction materials	Minimize heavy equipment within wetlands; not storing or fueling non-fixed construction equipment in wetlands; using construction mats to minimize impacts on wetlands soils.	Lessen impacts on the wetlands from construction materials
Erosion and sediment control	Appropriate scheduling and sequencing of construction, silt-fencing, covering soil stockpiles, watering exposed areas, managing wastes (such as construction materials, garbage, and debris) on-site during construction, storing and handling all petroleum products in contained areas, ensuring construction equipment is in good working order and not leaking any fluids before operation.	Minimize adverse impacts on surface water bodies.
In-water sediment controls	Turbidity curtains or other in-water measure to limit sediment disturbance to construction site.	Minimize turbidity in water bodies
Stormwater control	Deep sump catch basins and oil/water separators for the new bridge are examples of controls that could be installed.	Minimize stormwater runoff and improve water quality.
Underwater noise minimization	Incorporate noise reduction during the project design phase, in accordance with regulations and consultation with NOAA Fisheries Habitat Conservation Division; modify timing and duration of pile-driving to occur outside of spawning season (March-May).	Minimize acoustic impacts to marine species.
Construction phasing	Conduct tree removal outside of northern long-eared bat, tri-colored bat, and little brown bat pup season (June 1–July 31). Review vegetation clearing through the Comprehensive Work Approval Process to minimize impacts on monarch butterfly. Review wetland disturbances and in-water work through the Comprehensive Work Approval Process to minimize impacts on northern red-bellied cooter and spotted turtle.	Minimize potential impacts on monarch butterfly, northern red-bellied cooter, spotted turtle, tri-colored bat, and little brown bat (under review for Endangered Species Act listing), and northern long-eared bat (federally threatened species).

3 Affected Environment and Environmental Consequences

This chapter presents a description of the environmental resources and baseline conditions that could be affected from implementing any of the alternatives and an analysis of the potential direct and indirect effects of each alternative.

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), the Council on Environmental Quality (CEQ), and Department of Navy (Navy) guidelines; the discussion of the affected environment (i.e., existing conditions) focuses only on those resource areas potentially subject to impacts. In addition, the level of detail used in describing a resource is commensurate with the anticipated level of potential environmental impact.

“Significantly,” as used in NEPA, requires considerations of both context and intensity. Context means that the significance of an action must be analyzed in several contexts such as society as a whole (e.g., human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of a proposed action. For instance, in the case of a site-specific action, significance would usually depend on the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant. 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 be expected to be significant.

Chapter 3 discusses in detail air quality, water resources, geological resources, cultural resources, biological resources, infrastructure, and hazardous materials and wastes.

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

Land Use: The Proposed Action would replace or modify a deteriorating bridge. There would be no long-term change in functional land use at Naval Support Facility (NSF) Dahlgren. Therefore, land use is not analyzed in detail.

Visual Resources: Under the Proposed Action, a new bridge or repaired bridge could change the viewshed of NSF Dahlgren but would not degrade the visual character of the installation. The existing bridge is deteriorating; if left as-is, the bridge would continue to degrade and would be a visual detraction. A new bridge would be constructed using similar materials, such as steel and concrete (see Figure 3-1). Potential visual impacts on historic resources are discussed in Section 3.4, Cultural Resources. Therefore, visual impacts are not analyzed in detail.



Figure 3-1 Photo of Gambo Creek Bridge Looking Northeast

Airspace: The Proposed Action would not interfere with airspace use at any point during or after construction. Therefore, airspace is not analyzed in detail.

Noise: An assessment of noise includes sources and associated sensitive receptors. The Proposed Action would cause temporary increases in noise levels from construction and/or demolition activities. The ambient noise environment at NSF Dahlgren includes sources such as ordnance tests from small-arms firing, large-caliber-gun firing, and explosive detonations, and from aircraft overflights from helicopters and unmanned aerial vehicles. Gambo Creek Bridge is within an active range area where the Day-Night Average Sound Level noise contours show that noise levels are greater than 70 C-weighted decibels, which are adjusted to account for the frequency weighting produced by ordnance and include penalties for increased noise during nighttime hours (Navy, 2013). There are no noise-sensitive human populations or land uses permitted within this area; therefore, considering the high levels of existing ambient noise, short-term increases from construction noise would not be significant. The Proposed Action would not change long-term noise levels. Therefore, noise effects on human populations are not analyzed in detail.

Potential underwater noise effects on biological resources are discussed in more detail in Section 3.5.

Transportation: The Proposed Action would result in short-term, localized increases in construction-related traffic accessing the laydown area and the Gambo Creek Bridge vicinity. Large construction equipment would be transported to the site and generally remain for the duration of construction. Others, such as heavy trucks for hauling construction/demolition and delivering construction materials, would arrive more frequently, depending on the intensity of construction. On average, one to several trucks would be expected each day, though truck numbers would be higher during the initial site preparation phase. Construction workers would also arrive to and from the installation each day. Short-term, construction-related traffic would only occur while these activities are on-going and would not contribute to long-term changes in transportation volume at NSF Dahlgren.

As discussed in Section 2.1, construction would last approximately two years. During that time, Tisdale Road would be closed either intermittently or continuously, depending on the alternative. Figure 3-2 shows the detour routes that would be followed when Tisdale Road/Gambo Creek Bridge is closed during construction. The route using the northern bridge across Gambo Creek is often restricted due to range and explosive operations, so it would not always be available. The longer route would be available for all vehicles. Traffic along these detour routes would temporarily increase while Tisdale Road traffic is being diverted. A Transportation Improvement Plan was completed for NSF Dahlgren in 2012. An internal arterial analysis was completed at Caskey Road, south of Bennion Road, which is part of the roadway that would be used for the detour route. The level of service B was observed during both the AM and PM peak hours at Caskey Road, south of Bennion (NAVFAC Washington, 2012). Level of service B is considered stable traffic flow with a high degree of freedom to select speed and operating conditions but with some influence from other users (VDOT, 2019). In addition, the detour route is entirely within the installation boundary. As a result, short-term road closures and diversions would result in no long-term changes in transportation volume.

The Proposed Action would be expected to improve transportation systems in the long term. While the existing Gambo Creek Bridge is a two-lane road, it is often treated as a one-lane road because of the narrow width. Furthermore, weight restrictions limit the vehicles that can traverse the bridge. The proposed bridge would provide for two-way traffic and permit vehicles up to 25.25 tons. Overall, these improvements would be beneficial in the long term but not significant for transportation.

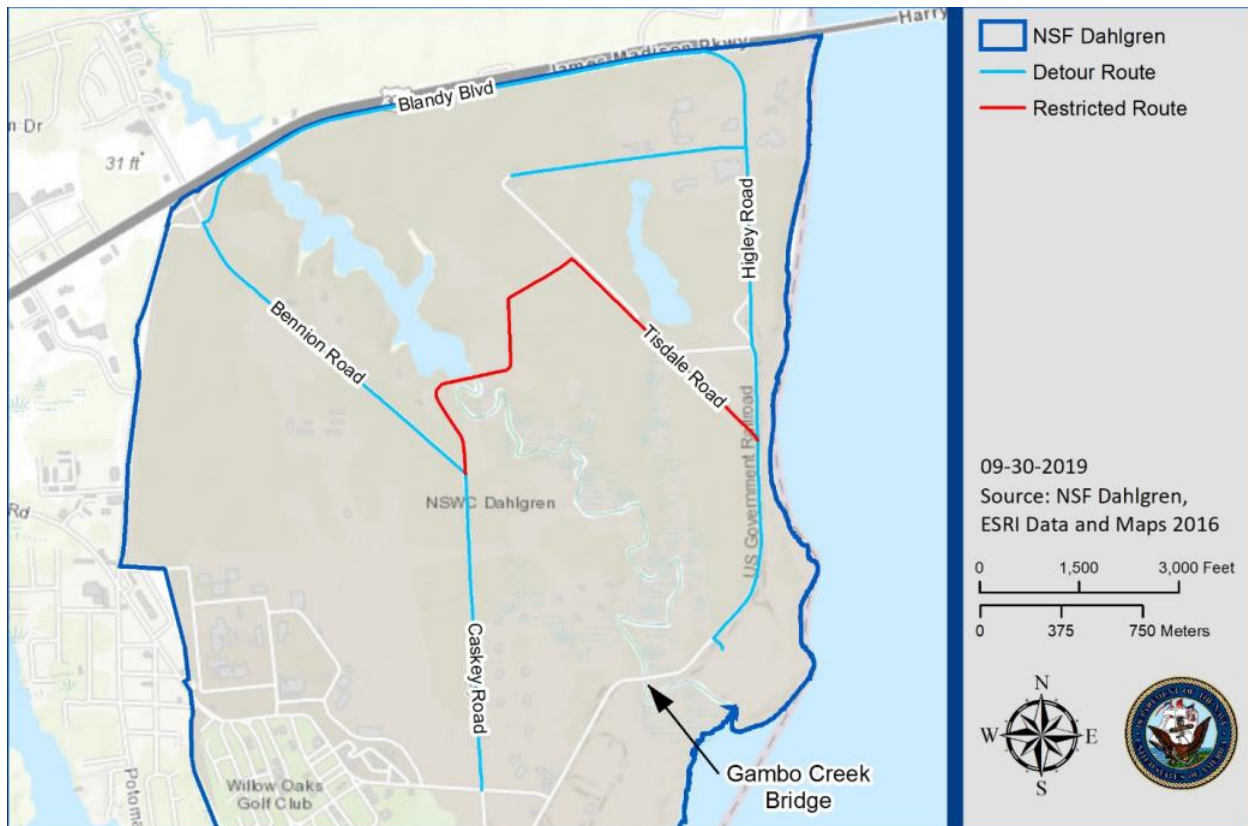


Figure 3-2 Temporary Detour Routes

Public Health and Safety: The Proposed Action is entirely within the boundaries of NSF Dahlgren and partially within an active range. This area is heavily restricted from the public, and Tisdale Road would be closed to through traffic while the road is undergoing active construction, or the bridge structure not passable. Gambo Creek Bridge is within an active range, and there are numerous explosive safety quantity distance arcs throughout the entire project site associated with munitions use and storage. These safety concerns are the same among all the alternatives, and there would be no change in range or explosive safety operations or restrictions.

Due to its location within a range and within various explosive safety arcs, construction activities would be coordinated with Range Operations to ensure that workers would not be present when the range is live. Work at the project site is allowable without further consultation or approvals (Shifflette, 2019). All explosive safety protocol would be followed to ensure a safe construction environment from operational risks.

Construction activities increase short-term safety risks. Contractors performing construction activities would be required to prepare and follow safety protocols appropriate for specific construction and demolition tasks, and to comply with applicable worker safety laws.

In the long term, a new bridge would enhance roadway safety by providing a wider roadway that meets applicable standards. Furthermore, the new bridge would not have the same weight restrictions, allowing fire trucks and other heavy vehicles to use the bridge; the shorter response times for emergency vehicles would also improve installation safety. Therefore, public health and safety is not analyzed in detail.

Impacts associated with special hazards, hazardous wastes, and potential contamination are discussed in Section 3.7, Hazardous Materials and Wastes.

Socioeconomics: The Proposed Action would result in short-term, minor expenditures from construction activities. Construction activities would have no long-lasting effects on the local economy. The Proposed Action would not change the number of personnel employed at NSF Dahlgren. Therefore, socioeconomics is not analyzed in further detail.

Environmental Justice: King George County is in the 41st (state) and 28th (national) percentiles for low-income populations and 41st (state) and 46th (national) percentiles for minority populations (USEPA, 2018). These levels do not meet the U.S. Environmental Protection Agency's (USEPA) recommended threshold of the 80th percentile for further assessing at-risk populations for environmental justice concerns (USEPA, 2016). The Proposed Action would not disproportionately affect minorities or economically disadvantaged populations protected under Executive Order (EO) 12898, *Environmental Justice for Low Income and Minority Populations*. Therefore, environmental justice is not analyzed in detail.

3.1 Air Quality

This discussion of air quality includes criteria pollutants, standards, sources, permitting, and greenhouse gases (GHGs). 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.

Most air pollutants originate from human-made sources, including mobile sources (e.g., cars, trucks, buses), stationary sources (e.g., factories, refineries, power plants), and indoor sources (e.g., some building materials and cleaning solvents). Air pollutants can also be released from natural sources such as forest fires.

3.1.1 Regulatory Setting

3.1.1.1 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 micrometers in diameter (PM₁₀), fine particulate matter less than or equal to 2.5 micrometers in diameter (PM_{2.5}), and lead. 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.

Under the Clean Air Act, 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. Short-term standards are designed to protect against acute health effects, while long-term standards were established to protect against chronic health effects.

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 nonattainment areas. Areas that have transitioned from nonattainment to attainment are designated as maintenance areas and are required to adhere to maintenance plans to ensure continued attainment.

The Clean Air Act requires states to develop a general plan to attain and maintain the NAAQS in all areas of the country and a specific plan to attain the standards for each area designated nonattainment 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.

In addition to the NAAQS for criteria pollutants, national standards exist for hazardous air pollutants, which are regulated under Section 112(b) of the 1990 Clean Air Act Amendments. The *National Emission Standards for Hazardous Air Pollutants* regulate hazardous air pollutant emissions from stationary sources (40 CFR part 61).

3.1.1.2 General Conformity

The USEPA General Conformity Rule applies to federal actions occurring in nonattainment or maintenance areas when the total direct and indirect emissions of nonattainment pollutants (or their precursors) exceed specified thresholds. King George County is unclassified or in attainment for all criteria pollutants (USEPA, 2019). Therefore, the General Conformity Rule does not apply to this project, and a Record of Non-Applicability is not required; General Conformity is not further discussed in this EA.

3.1.1.3 Permitting

New Source Review (Preconstruction Permit)

New projects located at stationary sources and modifications at existing stationary sources are required by the Clean Air Act to evaluate the need for, and potentially obtain, an air pollution permit before commencing construction. This permitting process for stationary sources is called a minor New Source Review (mNSR) permit and is required whether the new source or existing source modification is planned for nonattainment areas or attainment and unclassifiable areas. The Proposed Action would not involve any new or modified stationary air sources.

Title V (Operating Permit)

The Title V Operating Permit Program consolidates all Clean Air Act requirements applicable to the operation of a source. It applies to stationary sources of air pollution that exceed the major stationary source emission thresholds, as well as other non-major sources specified in a particular regulation. The program includes a requirement for payment of permit fees to finance the operating permit program whether implemented by USEPA or a state or local regulator. NSF Dahlgren does not have a Title V permit but does have a synthetic mNSR permit (Registration No. 40307), which contains state and federally enforceable conditions for operating stationary air sources. The Proposed Action would not involve any new or modified stationary air sources or result in changes in NSF Dahlgren's operating permit.

3.1.1.4 Greenhouse Gases

GHGs are gas emissions that trap heat in the atmosphere. These emissions occur from natural processes and human activities. Scientific evidence indicates a trend of increasing global temperature over the past century due in part to an increase in GHG emissions from human activities. The climate change

associated with this global warming is predicted to produce negative economic and social consequences across the globe. CEQ's most recent draft guidance on the consideration of GHGs states that a projection of a proposed action's direct and reasonably foreseeable indirect GHG emissions may be used as a proxy for assessing potential climate effects (CEQ, 2019). GHG emissions are standardized to carbon dioxide, which has a value of one. The carbon dioxide equivalent (CO₂e) 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.

3.1.2 Affected Environment

NSF Dahlgren is within the Northeastern Virginia Intrastate Air Quality Control Region (40 CFR 81.144). The Virginia DEQ is responsible for implementing and enforcing state and federal air quality regulations in Virginia. King George County is unclassified or in attainment for all criteria pollutants (USEPA, 2019).

The most recent emissions inventory for King George County is shown in Table 3-1. Volatile organic compound and nitrogen oxide emissions are used to represent ozone generation because they are precursors of ozone.

Table 3-1 King George County Air Emissions Inventory (2014)

<i>Location</i>	<i>NO_x</i> <i>(tpy)</i>	<i>VOC</i> <i>(tpy)</i>	<i>CO</i> <i>(tpy)</i>	<i>SO₂</i> <i>(tpy)</i>	<i>PM₁₀</i> <i>(tpy)</i>	<i>PM_{2.5}</i> <i>(tpy)</i>
King George County	1,273	5,455	4,830	158	1,512	305

Source: USEPA, 2014.

Key: NO_x = nitrogen oxides; VOC = volatile organic compound; CO = carbon monoxide; SO₂ = sulfur dioxide; PM₁₀ = suspended particulate matter less than or equal to 10 microns in diameter; PM_{2.5} = fine particulate matter less than or equal to 2.5 microns in diameter; tpy = tons per year.

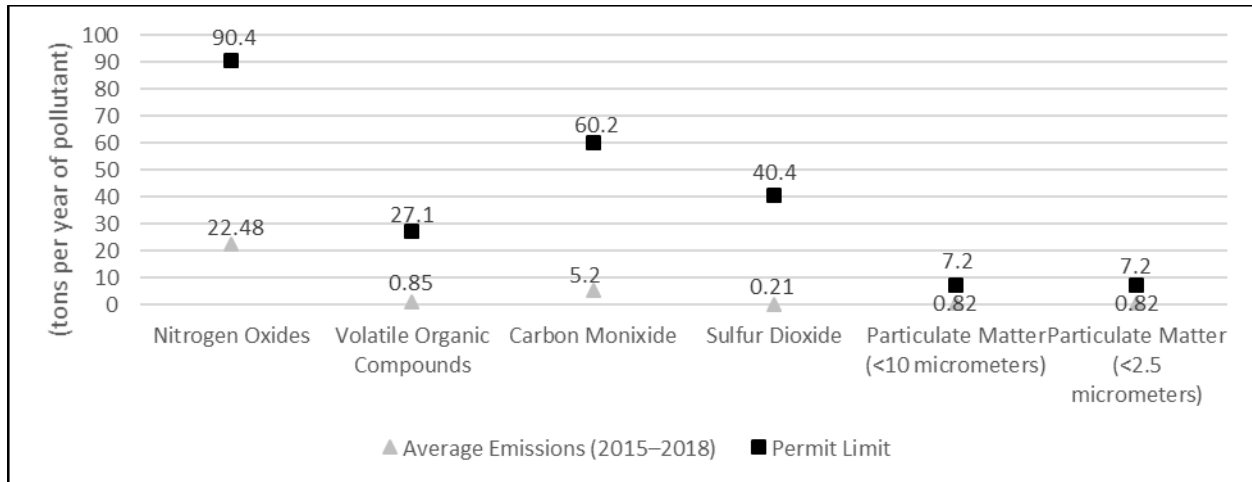
NSF Dahlgren's emissions are covered under a synthetic mNSR permit (Registration No. 40307) issued by Virginia DEQ. The permitted sources of criteria air pollutants at NSF Dahlgren include emissions from stationary sources supporting installation operations, such as boilers, generators, and other processes and equipment from paint booths and degreasers (Virginia DEQ, 2016). Recent annual criteria pollutants emissions and emissions limits for NSF Dahlgren are shown in Table 3-2. Criteria pollutant emissions are consistently well below permitted levels, as illustrated in Figure 3-3.

Table 3-2 Naval Support Facility Dahlgren Air Emissions Inventory (Stationary Sources)

<i>Year</i>	<i>NO_x</i> <i>(tpy)</i>	<i>VOC</i> <i>(tpy)</i>	<i>CO</i> <i>(tpy)</i>	<i>SO₂</i> <i>(tpy)</i>	<i>PM₁₀</i> <i>(tpy)</i>	<i>PM_{2.5}</i> <i>(tpy)</i>
2015	27.3	1.02	6.20	0.18	0.87	0.87
2016	17.9	0.73	4.21	0.25	0.77	0.77
2017	25.9	1.02	5.95	0.22	0.87	0.87
2018	18.8	0.63	4.44	0.17	0.77	0.77
Average, 2015–2018	22.5	0.85	5.20	0.21	0.82	0.82
Annual Facility-wide Limits	90.4	27.1	60.2	40.4	7.2	7.2

Sources: Virginia DEQ, 2016; NSA South Potomac, 2017; NSA South Potomac, 2018; Geil, 2019.

Key: NO_x = nitrogen oxides; VOC = volatile organic compound; CO = carbon monoxide; SO₂ = sulfur dioxide; PM₁₀ = suspended particulate matter less than or equal to 10 microns in diameter; PM_{2.5} = fine particulate matter less than or equal to 2.5 microns in diameter; tpy = tons per year.



Sources: Virginia DEQ, 2016; NSA South Potomac, 2017; NSA South Potomac, 2018; Geil, 2019.

Figure 3-3 Naval Support Facility Dahlgren Air Emissions Inventory (Stationary Sources)

CEQ’s NEPA regulations require evaluation of the degree to which a proposed action affects public health (40 CFR 1508.27). Children, elderly people, and people with illnesses are especially sensitive to the effects of air pollutants; therefore, hospitals, schools, convalescent facilities, and residential areas are sensitive receptors for air quality impacts. Within and just beyond a one-mile radius from Gambo Creek Bridge, children attend Dahlgren Elementary School and two child development centers as well as live in military family housing on NSF Dahlgren, as shown in Figure 3-4. No hospitals, convalescent facilities, or other sensitive air receptors are within the immediate affected environment.

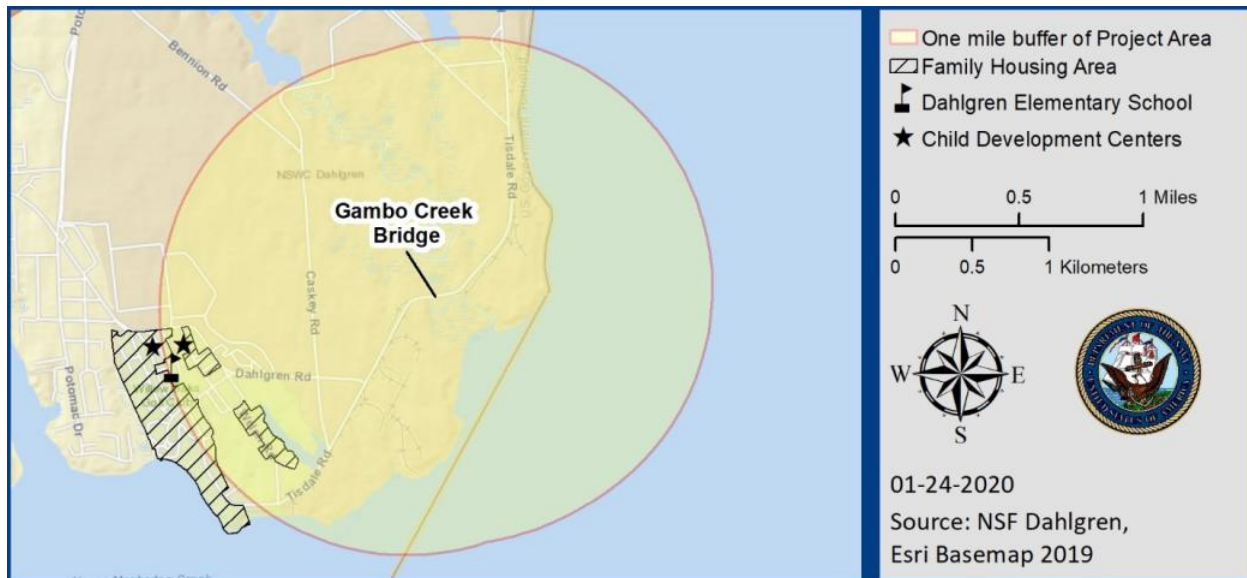


Figure 3-4 Sensitive Air Receptors within the Affected Environment

3.1.3 Environmental Consequences

Effects on air quality are based on estimated direct and indirect emissions associated with the action alternatives. The study area for assessing air quality impacts is King George County, which is in the Northeastern Virginia 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.

3.1.3.1 No Action Alternative

King George County has experienced growth in the recent past and is expected to continue to experience growth into the future. According to the King George Comprehensive Plan, the County's population is expected to increase by 28 percent between 2010 and 2020 (Navy, 2013) and 58 percent between 2010 and 2030 (King George County Planning Commission, 2013). Population and economic growth could increase criteria pollutant emissions in the county and the Northeastern Virginia Intrastate Air Quality Control Region associated with new minor point sources and increased traffic, but these increases are not expected to result in NAAQS violations or noticeably diminish air quality due to the still relatively rural setting of King George County.

Under the No Action Alternative, the Proposed Action would not occur and would not contribute to any changes in baseline air quality. Therefore, no significant impacts on air quality or air resources would occur with implementation of the No Action Alternative.

3.1.3.2 Alternative 1: Existing Bridge Alignment (Preferred Alternative) Potential Impacts

Under Alternative 1, short-term, minor air emissions would result from operating heavy equipment during site preparation, construction, and demolition activities. No increases in long-term emissions would occur. Air emissions were not quantitatively estimated for Alternative 1, but criteria pollutant and GHG emissions would be below those estimated for Alternative 2, as described in Section 3.1.3.3, which would be negligible. The project sites from Alternative 1 and 2 are comparable and both involve demolition activities. However, the proposed bridge for Alternative 1 would be constructed in place of the existing bridge, so less general site disturbance, grading, and new pavement and roadways would be required. Therefore, criteria pollutant and GHG emissions from Alternative 1 would be comparable to but slightly less than those described in Section 3.1.3.3 and Appendix C for Alternative 2, which would be short term and represent only a fraction of regional emissions. Implementation Alternative 1 would not result in significant impacts on air quality.

Air Quality Potential Impacts:

- No Action: Minor regional increases from growth in the county. No significant impacts.
- Alternative 1: Short-term, minor emissions during construction. No significant impacts.
- Alternative 2: Short-term, minor emissions during construction. No significant impacts.
- Alternative 3: Short-term, minor emissions during construction. No significant impacts.
- Option A: Additional negligible emissions during utility installation. No significant impacts.
- Option B: Additional short-term, negligible-to-minor emissions from trenching and drilling equipment and associated fugitive dust during construction. No significant impacts.

3.1.3.3 Alternative 2: Southern Bridge Alignment Potential Impacts

Under Alternative 2, short-term, minor air emissions would result from operating heavy equipment during site preparation, construction, and demolition activities. No increases in long-term emissions would be expected because there would be no changes in operations associated with the new bridge or stationary sources of air emissions. Estimated construction emissions are shown in Table 3-3.

Appendix C contains more detailed information about project inputs and assumptions used in estimating air emissions.

Air quality impacts from construction would occur from combustion emissions due to the use of fossil fuel-powered equipment and fugitive dust emissions (i.e., PM₁₀ and PM_{2.5}) during earth-moving activities, construction, demolition, and the operation of equipment on bare soil. As this project is in the planning stages, a detailed construction schedule is not known; it is estimated that construction would begin in fiscal year 2021 and last approximately two years. Direct emissions from construction activities would include equipment combustion for on-site construction vehicles and ground disturbance. Indirect emissions from construction activities include equipment combustion from delivery and waste-removal trucks and construction workers commuting to and from the site.

Construction activities would increase the concentration of criteria pollutants in the environment immediately surrounding the area of construction. Ambient air quality is generally good in and around NSF Dahlgren, and the estimated emissions from Alternative 2 would not be expected to noticeably diminish air quality or affect sensitive receptors, including Dahlgren Elementary School and military family housing areas. Projected emissions from construction activities would represent only minor regional increases within King George County (refer to Table 3-3) and would not violate any NAAQS. Therefore, implementation of Alternative 2 would not result in significant impacts on air quality from criteria pollutant emissions.

Table 3-3 Estimated Air Emissions from Proposed Construction Activities

<i>Activity</i>	<i>NO_x</i> <i>(tpy)</i>	<i>VOC</i> <i>(tpy)</i>	<i>CO</i> <i>(tpy)</i>	<i>SO₂</i> <i>(tpy)</i>	<i>PM₁₀</i> <i>(tpy)</i>	<i>PM_{2.5}</i> <i>(tpy)</i>
Total Construction (2 Years)	7.4	0.9	5.0	0.02	6.3	1.6
Construction Percent Increase over Regional Emissions (refer to Table 3-1)	0.6%	0.02%	0.1%	0.01%	0.4%	0.5%

Key: NO_x = nitrogen oxides; VOC = volatile organic compound; CO = carbon monoxide; SO₂ = sulfur dioxide; PM₁₀ = suspended particulate matter less than or equal to 10 microns in diameter; PM_{2.5} = fine particulate matter less than or equal to 2.5 microns in diameter; tpy = tons per year.

Greenhouse Gases

Implementation of Alternative 2 would contribute directly to emissions of GHGs from the combustion of fossil fuels. Construction and demolition activities would generate approximately 2,108 tons (1,912 metric tons) of CO₂e distributed over the duration of project construction. These limited emissions would be a negligible contribution to regional GHG emissions. Therefore, implementation of Alternative 2 would not result in significant impacts on air quality from GHG emissions.

3.1.3.4 Alternative 3: Parallel Bridge Alignment Potential Impacts

Under Alternative 3, short-term, minor air emissions would result from operating heavy equipment during site preparation, construction, and roadwork activities. No increases in long-term emissions would occur. Air emissions were not quantitatively estimated for Alternative 3 since the project sites of Alternatives 2 and 3 are comparable, but Alternative 3 does not involve demolition of the existing bridge. Overall, criteria pollutant and GHG emissions from Alternative 3 would be comparable to those described in Section 3.1.3.3 and Appendix C for Alternative 2, which would be short term and represent only a fraction of regional emissions. Therefore, implementation of Alternative 3 would not result in significant impacts on air quality.

3.1.3.5 Options for Bridge Utilities Potential Impacts

Option A: Aboveground Utilities

Under Option A, negligible emissions during utility installation would be expected. Utilities may include some minor trenching on land in the immediate area of the bridge during utility work, but this would be expected to be minimal, if required during construction. Hand-held equipment could also be used to install and interconnect utilities across the new or repaired Gambo Creek Bridge. It is anticipated that any utility work under Option A would be done concurrent with other bridge work and generate negligible additional criteria pollutant or GHG emissions. Emissions under Option A were not quantified as they would be expected to be less than those projected for Option B, which are anticipated to be negligible to minor (refer to Table 3-4). Implementation of Option A, combined with any of the action alternatives, would not result in significant impacts on air quality.

Option B: Underground Utilities

Under Option B, negligible-to-minor emissions during utility trenching and underground installation would be expected. Estimated utility emissions, which would be in addition to those for general bridge construction activities, are shown in Table 3-4. Appendix C contains more detailed information about project inputs and assumptions used in estimating air emissions. Emissions from trenching operations include those associated with trenching equipment and fugitive dust emissions from ground-disturbing activities. Estimated emissions for Option B would not likely be discernably greater than those estimated for general construction activities. Therefore, implementation of Option B, combined with any of the action alternatives, would not result in significant impacts on air quality.

Table 3-4 Estimated Air Emissions from Proposed Construction (Alternative B) Added to Optional Underground Utility Activities (Option B)

Activity	NO_x (tpy)	VOC (tpy)	CO (tpy)	SO₂ (tpy)	PM₁₀ (tpy)	PM_{2.5} (tpy)
Total Construction (see Table 3-3)	7.4	0.9	5.0	0.02	6.3	1.6
Total Option B Utilities	0.04	0.01	0.04	0.0001	0.05	0.01
Total Construction + Utilities Emissions	7.4	0.9	5.0	0.02	6.3	1.6
Construction Percent Increase over Regional Emissions (refer to Table 3-1)	0.6%	0.02%	0.1%	0.01%	0.4%	0.5%

Key: NO_x = nitrogen oxides; VOC = volatile organic compound; CO = carbon monoxide; SO₂ = sulfur dioxide; PM₁₀ = suspended particulate matter less than or equal to 10 microns in diameter; PM_{2.5} = fine particulate matter less than or equal to 2.5 microns in diameter; tpy = tons per year.

3.2 Water Resources

This discussion of water resources includes groundwater, surface water, wetlands, and floodplains. This section discusses the physical characteristics of wetlands; wildlife and vegetation are addressed in Section 3.5, Biological Resources.

Groundwater is water that flows or seeps downward and saturates soil or rock, supplying springs and wells. Groundwater is used for water consumption, agricultural irrigation, and industrial applications. Groundwater properties are often described in terms of depth to aquifer, aquifer or well capacity, water quality, and surrounding geologic composition. Sole source aquifer designation provides limited protection of groundwater resources that serve as drinking water supplies.

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. A Total Maximum Daily Load is the maximum amount of a substance that can be assimilated by a water body without causing impairment. A water body can be deemed impaired if water quality analyses conclude that exceedances of water quality standards occur.

Wetlands are jointly defined by USEPA and 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 and provide a basis for comparing the locale of the Proposed Action to floodplains.

3.2.1 Regulatory Setting

The Safe Drinking Water Act is the federal law that protects public drinking water supplies throughout the nation. Under the Safe Drinking Water Act, the USEPA sets standards for drinking water quality. Groundwater quality and quantity are regulated under several statutes and regulations, including the Safe Drinking Water Act.

The Clean Water Act establishes federal limits, through the National Pollutant Discharge Elimination System (NPDES) program, on the amounts of specific pollutants that can be discharged into surface waters to restore and maintain the chemical, physical, and biological integrity of the water. The NPDES program regulates the discharge of point (i.e., end of pipe) and nonpoint sources (i.e., stormwater) of water pollution.

The Virginia NPDES stormwater program requires construction site operators engaged in clearing, grading, and excavating activities that disturb one acre or more to obtain coverage under an NPDES Construction General Permit for stormwater discharges. Construction or demolition that necessitates an individual permit also requires preparation of a Notice of Intent to discharge stormwater and a stormwater pollution prevention plan (SWPPP) that is implemented during construction. As part of the

2014 Final Rule for the Clean Water Act, titled *Effluent Limitations Guidelines and Standards for the Construction and Development Point Source Category*, activities covered by this permit must implement non-numeric erosion and sediment controls and pollution prevention measures.

Wetlands are currently regulated by the USACE under Section 404 of the Clean Water Act as a subset of all "Waters of the United States." Waters of the United States are defined as (1) traditional navigable waters, (2) wetlands adjacent to navigable waters, (3) non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow perennially or have continuous flow at least seasonally (e.g., typically three months), and (4) wetlands that directly abut such tributaries under Section 404 of the Clean Water Act, as amended, and are regulated by USEPA and the USACE. The Clean Water Act requires that Virginia establish a Section 303(d) list to identify impaired waters and establish Total Maximum Daily Loads for the sources causing the impairment.

Section 404 of the Clean Water Act authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredge or fill into wetlands and other Waters of the United States. Any discharge of dredge or fill into Waters of the United States requires a permit from the USACE.

Section 438 of the Energy Independence and Security Act establishes stormwater design requirements for development and redevelopment projects. Under these requirements, federal facility projects larger than 5,000 square feet must "maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow."

Section 9 of the Rivers and Harbors Act is administered by the U.S. Coast Guard and provides for permit requirements for any bridge, dam, dike, or causeway in or over any navigable water of the United States. Approval of location and plans by the U.S. Coast Guard is required for bridge construction.

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

EO 11988, *Floodplain Management*, 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 and indirect support of floodplain development unless it is the only practicable alternative. Flood potential of a site is usually determined by the 100-year floodplain, which is defined as the area that has a one percent chance of inundation by a flood event in a given year.

The Chesapeake Bay Preservation Act, enacted by the Virginia General Assembly in 1988, is designed to improve water quality in the Chesapeake Bay and other waters of the state by requiring the use of effective land management and land use planning to reduce and prevent nonpoint source pollution. King George County is responsible for the designation of Chesapeake Bay Preservation Areas within the county based on the presence of perennial streams in order to protect the areas and the quality of water in the Chesapeake Bay.

Through the Coastal Zone Management Act of 1972 (CZMA), Congress established a national policy to preserve, protect, develop, restore, or enhance resources in the coastal zone. The CZMA 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 CZMA imparts an obligation upon federal agencies whose actions or activities affect any land, 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. 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 a 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 CZMA 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 and for consistency with Virginia’s Coastal Zone Management Program (CZMP). This takes the form of a consistency determination, a negative determination, or a determination that no further action is necessary. King George County is within Virginia’s coastal zone and Gambo Creek is considered a Chesapeake Bay Preservation Area; therefore, a Federal Consistency Determination will be submitted to Virginia DEQ.

3.2.2 Affected Environment

The following discussions provide a description of the existing conditions for each of the categories under water resources at NSF Dahlgren.

3.2.2.1 Groundwater

The principal producing, confined aquifer underlying NSF Dahlgren is the Potomac Group Artesian Aquifer Formation, which is composed of three aquifers and three confining units known collectively as the Potomac Formation. The Potomac Formation is composed of the upper, middle, and lower Potomac aquifers. It is mostly confined and yields between 100 and 1,500 gallons per minute. The wells at NSF Dahlgren draw from the upper Potomac Group Artesian Aquifer, and static water level on the base ranges from 116 feet to 123 feet below ground surface, with a yield of approximately 350 gallons per minute (Wray, 2013).

3.2.2.2 Surface Water

NSF Dahlgren Mainside is situated on approximately 4.2 miles of shoreline along the western bank of the Potomac River and the northern bank of the Upper Machodoc Creek. These waters eventually flow into the Potomac River, and subsequently the Chesapeake Bay, which is located at the mouth of the Potomac River, approximately 44 miles downstream.

Gambo Creek flows through Mainside from northwest to southeast, dividing Mainside into two approximately equal sections, and empties into the Potomac River. Gambo Creek is tidally influenced as far inland as the northern border of the installation (Wray, 2013). Upper Machodoc Creek splits the NSF Dahlgren property between Mainside and the Explosives Experimental Area (EEA) and flows into the Potomac River. Many small, unnamed tributaries of Upper Machodoc Creek and Gambo Creek also flow through Mainside.

3.2.2.3 Wetlands

Wetlands at NSF Dahlgren Mainside are primarily associated with the Potomac River, Upper Machodoc Creek, Gambo Creek, and unnamed tributaries to these waterways. Wetlands outside the installation’s boundaries are of similar type and distribution as those found within.

Estuarine and palustrine wetlands, as classified under the Cowardin system (Cowardin, Carter, Golet, & LaRoe, 1979), cover approximately 608 acres (14 percent) of NSF Dahlgren. Installation wetlands are mostly estuarine intertidal, palustrine forested, and estuarine subtidal wetlands. Table 3-5 provides a summary of the extent of wetlands on NSF Dahlgren, and Figure 3-5 provides a visual representation of wetlands located on NSF Dahlgren Mainside.

The wetlands in the vicinity of the Gambo Creek Bridge are classified as estuarine intertidal persistent emergent wetlands, irregularly flooded; estuarine subtidal unconsolidated bottom, subtidal; and estuarine intertidal unconsolidated shore, irregularly flooded (Marstel-Day and Versar, 2019). Estuarine wetland systems consist of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have sporadic access to ocean waters, and with occasional freshwater runoff from the land. Intertidal wetlands are within the substrate that is exposed and flooded by tides. Persistent emergent wetlands are characterized by vegetation that is present for most of the growing season, subject to temporary to permanent flooding at the base (Cowardin, Carter, Golet, & LaRoe, 1979).

A wetland delineation was conducted in the vicinity of the Proposed Action; a total of 116,741 square feet (2.68 acres) of wetlands were identified within the Gambo Creek Bridge wetland delineation area. Over three-quarters of this total (88,427 square feet; 2.03 acres) is estuarine intertidal persistent emergent wetland, irregularly flooded, which occurred along the shoreline on either side of Gambo Creek. Figure 3-6 shows the wetlands that were delineated and classified at the site. The estuarine subtidal unconsolidated bottom, subtidal wetland (20,473 square feet; 0.47 acres) was mapped within the Gambo Creek channel, and estuarine intertidal unconsolidated shore, irregularly flooded wetland (7,841 square feet; 0.18 acres) was mapped under the Gambo Creek Bridge where vegetation does not grow (Marstel-Day and Versar, 2019). Table 3-5 summarizes the delineated wetland acreages near the Proposed Action.

The wetlands adjacent to Gambo Creek near the Proposed Action are subject to the ebb and flow of tides. Gambo Creek a relatively permanent water body that flows directly to the Potomac River, which is a traditional navigable water. Therefore, all the wetlands delineated near the Proposed Action are presumed to be jurisdictional to USACE. The wetland delineation of the project site will be coordinated with USACE for an approved Jurisdictional Determination.

Table 3-5 Wetlands at Naval Support Facility Dahlgren

<i>Wetland Type</i>	<i>Wetlands Delineated Near Proposed Action (acres)</i>	<i>Wetlands on Installation (acres)</i>	<i>Percentage of Installation</i>
Estuarine Subtidal	0.47 ¹	90	2.1%
Estuarine Intertidal	2.21 ²	278	6.4%
Palustrine Emergent	—	18	0.4%
Palustrine Forested	—	183	4.2%
Palustrine Shrub	—	9	0.2%
Palustrine Unconsolidated Bottom	—	30	0.7%
Total Wetlands	2.68	608	14%

Sources: Wray, 2013; Marstel-Day and Versar, 2019.

Notes: ¹Estuarine subtidal was delineated as estuarine subtidal unconsolidated bottom wetlands.

²Estuarine intertidal persistent emergent, irregularly flooded wetlands account for 2.03 acres, and estuarine intertidal unconsolidated shore, irregularly flooded wetlands account for 0.18 acres.

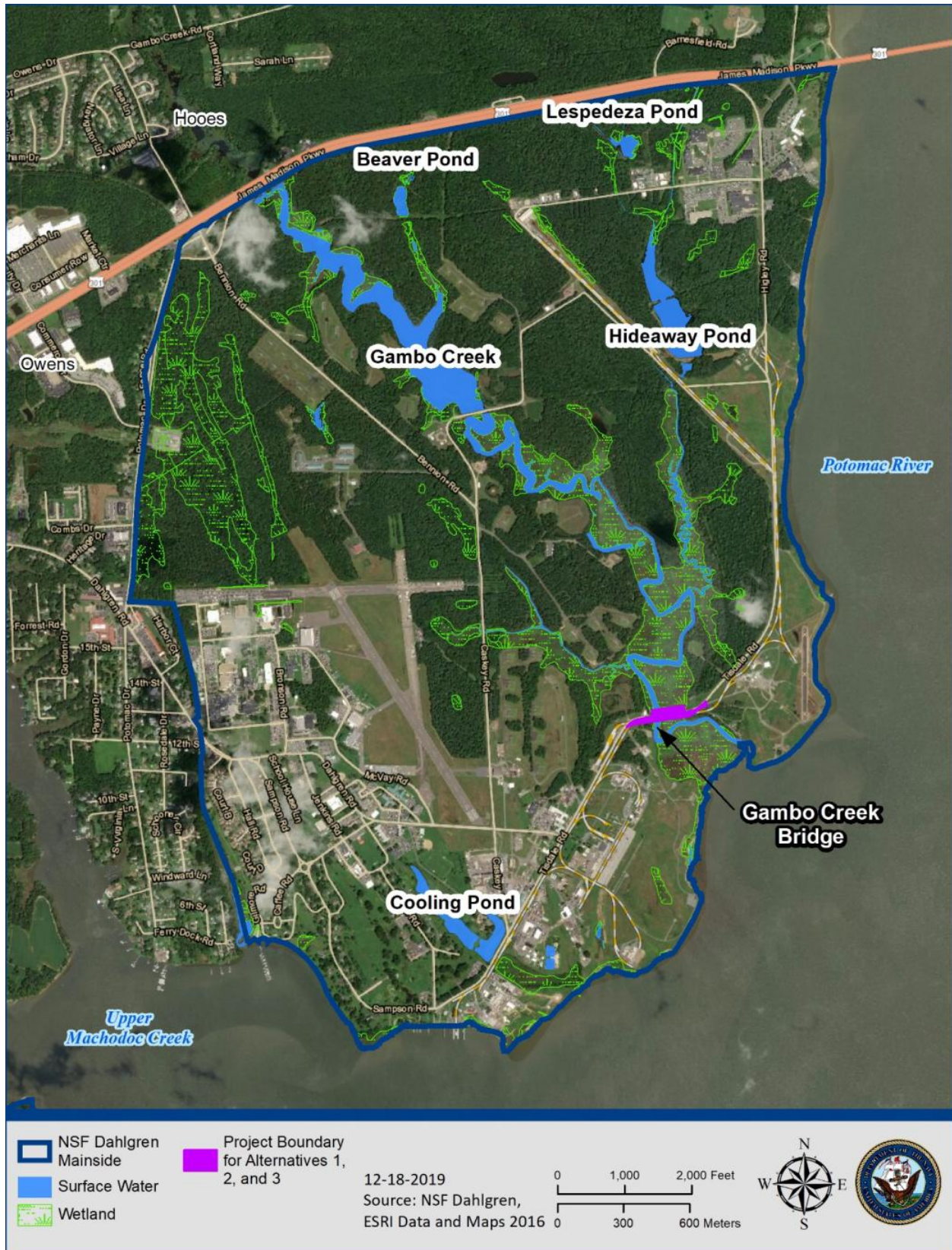


Figure 3-5 Surface Water and Wetlands on Naval Support Facility Dahlgren Mainside

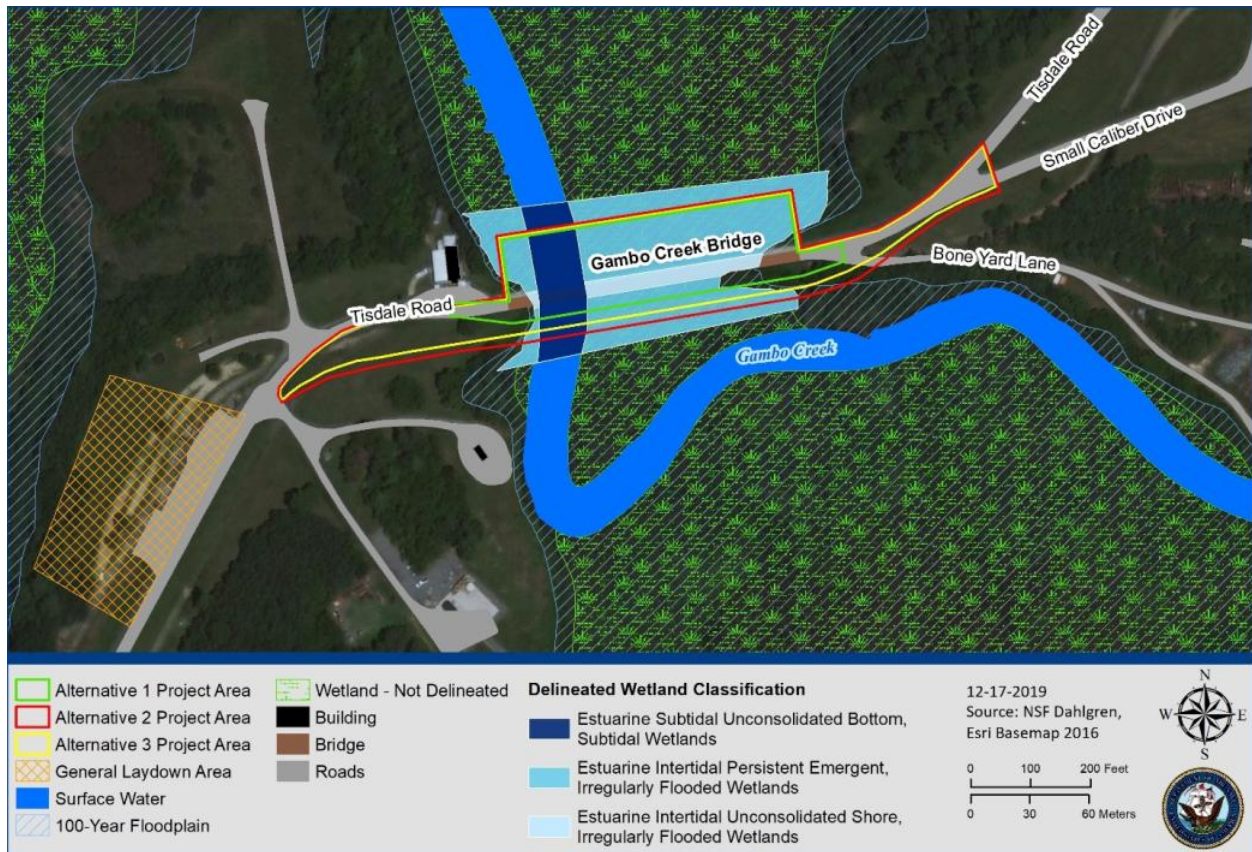


Figure 3-6 Surface Water, Wetlands, and Floodplain at Gambo Creek Bridge

3.2.2.4 Floodplains

The Federal Emergency Management Agency defines floodplains by the likelihood that a given area will be flooded in a year: a 100-year floodplain is an area that has a 1 percent chance of flooding in any given year, and a 500-year floodplain has a 0.2 percent chance annually. The 100-year floodplain includes some land areas that are flooded by small, often dry watercourses.

Federal Emergency Management Agency National Flood Insurance Program data show that NSF Dahlgren Mainside has approximately 391 acres that are within the 100-year floodplain, the majority of which is located on either side of Gambo Creek. Tisdale Road is not located within the 100-year flood zone. See Figure 3-6 for flood risk areas within the project vicinity.

3.2.2.5 Coastal Zone Management

The CZMA encourages states, in cooperation with federal and local agencies, to develop land and water use programs in coastal zones. NSF Dahlgren is not within the statutory definition of Virginia’s coastal zone; however, Section 307 of the CZMA applies if a proposed federal project affects land uses, water uses, or other coastal resources of a state’s coastal zone. Federal consistency with the enforceable policies of a state’s federally approved CZMP is demonstrated by means of a Federal Consistency Determination that is submitted to the state agency responsible for review and comments. Applying for and complying with state permits when required by federal law also achieves consistency.

King George County is within Virginia's designated coastal zone. Virginia DEQ is the lead agency for coastal management and is responsible for enforcing the Commonwealth's federally approved CZMP describing current coastal legislation and enforceable policies. The Virginia CZMP has nine enforceable policies: fisheries management, subaqueous lands management, wetlands management, dune management, non-point source pollution control, point source pollution control, shoreline sanitation, air pollution control, and coastal lands management (which are land area designations defined in Virginia's Chesapeake Bay Preservation Act).

3.2.3 Environmental Consequences

In this EA, the analysis of water resources looks at the potential impacts on groundwater, surface water, wetlands (jurisdictional and non-jurisdictional), and floodplains. Groundwater analysis focuses on the potential for impacts on the quality, quantity, and accessibility of the water. The analysis of surface water quality considers the potential for impacts that may change the water quality, including both improving and degrading current water quality. The impact assessment of wetlands considers the potential for impacts that may change the local hydrology, soils, or vegetation that support a wetland. The analysis of floodplains considers if any new construction is proposed within a floodplain or may impede the functions of floodplains in conveying floodwaters.

3.2.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and there would be no change in baseline water resources. Therefore, no significant impacts on water resources would occur with implementation of the No Action Alternative.

3.2.3.2 Alternative 1: Existing Bridge Alignment (Preferred Alternative) Potential Impacts

The study area for the analysis of effects on water resources associated with Alternative 1 includes Gambo Creek and the wetlands in the vicinity of Alternative 1, with consideration for how changes during construction could affect other water resources on the installation and surrounding community. Alternative 1 would be built on the existing footprint of the Gambo Creek Bridge and roadway. Under Alternative 1, there would be an estimated net increase of

Water Resources Potential Impacts:

- No Action: No change in baseline conditions. No significant impacts.
- Alternative 1: Short-term, minor impacts on jurisdictional wetlands and water bodies from construction disturbance. Fill within the jurisdictional wetland to construct new abutments and bridge apron would be permitted and mitigated in accordance with Section 404 of the Clean Water Act. With mitigations and Section 404 permitting for impacts on jurisdictional wetlands, no significant impacts.
- Alternative 2: Similar to Alternative 1, but with increased impacts on jurisdictional wetlands due to the larger footprint. With mitigations and Section 404 permitting for impacts on jurisdictional wetlands, no significant impacts.
- Alternative 3: Similar to Alternative 1, but with increased impacts on jurisdictional wetlands due to the larger footprint. With mitigations and Section 404 permitting for impacts on jurisdictional wetlands, no significant impacts.
- Option A: Additional short-term, minor impacts on water resources. No significant impacts.
- Option B: Additional short-term, minor impacts on water resources. Trenching and drilling for utilities would occur outside of and below wetlands. No significant impacts.

2,920 square feet of impervious surface. Since the proposed bridge would be constructed along the existing bridge alignment, proposed demolition and construction would occur over wetlands and Gambo Creek. There would be no changes in operations associated with the new bridge.

There is a potential for minor effects on groundwater resources under Alternative 1. The study area includes Installation Restoration (IR) Site 001, which is believed to have soil contamination from its historic use as a bombing range, as well as potential UXO. While no ground-disturbing activities would occur within IR Site 001, there is the potential that sediment contaminated with heavy metals could exist at the bridge site, which could be disturbed during bridge construction. As a precaution, soil and sediment samples would be taken prior to construction to determine if contaminants are present, and the Navy would remove and dispose of contaminated soil wastes appropriately. More information on IR Site 001 and soil contaminants is in Section 3.7. The Navy would use BMPs (e.g., good housekeeping measures for construction equipment containing petroleum, oil, and/or lubricants, and minimizing sediment transport) to prevent leaching of construction-related contaminants into groundwater resources. Implementation of Alternative 1 would not increase the demand for pumped groundwater on NSF Dahlgren.

Alternative 1 would result in short-term, minor, adverse impacts on surface water resources from construction activities. Implementation of Alternative 1 would temporarily increase sedimentation and turbidity of Gambo Creek and the downstream Potomac River during bridge demolition, roadway construction, and cofferdam installation. Construction would directly affect Gambo Creek as construction occurs and indirectly affect downstream water bodies (i.e., the Potomac River). The Virginia NPDES stormwater program for an individual construction or demolition permit (like Alternative 1) requires the preparation of a Notice of Intent and implementation of a stormwater pollution prevention plan (SWPPP) during construction. Impacts on surface water would be minimized through BMPs outlined in the SWPPP to protect against soil erosion and sedimentation into receiving water bodies at or near the Alternative 1 site. Impacts on surface water quality could occur due to the proximity to IR Site 001, as previously described; sediments would be monitored by the Navy and if contamination is present, the Navy would use BMPs to minimize impacts on surface water quality.

The use of cofferdams during bridge construction would alter the flow of Gambo Creek during construction. Cofferdams would be used as necessary for the installation of new bridge piers but would not completely block flow during construction activities. Cofferdams and construction equipment within Gambo Creek would likely loosen and introduce sandy sediments into the creek, increasing turbidity and reducing water quality. Although increases in turbidity may occur, impacts would be localized and temporary, lasting only as long as equipment and materials are used within the creek bed. After construction activity is complete, sedimentation and turbidity levels would return to preconstruction levels.

Under Alternative 1, there would be short-term wetland disturbance of up to 63,860 square feet during construction activities. Construction disturbance would be primarily short term and minor. Bridge designs have not been finalized, but any direct, long-term impacts (i.e., discharge of fill material) within the jurisdictional wetland would be permitted and mitigated in accordance with Section 404 of the Clean Water Act, to reduce impacts to less than significant. As shown in Figure 3-6, wetlands are present on both sides of Gambo Creek. The bridge would be constructed to span over the wetland areas, and short-term impacts on wetlands would be anticipated from cutting existing pilings, inserting new pilings to support the new bridge, and installing cofferdams within Gambo Creek adjacent to the wetlands. Placement of pilings for bridges is not considered a discharge of fill material under Section 404 of the

Clean Water Act. Construction vehicles would cross the wetlands in order to add and cut pilings, and to set up and remove cofferdams. Construction BMPs would be implemented to reduce temporary impacts on the wetlands from construction vehicles. Indirect impacts on wetlands located within and adjacent to the Alternative 1 site could occur from construction activity, including an inflow of surface water and sediments, and changes in local drainage patterns from an increase in impervious surface. However, indirect impacts would be minimized by implementing erosion and sediment BMPs.

The implementation of Alternative 1 would unavoidably result in the discharge of fill within jurisdictional, tidal wetlands in order to construct new abutments and aprons for the proposed bridge. Permitting for work within jurisdictional wetlands would be done in accordance with Section 404 of the Clean Water Act, and the Navy would mitigate impacts on jurisdictional wetlands. Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into waters of the United States. Design plans have not yet been drafted, so the area of direct impacts is not known. If final design plans would result in the permanent fill of less than one-third acre, the Navy could pursue coverage under the USACE Nationwide Permit 14 for Linear Transportation Projects, which sets forth permitting conditions. Under this permit, compensatory mitigation for impacts are prescribed at a minimum of 1:1 for all wetland losses exceeding one-tenth acre. However, if the design plans would result in the permanent fill of more than one-third acre, a Standard Joint Permit Application would be needed for impacts on tidal wetlands. Compensatory mitigation at a minimum of 1:1 would also be required under this permit. The Navy has initiated a jurisdictional delineation of the entire project area, currently in draft phase. Once bridge designs are finalized, the Navy will obtain all required permits pursuant to Section 404 of the Clean Water Act and implement all necessary mitigations.

The Navy would also coordinate with the U.S. Coast Guard to receive authorization for bridge construction under Section 9 of the Rivers and Harbors Act.

The bridge construction under Alternative 1 would be within the 100-year floodplain associated with Gambo Creek (Figure 3-6). Construction within the floodplain is unavoidable. Short-term, minor impacts on floodplains from construction activities adjacent to and within the creek would be expected. EO 11988 directs agencies to avoid impacts on floodplains or, if impacts cannot be avoided, to develop measures to minimize impacts and restore and preserve the floodplain, as appropriate. After construction is completed, equipment would be removed, and the disturbed areas restored to preconstruction conditions. In order to construct the new bridge, which would be wider than the existing bridge, soil would need to be removed and replaced to achieve the compaction and stabilization needed for the new bridge approaches and abutments. The Navy would attempt to minimize long-term impacts on the existing floodplain by restoring and preserving the existing floodplain to the extent practicable to reduce flood risk. Impacts on the floodplains would be minor under Alternative 1.

The project site is within Virginia's coastal zone. In accordance with CZMA Section 307, the Navy will submit a Federal Consistency Determination to the Virginia DEQ. The nine enforceable policies of Virginia CZMP pertain to fisheries management, state-owned subaqueous lands management, wetlands management, dune management, non-point source pollution control, point source pollution control, shoreline sanitation, air pollution control, and coastal lands management. Alternative 1 would not affect state-owned subaqueous lands, dunes, new point sources of pollution, or septic tanks along shorelines. Sediment and stormwater management practices would minimize the potential for non-point source pollution to affect off-installation coastal lands during construction and operations. Sources of air pollution would not be expected to result in violations of NAAQS, as discussed in Section 3.1. Fisheries and wetlands would be affected by Alternative 1; however, BMPs and minimization measures would be

applied, and the Navy would adhere to relevant regulations and permits. Gambo Creek is considered a Chesapeake Bay Preservation Area (i.e., Resource Protection Area). The Navy will coordinate further with the Virginia DEQ and the Virginia Marine Resources Commission pursuant to CZMA.

Implementation of Alternative 1 would not result in significant impacts on water resources.

3.2.3.3 Alternative 2: Southern Bridge Alignment Potential Impacts

The study area for the analysis of effects on water resources associated with Alternative 2 is the same as for Alternative 1—the lower portion of Gambo Creek and the wetlands in the vicinity of Alternative 2, with consideration for how changes during construction could affect other water resources on the installation and surrounding community. Alternative 2 would be built south of the existing bridge footprint, resulting in the loss of tree cover of approximately 10,790 square feet and a net increase of impervious surface of 30,040 square feet. Since the proposed bridge would be constructed south of the existing bridge alignment, the total area of the proposed demolition and construction would occur over wetlands and Gambo Creek. There would be no changes in operations associated with the new bridge.

Land disturbance associated with Alternative 2 would exceed one acre, requiring a Virginia NPDES permit for stormwater on construction sites. As a component of the permit, the construction contractor would develop a SWPPP to address stormwater during construction. The SWPPP must address erosion- and sediment-control (satisfied by a Virginia DEQ-approved erosion- and sediment-control plan and consistent with Virginia laws and regulations). The permit requires the use of BMPs to protect against soil erosion and sedimentation into receiving water bodies. The permit also requires the contractor to regularly inspect stormwater discharges from construction to ensure that BMPs are controlling the discharge of pollutants to the maximum extent practicable and are meeting water quality standards. In addition, the SWPPP requires the contractor to manage other wastes on site, such as construction materials, garbage, and debris, and to have controls to minimize the exposure of these materials to stormwater to minimize the discharge of pollutants to state waters. The Virginia DEQ-approved erosion- and sediment-control plan would show the existing topography of the site, indicate how the topography would be altered, identify site-specific measures to be used to control erosion and minimize or eliminate sedimentation into surface water bodies, and describe how these site-specific measures would be implemented and maintained during construction. Use of erosion- and sediment-control practices during the construction phase would minimize adverse impacts on surface water bodies.

Impacts on water resources under Alternative 2 would be similar to those described for Alternative 1, but some impacts would be greater due to the new bridge footprint and greater alterations to the roadway approach under Alternative 2.

Alternative 2 would have the potential for minor impacts on groundwater resources due to proximity to IR Site 001, similar to what is described under Alternative 1.

Alternative 2 would have short-term, minor, adverse impacts on surface water resources from construction activities, similar to what is described under Alternative 1. Potential impacts on the water quality of Gambo Creek and the Potomac River would occur during roadway construction, cofferdam installation, and bridge demolition, all of which would cause ground disturbance, leading to increased sedimentation and turbidity in surface waters. The roadwork under Alternative 2 would be greater than Alternative 1, so the potential for erosion and sedimentation would be increased under this alternative as compared with Alternative 1, causing greater potential impacts on water quality. As with Alternative 1, these impacts would be minimized through BMPs to protect against soil erosion and sedimentation

into receiving water bodies. Impacts on surface water quality could occur due to the proximity to IR Site 001, as previously described; sediments would be monitored by the Navy and if contamination is present, the Navy would use BMPs to minimize impacts on surface water quality.

As described under Alternative 1, the use of cofferdams during bridge construction would alter the flow of Gambo Creek but would not completely block the flow of the creek during construction. Impacts from the cofferdams on surface waters would be localized and temporary.

Impacts on jurisdictional wetlands under Alternative 2 would be similar to what is expected under Alternative 1, but to a greater extent. The Alternative 2 construction and demolition footprint would be larger than under Alternative 1. There would be short-term disturbance of up to 75,520 square feet of jurisdictional wetlands during construction activities. Short-term, minor construction disturbance within the jurisdictional wetlands would occur from cutting existing pilings, inserting new pilings to support the new bridge, and installing cofferdams adjacent to the wetlands. Construction vehicles would cross the wetlands in order to add and cut pilings, and to set up and remove the cofferdams, but the use of BMPs would minimize construction impacts.

The new bridge would unavoidably result in fill material in jurisdictional, tidal wetlands associated with Gambo Creek. Design plans have not yet been drafted, so the area of direct impacts is not known. If final design plans would result in the permanent fill of less than one-third acre, the Navy could pursue coverage under the USACE Nationwide Permit 14 for Linear Transportation Projects, which sets forth permitting conditions. Under this permit, compensatory mitigation for impacts are prescribed at a minimum of 1:1 for all wetland losses exceeding one-tenth acre. However, if the design plans would result in the permanent fill of more than one-third acre, a Standard Joint Permit Application would be needed for impacts on tidal wetlands. Compensatory mitigation at a minimum of 1:1 would also be required under this permit. The Navy has initiated a jurisdictional delineation of the entire project area, currently in draft phase. Once bridge designs are finalized, the Navy will obtain all required permits pursuant to Section 404 of the Clean Water Act and implement all necessary mitigations.

Bridge construction would also require a permit under Section 9 of the Rivers and Harbors Act, which is issued by the U.S. Coast Guard.

Impacts on the floodplain under Alternative 2 would be similar to what is described under Alternative 1. Alternative 2 would have a net increase of impervious surface over Alternative 1, but impacts on the floodplain would remain minor under Alternative 2.

Alternative 2 is within Virginia's coastal zone, and within a Chesapeake Bay Preservation Area (i.e., a Resource Protection Area). Impacts on the coastal zone would be the same as described under Alternative 1, and the Navy will coordinate further with the Virginia DEQ and the Virginia Marine Resources Commission pursuant to CZMA.

Implementation of Alternative 2 would not result in significant impacts on water resources.

3.2.3.4 Alternative 3: Parallel Bridge Alignment Potential Impacts

The study area for the analysis of effects on water resources associated with Alternative 3 is the same as for Alternative 1—the lower portion of Gambo Creek and the wetlands in the vicinity of Alternative 3, with consideration for how changes during construction could affect other water resources on the installation and surrounding community. Under Alternative 3, there would be a loss of tree cover of approximately 8,290 square feet and a net increase of impervious surface of an estimated 22,210 square

feet. Since the proposed bridge would be constructed adjacent to the existing bridge alignment, proposed construction would occur over wetlands and Gambo Creek.

Land disturbance associated with Alternative 3 would exceed one acre, requiring a General Permit for Stormwater on Construction Sites, a SWPPP, and an erosion- and sediment-control plan and consistent with Virginia laws and regulations. The requirements of these permits and plans are previously described, under Alternative 1 and Alternative 2.

Alternative 3 would have the potential for minor impacts on groundwater resources due to proximity to IR Site 001, similar to what is described under Alternative 1 and Alternative 2.

Alternative 3 would have short-term, minor, adverse impacts on surface water resources from construction activities, similar to what is described under Alternative 1. Potential impacts on the water quality of Gambo Creek and the Potomac River would occur during roadway construction and cofferdam installation, which would all cause ground disturbance, leading to increased sedimentation and turbidity in surface waters. The roadwork under Alternative 3 would be greater than Alternative 1 and similar to Alternative 2. As with Alternative 1, these impacts would be minimized through BMPs to protect against soil erosion and sedimentation into receiving water bodies. Impacts on surface water quality could occur due to the proximity to IR Site 001, as previously described; sediments would be monitored by the Navy and, if contamination is present, the Navy would use BMPs to minimize impacts on surface water quality.

As described under Alternative 1, the use of cofferdams during bridge construction would alter the flow of Gambo Creek but would not completely block the flow of the creek during construction. Impacts from the cofferdams on surface waters would be localized and temporary.

Impacts on wetlands under Alternative 3 would be similar to what is expected under Alternative 1, but to a greater extent. The Alternative 3 construction footprint would be larger than under Alternative 1 and Alternative 2. There would be disturbance within an estimated 70,190 square feet during construction activities. Construction disturbance would be primarily short term and minor. Construction disturbance within the jurisdictional wetlands would occur from inserting new pilings to support the new bridge and installing cofferdams adjacent to the wetlands. Construction vehicles would cross the wetlands in order to add pilings, and to set up and remove the cofferdams. As with Alternative 1, these impacts would be minimized through BMPs to protect the wetlands.

The new bridge would unavoidably result in fill material in jurisdictional, tidal wetlands associated with Gambo Creek. Design plans have not yet been drafted, so the area of direct impacts is not known. If final design plans would result in the permanent fill of less than one-third acre, the Navy could pursue coverage under the USACE Nationwide Permit 14 for Linear Transportation Projects, which sets forth permitting conditions. Under this permit, compensatory mitigation for impacts are prescribed at a minimum of 1:1 for all wetland losses exceeding one-tenth acre. However, if the design plans would result in the permanent fill of more than one-third acre, a Standard Joint Permit Application would be needed for impacts on tidal wetlands. Compensatory mitigation at a minimum of 1:1 would also be required under this permit. The Navy has initiated a jurisdictional delineation of the entire project area, currently in draft phase. Once bridge designs are finalized, the Navy will obtain all required permits pursuant to Section 404 of the Clean Water Act and implement all necessary mitigations.

Bridge construction would also require a permit under Section 9 of the Rivers and Harbors Act, which is issued by the U.S. Coast Guard.

Impacts on the floodplain under Alternative 3 would be the similar to what is described under Alternative 1. Alternative 3 would have a net increase of impervious surface over Alternative 1, but impacts on the floodplain would remain minor under Alternative 3.

Alternative 3 is within Virginia's coastal zone, and within a Chesapeake Bay Preservation Area (i.e., a Resource Protection Area). Impacts on the coastal zone would be the same as described under Alternative 1, and the Navy will coordinate further with the Virginia DEQ and the Virginia Marine Resources Commission pursuant to CZMA.

Implementation of Alternative 3 would not result in significant impacts on water resources.

3.2.3.5 Options for Bridge Utilities Potential Impacts

Option A: Aboveground Utilities

The study area for the analysis of effects on water resources associated with Option A includes Gambo Creek and wetlands in the vicinity of the proposed bridge. Installing utility conduit on bridges would have minor impacts on water resources. Utilities may include some minor trenching on land in the immediate area of the bridge during utility work, but this would be expected to be minimal and avoid wetlands. As previously discussed, erosion and sedimentation from ground disturbance can affect water quality in nearby water resources. The Navy would implement BMPs in accordance with all erosion- and sediment control plans and permits to minimize impacts on surface water quality. Utility work would be expected to be completed concurrent with other bridge work and generate minimal additional impacts on Gambo Creek, downstream water bodies, and wetlands. Implementation of Option A, combined with any of the action alternatives, would not result in significant impacts on water resources.

Option B: Underground Utilities

The study area for the analysis of effects on water resources associated with Option B includes Gambo Creek and wetlands in the vicinity of the proposed bridge. Minor impacts on water resources would be expected under this option. Some utility trenching would be required, but the Navy would bore utilities under the creek to avoid dredging or the use of cofferdams. To achieve this, entry points would be drilled outside of the wetland areas, and then horizontal directional drilling would occur well below the wetlands and creek bed. In the long term, utility repairs, if needed, would typically be addressed using a guided drill head at the same entry points used for installing the utility piping. If such extensive repairs were needed to require trenching within the wetland or creek bed, the Navy would adhere to all necessary permits and regulations. Since the area in the vicinity of the proposed bridge would already be disturbed from bridge construction and demolition, impacts would be further minimized. Implementation of Option B, combined with any of the action alternatives, would not result in significant impacts on water resources.

3.3 Geological Resources

This discussion of geological resources includes topography, geology, and soils of a given area. 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 regarding particular construction activities and types of land use.

3.3.1 Regulatory Setting

Consideration of geologic resources extends to prime or unique farmlands. The Farmland Protection Policy Act was enacted in 1981 in order to minimize the loss of prime farmland and unique farmlands as a result of federal actions. The implementing procedures of the Farmland Protection Policy Act require federal agencies to evaluate the adverse effects of their activities on farmland, which includes prime and unique farmland and farmland of statewide and local importance, and to consider alternative actions that could avoid adverse effects. The project areas considered in this EA are primarily aquatic and would not be considered available for use as farmland. Therefore, prime farmland is not considered further in this EA.

3.3.2 Affected Environment

The following discussions provide a description of the existing conditions for each of the categories under geological resources at NSF Dahlgren.

3.3.2.1 Topography

NSF Dahlgren's topography is generally low and flat with elevations ranging from mean sea level near the Potomac River and its tributaries to 28 feet above mean sea level. Most slopes are gradual; however, steep slopes are found along sections of streams within the installation and along the Potomac River shoreline (Navy, 2013). The topography at the alternative sites is primarily flat. Most of the area has slopes of one degree or less with a few areas having slopes of less than five degrees, which was calculated using a standard digital elevation model developed for the U.S. Geological Survey.

3.3.2.2 Geology

NSF Dahlgren is located within the Coastal Plain physiographic province. The Coastal Plain province consists of an eastward-thickening sedimentary wedge of unconsolidated sediments, including silt, clay, and sand, with some gravel and lignite. The sediments range in geologic age from the Cretaceous to the Quaternary periods. There are approximately 1,500 feet of Coastal Plain unconsolidated sediment beneath NSF Dahlgren. The unconsolidated sediments are underlain by crystalline basement rock (Navy, 2013).

Surficial sediments at NSF Dahlgren are Quaternary-age deposits derived from Holocene deposits and the Tabb Formation, and Tertiary-age deposits derived from the Calvert Formation, Chickahominy Formation, and Piney Point Formation sediments. The surficial deposits vary in thickness due to erosion and deposition over time. The Calvert, Chickahominy, and Piney Point Formations may be absent in portions of the installation. The Nanjemoy Formation underlies the surficial sediments. This formation is approximately 148 feet thick and is composed of alternating quartz and glauconite sands, clays, and calcitic units of shell and cavernous shell limestone of the Tertiary Period. The Marlboro Clay in turn underlies the Nanjemoy Formation. The Marlboro Clay is a 20- to 30-foot-thick clay, alternating pinkish-orange and dark gray in color. The Aquia Formation underlies the Marlboro Clay and consists of distinctive dark green to gray-green, argillaceous, glauconitic, well-sorted sand with indurated shell beds. The thickness of the Aquia Formation ranges up to 100 feet. Finally, the Cretaceous Period Potomac Group underlies the Aquia Formation; it is approximately 1,000 feet thick and is the oldest and deepest formation, resting on the crystalline basement rock (Navy, 2013).

3.3.2.3 Soils

Twenty named soil types are within the installation. The primary soil type found across NSF Dahlgren consists of the Tetotum-Bladen-Bertie soil association. This soil association is characterized by deep, moderately well-drained to poorly drained soils with clay loam, sandy clay loam, or clay subsoil in broad, low-lying areas. The Natural Resources Conservation Service (NRCS) National Hydric Soil List identifies three hydric soil types that occur at NSF Dahlgren: Bladen loam, Fallingston very fine sandy loam, and Pooler loam. Hydric soils typically support hydrophytic vegetation and occur in wetland areas (Navy, 2013).

Bladen loam is located throughout large areas of Mainside and comprises the sites analyzed in this EA (Wray, 2013). This soil is described as a deep, poorly drained, nearly level (0 to 2 percent slopes) soil. Textures range from loam-clay to clay, and permeability is slow. It is very strongly acidic and low in natural fertility and organic matter content. A seasonal high-water table remains near the surface for long periods (Navy, 2013).

3.3.2.4 Geologic Hazards

Historically, earthquakes have occurred infrequently in Virginia. The most recent earthquakes in the state occurred in Central Virginia and have generally been at a magnitude of 3.0 or less with few that reach a magnitude of 4.0 or higher. The last large earthquake to affect the state occurred in 2011 in Mineral, Virginia, with a magnitude of 5.8 (VTSO, n.d.).

3.3.3 Environmental Consequences

Geological resources are analyzed in terms of drainage, erosion, land subsidence, and seismic activity. The analysis of topography and soils focuses on the area of soils that would be disturbed, the potential for erosion of soils from construction areas, and the potential for eroded soils to become pollutants in downstream surface water during storm events. The analysis also examines potential impacts related to seismic events. BMPs are identified to minimize soil impacts and prevent or control pollutant releases into stormwater. The potentially affected environment for geological resources is limited to lands that would be disturbed by any proposed facility development or demolition.

3.3.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and there would be no change in baseline geologic resources. Therefore, no significant impacts on geologic resources would occur with implementation of the No Action Alternative.

Geological Resources Potential Impacts:

- No Action: No change in baseline condition. No significant impacts.
- Alternative 1: Short- and long-term, minor impacts. No significant impacts.
- Alternative 2: Short- and long-term, minor impacts. No significant impacts.
- Alternative 3: Short- and long-term, minor impacts. No significant impacts.
- Option A: Additional negligible impacts during construction. No significant impacts.
- Option B: Additional short-term, minor impacts during construction. No significant impacts.

3.3.3.2 Alternative 1: Existing Bridge Alignment (Preferred Alternative) Potential Impacts

The study area for the analysis of effects on geological resources associated with Alternative 1 includes the Gambo Creek shorelines, and soils and sediments in the waterway in and surrounding the project site. Alternative 1 would have short- and long-term, minor impacts on geological resources.

Demolition and construction activities would be expected to directly affect the soils as a result of excavation and fill to prepare the site for development. Under Alternative 1, the proposed bridge would be wider than the existing bridge; therefore, new abutments would be installed with concrete apron approaches leading to the abutments. The soil on the banks of Gambo Creek consists of either alluvial deposits of sediments or reclaimed swampland with a high clay and moisture content. As a result, during construction of the new abutments and apron, the existing soil would need to be removed and replaced with soils that can be compacted and stabilized. This would include approximately 10,600 cubic feet of soil excavation and 141,300 cubic feet of fill. Minor increases in impervious surfaces associated with the new abutments and approaches would also occur.

Sediments contaminated with heavy metals by munitions could potentially be disturbed during bridge construction. As a precaution, soil and sediment samples would be taken prior to construction to determine if contaminants are present, and the Navy would remove and dispose of contaminated soil wastes appropriately. More information on IR Site 001 and soil contaminants in the area can be found in Section 3.7.

During construction, cofferdams would be used when working below the waterline. This process involves driving steel beams into the mud. As discussed in Section 3.2.3.2, cofferdams and construction equipment within Gambo Creek would likely loosen soils in the creek, resulting in increases in turbidity and reducing water quality. However, these impacts would be localized and temporary, lasting only as long as equipment and materials are used within the creek bed. After construction activity is complete, sedimentation and turbidity levels would return to preconstruction levels. An erosion- and sediment-control plan would be developed with BMPs to minimize impacts as a result of demolition and construction.

During construction, a laydown area would be used on the western side of the existing bridge to house equipment. This area consists mostly of gravel (see Figure 2-1), and the soils are already compacted. There may be some minor disturbances from the equipment accessing the site; however, these effects would be short term and negligible.

The area of disturbance under Alternative 1 would be approximately 80,080 square feet, which is larger than one acre and would therefore require a Virginia NPDES permit for discharges of stormwater from construction activities (Virginia DEQ, 2019). As required by the Virginia DEQ and discussed in Section 3.2.3.2, a SWPPP to address stormwater during construction, an erosion- and sediment-control plan, and BMPs to protect against soil erosion and sedimentation in receiving water bodies would be required. The erosion- and sediment-control plan would show the existing topography of the site, indicate how the topography would be altered, and identify measures to be used to minimize impacts.

Long-term, minor impacts would occur once the bridge is constructed. There would be an increase in impervious surface of approximately 2,920 square feet and approximately 3,340 square feet of tree loss. The new soils at the abutment would compact and stabilize, and revegetation would occur to prevent future erosion; therefore, soils are not expected to erode in the surface water. Any changes in topography would be minor and similar to the existing topography at the shoreline.

Implementation of Alternative 1 would not result in significant impact on geological resources.

3.3.3.3 Alternative 2: Southern Bridge Alignment Potential Impacts

The study area for the analysis of effects on geological resources associated with Alternative 2 includes the Gambo Creek shorelines, and soils and sediments in the waterway in and surrounding the project site. Alternative 2 would result in short- and long-term, minor impacts on geological resources.

Demolition and construction activities would be expected to directly affect the soils as a result of excavation and fill to prepare the site for development. Under Alternative 2, the proposed bridge would be constructed in a different area than the existing bridge; therefore, new abutments would need to be installed with concrete apron approaches leading to the abutments. The soil on the banks of Gambo Creek consists of either alluvial deposits of sediments or reclaimed swampland with a high clay and moisture content. As a result, during construction of the new abutments and apron, the existing soil would need to be removed and replaced with soils that can be compacted and stabilized. At this time, the amount of soil excavation and fill are unknown; however, the amounts would be greater than discussed under Alternative 1 since the site is undeveloped and all the abutments would be new. This alternative may also have an increased potential to encounter contaminated sediments due to the larger area that is undeveloped. As discussed in Section 3.3.3.2, the Navy would take samples prior to construction and remove and dispose of contaminated wastes appropriately.

Under Alternative 2, there would be increase in impervious surface of approximately 30,040 square feet. In addition, there would be a loss of tree cover from the construction of the new bridge south of approximately 10,790 square feet. The increase in impervious surface and the loss of the tree cover could lead to erosion and sediment runoff into Gambo Creek and the potential for a change in drainage patterns; however, BMPs would be implemented to minimize impacts. After the existing bridge is demolished and removed, the area would likely be replanted to compensate for loss the tree cover. The changes in the topography and slope at the site of the new bridge would be similar to slopes currently at the existing bridge location.

The area of disturbance under Alternative 2 would be approximately 131,340 square feet, which is larger than an acre and would require a Virginia NPDES permit for discharges of stormwater from construction activities (Virginia DEQ, 2019). As required by the Virginia DEQ and discussed in Section 3.2.3.3, a SWPPP to address stormwater during construction, an erosion- and sediment-control plan, and BMPs to protect against soil erosion and sedimentation in receiving water bodies would be required. The erosion- and sediment-control plan would show the existing topography of the site, indicate how the topography would be altered, and identify measures to be used to minimize impacts.

Impacts from the laydown area and from cofferdams used during construction would be the same as discussed under Alternative 1.

Long-term, minor impacts would occur once the bridge is constructed from the increase in impervious surface and tree loss. The new soils at the abutment would compact and stabilize, and revegetation would occur to prevent future erosion; therefore, soils are not expected to erode in the surface water. Changes in topography would be minor and similar to the existing topography at the shoreline. Implementation of Alternative 2 would not result in significant impacts on geological resources.

3.3.3.4 Alternative 3: Parallel Bridge Alignment Potential Impacts

The study area for the analysis of effects on geological resources associated with Alternative 3 includes the Gambo Creek shorelines, and soils and sediments in the waterway in and surrounding the project site. Alternative 3 would result in short- and long-term impacts on geological resources.

Construction activities would be expected to directly affect the soils as a result of excavation and fill to prepare the site for development. Under Alternative 3, a new one-way bridge would be constructed south of the existing bridge; therefore, new abutments would need to be installed with concrete apron approaches leading to the abutments. The soil on the banks of Gambo Creek consists of either alluvial deposits of sediments or reclaimed swampland with a high clay and moisture content. As a result, during construction of the new abutments and apron, the existing soil would need to be removed and replaced with soils that can be compacted and stabilized. At this time, the amount of soil excavation and fill are unknown. However, since the location of the new bridge is undeveloped and all the abutments would be new, it is assumed that the amounts would be greater than discussed under Alternative 1. This alternative may also have an increased potential to encounter contaminated sediments due to the larger area that is undeveloped. As discussed in Section 3.3.3.2, the Navy would take samples prior to construction and remove and dispose of contaminated wastes appropriately.

Under Alternative 3, there would be an increase in impervious surface of approximately 22,210 square feet. In addition, there would be a loss of tree cover of approximately 8,290 square feet. Similar to Alternatives 1 and 2, the increase in impervious surface and the loss of the tree cover could lead to erosion and sediment runoff into Gambo Creek and the potential for a change in drainage patterns; however, BMPs would be implemented to minimize impacts.

The area of disturbance under Alternative 3 would be approximately 117,520 square feet, which is larger than an acre and would therefore require a Virginia NPDES permit. The Virginia NPDES permit requires a SWPPP, an erosion- and sediment-control plan, and BMPs to protect against soil erosion and sedimentation. The erosion- and sediment-control plan would show the existing topography of the site, indicate how the topography would be altered, and identify measures to be used to minimize impacts.

Long-term, minor impacts would occur once the bridge is constructed from the increase in impervious surface and tree loss. The new soils at the abutment would compact and stabilize, and revegetation would occur to prevent future erosion; therefore, soils are not expected to erode in the surface water. Changes in topography would be minor and similar to the existing topography at the shoreline.

Impacts from the laydown area and from cofferdams used during construction would be the same as discussed under Alternative 1.

Implementation of Alternative 3 would not result in significant impacts on geological resources.

3.3.3.5 Options for Bridge Utilities Potential Impacts

Option A: Aboveground Utilities

Under Option A, the updated utilities would be attached to the new or existing bridge, similar to existing conditions. The update to the utilities would not differ from the current design; therefore, combined with any of the action alternatives, there would be no significant impacts on geological resources.

Option B: Underground Utilities

The study area for the analysis of effects on geological resources associated with Option B includes the northern point of level of disturbance to the southern alignment. The primary methods for installation of the utilities would bore utilities under Gambo Creek to avoid dredging. Installing underground utilities would require trenching and would lead to short-term disturbance of the soil, although soil disturbance would be limited to areas outside the creek bed. Option B would result in ground disturbance and require permits including Virginia NPDES; however, these impacts would be short term. Combined with any of the action alternatives, there would not be significant impacts on geological resources as a result of implementing Option B.

3.4 Cultural Resources

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.

3.4.1 Regulatory Setting

Cultural resources are governed by other federal laws and regulations, including the National Historic Preservation Act (NHPA), Archeological and Historic Preservation Act (AHPA), American Indian Religious Freedom Act (AIRFA), Archaeological Resources Protection Act of 1979 (ARPA), and the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA). Federal agencies' responsibility for protecting historic properties is defined primarily by Sections 106 and 110 of the NHPA. Section 106 requires federal agencies to consider 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 also may be covered by state, local, and territorial laws.

3.4.2 Affected Environment

Cultural resources listed in the National Register of Historic Places (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 (SHPO). An NRHP-eligible property has the same protections as a property listed in the NRHP. The historic properties include archaeological and architectural resources. The Navy has conducted inventories of cultural resources at NSF Dahlgren to identify historic properties that are listed or potentially eligible for listing in the NRHP, as discussed further below (Navy, 2014).

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 Proposed Action, the Navy identified an APE to encompass archaeological and architectural components. The archaeological portion includes where ground disturbance would occur. The architectural portion considers the viewshed from any historic aboveground structures or historic districts. Both the archaeological APE and the aboveground APE are shown in Figure 3-7.



Figure 3-7 Areas of Potential Effect

3.4.2.1 Archaeological Resources

Forty archaeological sites have been identified at NSF Dahlgren and registered with VDHR. These sites include both prehistoric and historic archaeological resources that range in occupation from the early Middle Archaic subperiod through the early-twentieth century (refer to Figure 3-8 for summary timeline of archaeological periods relevant to this area). Archaeological surveys have been conducted near the project site with 11 sites located within a mile to the north and northwest of Gambo Creek Bridge. Most of the nearby sites are within a wooded area adjacent to the Plate Battery Area immediately to the north.

One archaeological site (Site 44KG0157) is either within or immediately adjacent to the three alternatives on the eastern side of Gambo Creek, south of the bridge. This prehistoric site is NRHP-eligible and dates to the Late Archaic to the Early Woodland Period and includes a shell midden associated with the Late Archaic occupation. This is one of two sites at NSF Dahlgren that is currently NRHP-eligible. Site 44KG0157 was first identified during a survey by American University in 1979 (Evans, 1979) and later re-examined by the Mary Washington College Center for Historic Preservation (Klein, 1998).

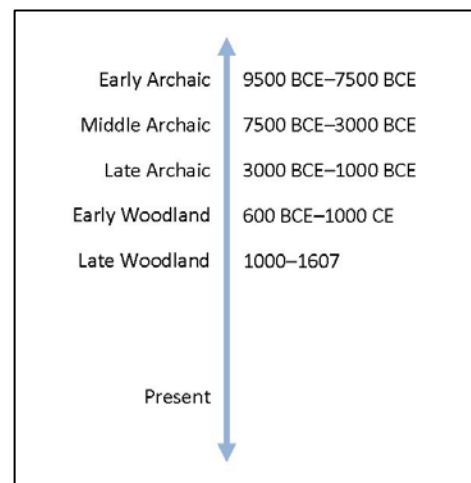


Figure 3-8 Summary Timeline of Archaeological Periods

A second site, Site 44KG0169, is located just northwest of, but outside, the project area. This site is a multicomponent site, with remains of a Woodland Period camp and an eighteenth- to early-nineteenth-century component (Klein, 1998). Its NRHP status is unevaluated (Navy, 2014).

In November 2019, Marstel-Day, LLC conducted a Phase I archaeological survey on the southwest side of Gambo Creek Bridge to identify any new sites. An area of shell concentration was identified, and historic period artifacts were recovered. The shell concentration is possibly a natural tidal deposit, based on the location, appearance, and surrounding landform. It was found in a depression at the lowest point of the landform. One artifact was recovered in the shell concentration: a non-diagnostic, prehistoric biface fragment. Apart from the one prehistoric artifact, finds were historic period glass, metal debris, brick, and one piece of mortar/concrete, dating approximately from the early- to mid-twentieth century. This new site does not appear to be eligible for listing on the NRHP.

3.4.2.2 Architectural Resources

Establishment of NSF Dahlgren in 1918 is recognized as a significant event in our nation's history. As a result of historic architectural surveys conducted at NSF Dahlgren, the Dahlgren Mainside Historic District was determined NRHP-eligible (see Figure 3-9). The Dahlgren Mainside Historic District Period of Significance is 1918 to 1989 (the end of the Cold War). The district is made up of four noncontiguous areas: the Main Battery Area, the Wharf Area, the Ammunition Handling Area, and the Airfield Area. The district was determined significant for its contributions to weapons testing and weapons research and development from 1918 to 1945 under Criteria A and C. The district was eligible because it contained "a cohesive, intact group of historic resources that retain the overall integrity of design, materials, location, setting, workmanship, and association to convey their [period of] significance" (Best and Hirrel, 1994). Later research expanded the period of significance to 1989, to include work conducted during the Cold War (Navy, 2014). During the Cold War, work at Dahlgren was crucial to the development of weapons systems and warfare systems such as Polaris and Aegis Combat System. The U.S. Naval Space Surveillance Facility was housed at Dahlgren from 1960 to the end of the Cold War (Navy, 2014).

As part of the requirements per Section 106 of the NHPA for this undertaking, the Gambo Creek Bridge (VDHR ID No. 048-5192) was evaluated for the NRHP (see Figure 3-10 and Figure 3-11, showing views of Gambo Creek Bridge). It was determined that the bridge was not individually eligible for the NRHP; however, it was recommended as a contributing resource to the Dahlgren Mainside Historic District (VDHR ID No. 048-0104) as part of the Main Battery Area. It is a noncontiguous resource to the district as the Main Battery Area does not extend to Gambo Creek.

Building 469 (VDHR ID No. 048-5162) is the nearest aboveground resource to Gambo Creek Bridge located on the west end of the bridge on the north side of Tisdale Road. This building has been recommended NRHP-eligible as a contributing resource to the Dahlgren Mainside Historic District as part of the Plate and Main Battery Areas. Figure 3-7 shows the location of these resources within the project APE.

3.4.2.3 Traditional Cultural Properties

There are no known traditional cultural properties within NSF Dahlgren.

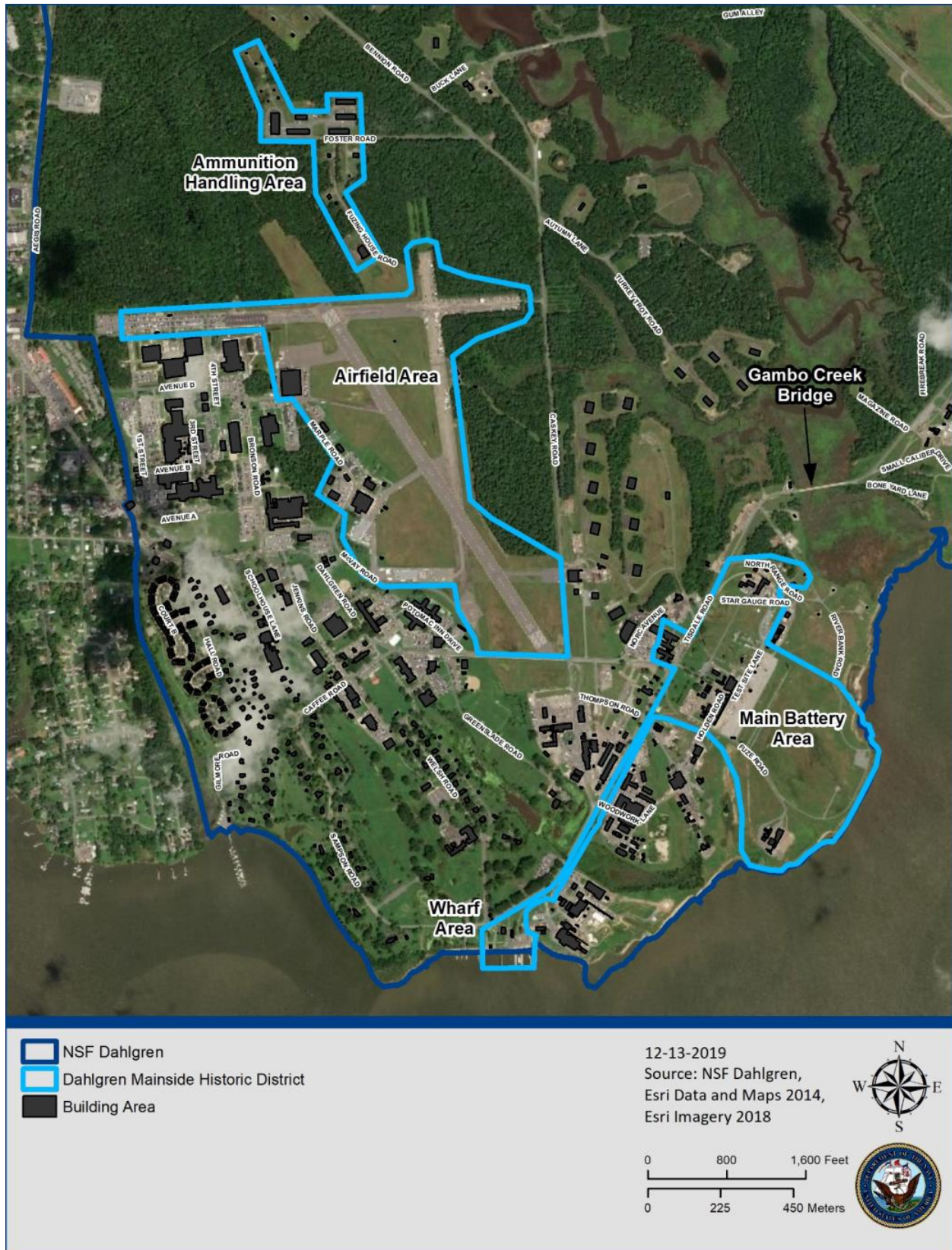


Figure 3-9 Mainside Historic District on Naval Support Facility Dahlgren



Figure 3-10 View of Gambo Creek Bridge Looking East



Figure 3-11 View of Gambo Creek Bridge Looking West

3.4.2.4 Section 106 Consultation

In accordance with Section 106 of the NHPA, the Navy will send a consultation letter to the Virginia SHPO to seek concurrence on the conclusions of this EA.

The Navy consults with federally recognized Native American Tribes (or Native Hawaiian or Alaska Native Organizations) on actions with the potential to significantly affect protected tribal resources, tribal treaty rights, or Indian lands. As part of the consultation process, the Navy will send letters to the seven federally recognized tribes in Virginia who may have an interest in this location: the Pamunkey Indian Tribe, the Chickahominy Indian Tribe, the Chickahominy Indians Eastern Division, the Upper Mattaponi Tribe, the Rappahannock Tribe, the Nansemond Indian Tribe, and the Monacan Indian Nation. Consultation letters and responses are in Appendix C.

3.4.3 Environmental Consequences

Analysis of potential impacts on cultural resources considers both direct and indirect impacts. Direct impacts may be the result of physically altering, damaging, or destroying all or part of a resource, altering characteristics of the surrounding environment that contribute to the importance of the resource, introducing visual, atmospheric, or audible elements that are out of character for the period the resource represents (thereby altering the setting), or neglecting the resource to the extent that it deteriorates or is destroyed.

3.4.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur; however, there would be continued deterioration of the bridge. Insufficient maintenance could eventually cause bridge failure, which would be a long-term, minor, adverse effect on the Dahlgren Mainside Historic District due to neglect. As there would be no ground disturbance, there would be no change in belowground cultural resources. Therefore, no significant impacts on cultural resources would occur with implementation of the No Action Alternative.

Cultural Resources Potential Impacts:

- No Action: Long-term, minor, adverse effect on the bridge due to deterioration. No significant impacts.
- Alternative 1: Long-term, minor, adverse effect on the bridge due to demolition. Possible long-term, minor adverse effect on Site 44KG0157 due to bridge construction. With execution of the MOA including Phase III recovery, no significant impacts.
- Alternative 2: Long-term, minor, adverse effect on the bridge due to demolition. Long-term minor adverse effects on Site 44KG0157 due to bridge and road construction. With execution of the MOA including Phase III recovery, no significant impacts.
- Alternative 3: Beneficial effects on the bridge due to planned repairs. Long-term, minor adverse effects on Site 44KG0157 due to bridge and road construction. With execution of the MOA including Phase III recovery, no significant impacts.
- Option A: No adverse effects above those described for action alternatives. No significant impacts.
- Option B: Trenching and utilities would avoid known archaeological sites. Mitigation measures between the Navy and SHPO would be included in the executed MOA. No significant impacts.

3.4.3.2 Alternative 1: Existing Bridge Alignment (Preferred Alternative) Potential Impacts

The belowground APE includes the entire project site where potential ground disturbance would occur. The aboveground APE includes the project viewshed, which contains the nearby NRHP-eligible Building 469 as shown on Figure 3-7. Under Alternative 1, the current bridge would be demolished, which would have a direct adverse effect on the bridge because it is a contributing resource to the Dahlgren Mainside Historic District. This demolition would have a long-term, minor, adverse effect on the historic district. In addition, the replacement bridge would not be NRHP-eligible to the Mainside Historic District as a contributing resource as its construction date is outside of the historic district's period of significance. There would be no direct or indirect effects on Building 469, an adjacent contributing resource. The bridge would be replaced with another bridge of similar length and profile and would not adversely affect the viewsheds between the bridge, Building 469, and the surrounding landscape. Therefore, there would be no long-term, indirect adverse effects associated with the proposed demolition and construction of the bridge.

There would be no adverse effects from the development of a temporary access road nor the laydown area on the western side of the existing bridge.

The proposed demolition and construction would cause minimal disturbance to the shoreline along Gambo Creek. The width of the new bridge would increase, resulting in possible impacts on nearby Site 44KG0157. The Navy is consulting with the SHPO about adverse effects that would result from the bridge demolition and possible disturbance of adjacent archaeological sites. The Navy is also preparing a Phase III data recovery plan for that part of Site 44KG0157 that would be disturbed. Phase III data recovery would be a mitigation measure in the Memorandum of Agreement (MOA) between the Navy and the SHPO. With the mitigation measures in the MOA, implementation of Alternative 1 would not result in significant impacts on cultural resources.

3.4.3.3 Alternative 2: Southern Bridge Alignment Potential Impacts

The APE for Alternative 2 is the same as Alternative 1, which includes the entire project site where potential ground disturbance would occur and the project viewshed, which contains the nearby NRHP-eligible Building 469. Alternative 2 would leave the current bridge in place during the construction of a new bridge immediately to the south. Following completion, the original bridge would be demolished. The demolition of Gambo Creek Bridge would have similar direct and indirect effects on aboveground resources as described under Alternative 1, which are long term, minor, and adverse. This demolition, however, would not change the eligibility status of the Mainside Historic District.

The new bridge would have a new alignment, and this would pass through the edge of the NRHP-eligible Site 44KG0157. There would be adverse effects on cultural resources with the new road and bridge alignment crossing through a portion of this site. The construction of the new bridge and associated roadway would destroy a portion of Site 44KG0157, which would be a direct adverse effect on cultural resources. The Navy is currently consulting with the SHPO on mitigation measures regarding adverse effects from the bridge demolition and disturbance of existing and potential sites. There would be no direct or indirect effects on Building 469, an adjacent contributing resource. The bridge would be replaced with another bridge of similar length and profile. Although slightly further away, it would not adversely affect the viewsheds between the bridge, Building 469, and the surrounding landscape. Therefore, there would be no long-term, indirect adverse effects on the Dahlgren Mainside Historic District associated with the proposed demolition and construction of the bridge.

Similar to Alternative 1, there would be no adverse effects from the development of a temporary access road nor the laydown area on the western side of the existing bridge.

With the execution of mitigation measures between the Navy and the SHPO in an MOA, and a Phase III data recovery, the implementation of Alternative 2 would not result in significant impacts on cultural resources.

3.4.3.4 Alternative 3: Parallel Bridge Alignment Potential Impacts

The APE for Alternative 3 is the same as Alternative 1, which includes the entire project site where potential ground disturbance would occur and extends to include the visual viewshed and the nearby NRHP-eligible Building 469. There would be no direct or indirect effects on Building 469, an adjacent contributing resource, as the bridge would remain in place. Alternative 3 would repair the current Gambo Creek Bridge, and a parallel bridge would be built south of the current structure. There would be beneficial effects on the NRHP-eligible Gambo Creek Bridge under Alternative 3. Repairs and maintenance would improve its condition and possibly slow deterioration, thereby resulting in beneficial effects. Adverse effects on belowground cultural resources would be similar as described in Alternative 2. Similar to Alternative 1, there would be no adverse effects on the development from a temporary access road nor the laydown area on the western side of the existing bridge. With the execution of mitigation measures between the Navy and the SHPO in an MOA regarding the adverse effects on belowground cultural resources, the implementation of Alternative 3 would not result in significant impacts on cultural resources.

3.4.3.5 Options for Bridge Utilities Potential Impacts

Option A: Aboveground Utilities

The APE for Option A includes the entire project site where the utilities would be located as shown on Figure 3-7. The utilities are currently located aboveground on Gambo Creek Bridge. Under this option, the utilities would be reattached to the existing bridge following repairs. Gambo Creek Bridge was determined NRHP-eligible as a contributing resource to the Mainside Historic District with the utilities attached. Reattaching the utilities to the bridge following repairs would not change its eligibility status. There would be no adverse effects under Option A; therefore, implementation would not result in significant impacts on cultural resources, combined with any of the action alternatives.

Option B: Underground Utilities

The APE for Option B includes the entire project site where there would be ground disturbance. The utilities are currently located aboveground on Gambo Creek Bridge. Under this alternative the utilities would be bored underneath Gambo Creek using a technique such as horizontal directional drilling. The utilities would avoid any existing and potential archaeological sites. However, because survey of the area under the creek is not possible using traditional survey methods, there is the potential to encounter unanticipated discoveries during this option. In the event of an unanticipated discovery, the Navy would follow specific procedures detailed in the MOA. Under Option B, mitigation measures between the Navy and the SHPO would be included in the executed MOA; therefore, implementation of Option B would not result in significant impacts on cultural resources, combined with any of the action alternatives.

3.5 Biological Resources

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. 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 present in an area that support a plant or animal. Within this EA, biological resources are divided into four major categories: vegetation, terrestrial wildlife, marine species, and threatened and endangered species.

3.5.1 Regulatory Setting

Special-status species, for the purposes of this EA, are those species listed as threatened or endangered under the Endangered Species Act and species afforded federal protection under the Marine Mammal Protection Act or the Migratory Bird Treaty Act.

The purpose of the Endangered Species Act is to conserve the ecosystems upon which threatened and endangered species depend and to conserve and recover listed species. Section 7 of the Endangered Species Act requires action proponents to consult with USFWS or NOAA Fisheries to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered species, or result in the destruction or adverse modification of designated critical habitat. Critical habitat cannot be designated on any areas owned, controlled, or designated for use by the Department of Defense (DoD) where an Integrated Natural Resources Management Plan has been developed that, as determined by the Department of the Interior or Department of Commerce Secretaries, provides a benefit to the species subject to critical habitat designation.

All marine mammals are protected under the provisions of the Marine Mammal Protection Act. While marine mammals, namely the bottlenose dolphin (*Tursiops truncatus*), are occasionally sighted in the Potomac River as far north as Dahlgren, no marine mammals are found in Gambo Creek. Therefore, marine mammals are not discussed further in this EA.

Birds, both migratory and most native-resident bird species, are protected under the Migratory Bird Treaty Act, and their conservation by federal agencies is mandated by EO 13186, *Migratory Bird Conservation*. Under the Migratory Bird Treaty Act, 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 Armed Forces from the incidental taking of migratory birds during authorized military readiness activities. The final rule authorizing the DoD to take migratory birds in such cases includes a requirement that the 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.

Bald and golden eagles are protected by the Bald and Golden Eagle Protection Act. This act prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald eagles, including their parts, nests, or eggs; “take” is defined as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.”

The Magnuson-Stevens Fishery Conservation and Management Act provides for the conservation and management of the fisheries. Under this act, essential fish habitat (EFH) consists of the waters and substrate needed by fish to spawn, breed, feed, or grow to maturity. See Section 3.2.3 for the discussion regarding the CZMA.

3.5.2 Affected Environment

The following discussions provide a description of the existing conditions for each of the categories under biological resources at NSF Dahlgren. Federally listed threatened and endangered species are discussed in Section 3.5.2.4.

3.5.2.1 Vegetation

NSF Dahlgren contains a wide diversity of terrestrial habitats, as well as estuarine and palustrine wetland communities. A summary of terrestrial communities is included in Table 3-6. Floral surveys conducted in 1978 documented over 300 plant species representing 86 families. The complete list of floral species and vegetative communities present at NSF Dahlgren can be found in the Integrated Natural Resources Management Plan (Wray, 2013).

Table 3-6 Terrestrial Communities at Naval Support Facility Dahlgren

<i>Community</i>	<i>Percent of Installation</i>
Terrestrial communities	86
Forest	52
Mixed pine-hardwoods	31
Hardwood forests	26
Pine forests	6
Open uplands	34
Grasslands	6
Developed/maintained area	28
Wetlands	14

Source: Wray, 2013.

Note: Refer to Section 3.2, Water Resources, for full discussion of wetlands.

At the project site, the terrestrial vegetative communities consist of mixed pine-hardwood forest, manicured lawn, scrub-shrub habitat along the forest edge, and wetlands on either side of Gambo Creek. These communities include various pine and hardwood types such as sweetgum (*Liquidambar styracifula*), red maple (*Acer rubrum*), tulip poplar (*Liriodendron tulipifera*), and loblolly pine (*Pinus taeda*). Understories of these forest communities are varied and depend on site conditions (Wray, 2013). Gambo Creek consists of a brackish-intertidal emergent marsh community. These marshes are dominated by saltmarsh cordgrass (*Spartina alterniflora*), marsh elder (*Iva annua*), and pigweed (*Amaranthus cannabinus*) (Wray, 2013).

Based on a Virginia Natural Heritage database search, the following state- or federal-listed plant species may potentially be present in the Northern Neck region of Virginia but were not analyzed further in this EA due to a low likelihood of presence within the project site: small whorled pogonia (*Isotria medeoloides*), long beach seedbox (*Ludwigia brevipes*), and Virginia least trillium (*Trillium pusillum* var. *virginianum*) (Virginia Department of Conservation and Recreation, 2019; USFWS, 2019a; USFWS, 2011a; USFWS, 2019b).

3.5.2.2 Terrestrial Wildlife

Wildlife includes all animal species (i.e., insects and other invertebrates, amphibians, reptiles, birds, and mammals), with a focus on the species and habitat features of greatest importance or interest. Fish species are discussed in Section 3.5.2.3. Faunal surveys conducted in 1978 documented 157 avian, 20

mammalian, 16 amphibian, and 16 reptilian species. The complete list of wildlife species present at NSF Dahlgren can be found in the Integrated Natural Resources Management Plan (Wray, 2013).

The installation's wetlands, ponds, and wooded areas provide habitat for a number of reptiles and amphibians that are common in the region. Common snakes include the northern water snake (*Nerodia s. sipedon*), black rat snake (*Elaphe obsoleta*), and northern black racer (*Coluber c. constrictor*). Common turtles include the common snapping turtle (*Chelydra serpentina*), red-bellied turtle (*Pseudemys rubriventris*), eastern mud turtle (*Kinosternon subrubrum*), and eastern box turtle (*Terrapene carolina*). Lizards found on the installation include ground skinks (*Scincella lateralis*) and five-lined skinks (*Eumeces fasciatus*). Of the amphibians that inhabit the area, frogs and toads comprise the largest group. Common frogs and toads found on the installations include the American toad (*Bufo americanus*), green frog (*Rana clamitans*), southern leopard frog (*Rana sphenoccephala*), spring peeper (*Pseudacris crucifer*), green tree frog (*Hyla cinerea*), and upland chorus frog (*Pseudacris triseriata*) (Wray, 2013).

Forest habitats at NSF Dahlgren generally support a variety of mammal species. Large mammal species observed on NSF Dahlgren include white-tail deer (*Odocoileus virginianus*), coyote (*Canis latrans*), grey fox (*Urocyon cinereoargenteus*), and red fox (*Vulpes vulpes*). Medium and small mammals include eastern cottontail (*Sylvilagus floridanus*), opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), grey squirrel (*Sciurus carolinensis*), white-footed mouse (*Peromyscus leucopus*), groundhog (*Marmota monax*), beaver (*Castor canadensis*), river otter (*Lontra canadensis*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), long-tailed weasel (*Mustela frenata*), and a number of small rodents and insectivores (Wray, 2013). Mammal species present at NSF Dahlgren include several bat species. Recent surveys have confirmed the presence of eight bat species: big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), southeastern myotis (*Myotis austroriparius*), little brown bat (*Myotis lucifugus*), evening bat (*Nycticeius humeralis*), and tri-colored bat (*Perimyotis subflavus*) (NAVFAC Washington, 2017; NAVFAC Washington, 2018; NAVFAC Washington, 2019). The little brown bat and tri-colored bat are addressed in greater detail in Section 3.5.2.4.

The avian community at NSF Dahlgren is particularly diverse and includes a large number of migratory waterfowl that overwinter at the installation, as well as a large number of neotropical migrants that breed on-site (Wray, 2013). Many species of migratory birds protected under the Migratory Bird Treaty Act have the potential to occur at NSF Dahlgren, including the bobolink (*Dolichonyx oryzivorus*), buff-breasted sandpiper (*Calidris subruficollis*), lesser yellowlegs (*Tringa flavipes*), prothonotary warbler (*Protonotaria citrea*), red-headed woodpecker (*Melanerpes erythrocephalus*), red-throated loon (*Gavia stellata*), ruddy turnstone (*Arenaria interpres morinella*), rusty blackbird (*Euphagus carolinus*), semipalmated sandpiper (*Calidris pusilla*), whimbrel (*Numenius phaeopus*), and wood thrush (*Hylocichla mustelina*) (USFWS, 2019c). Of these, lesser yellowlegs, rusty blackbird, and wood thrush have been observed at NSF Dahlgren in recent biological surveys (Wray, 2013). In addition, the peregrine falcon (*Falco peregrinus*) has been known to nest on the nearby Harry W. Nice Memorial Bridge (Nice Bridge) over the Potomac River and potentially forages on the installation (Chesapeake Conservancy, 2019). This species is addressed in greater detail in Section 3.5.2.4.

Bald eagles are known to occur on NSF Dahlgren; while this species has been delisted from the Endangered Species Act, it retains federal protection under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. NSF Dahlgren has 11 active bald eagle nests, the management of which are outlined in a Bald Eagle Management Plan and implemented in joint cooperation with Virginia

Department of Game and Inland Fisheries and USFWS (Wray, 2013). Gambo Creek Bridge is not located near any active bald eagle nests (Wray, 2019a).

The brackish intertidal marsh areas of Gambo Creek also provide habitat for some uncommon invertebrates, including blue-faced meadowfly (*Sympetrum ambiguum*) and unicorn clubtail (*Arigomphus villosipes*) (Wray, 2013).

Based on a Virginia Natural Heritage database search, the following state- or federal-listed animal species may potentially be present in the Northern Neck region of Virginia but were not analyzed further in this EA due to a low likelihood of presence within the project site: tiger salamander (*Ambystoma tigrinum*) and northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) (Virginia Department of Conservation and Recreation, 2019; Virginia Department of Game and Inland Fisheries, 2019a; Virginia Department of Conservation and Recreation, 2008; USFWS, 2011b).

3.5.2.3 Marine Species

Marine Vegetation

Marine vegetation includes plants occurring in marine or estuarine waters. These may include algae and various grasses.

Submerged aquatic vegetation (SAV) beds grow in the intertidal area (also called the littoral zone) of the Potomac River and its tributaries, typically at depths of 6.6 feet or less during low tide. Annual SAV monitoring of Chesapeake Bay and its tributaries is conducted using aerial photography and field sampling. Recent aerial photography of the area around the installation did not reveal SAV densities great enough to be detected (Navy, 2013).

Upper Machodoc Creek is approximately 17 miles long, approximately 3,000 feet wide at the mouth, and about six feet deep. SAV is present most years in Upper Machodoc Creek near the mouth of Williams Creek, west of Gambo Creek. Prior to 2002, SAV was also generally found in the more upstream reaches of the creek (Navy, 2013). Species found include wild celery (*Vallisneria americana*), common waterweed (*Elodea canadensis*), coontail (*Ceratophyllum demersum*), and the invasive Eurasian watermilfoil (*Myriophyllum spicatum*). Gambo Creek is tidally influenced as far inland as the northern boundary of the installation. The creek is bordered by extensive tidal wetlands dominated by saltmarsh cordgrass (*Saltmarsh alterniflora*) and big cordgrass (*Spartina cynosuroides*).

Fish

Fish are vital components of the marine ecosystem that contribute great ecological and economic impact. NSF Dahlgren is located at the confluence of the Potomac River and Upper Machodoc Creek. This stretch of the Potomac River is the upper limit of the river's estuarine zone and is an ecologically important area providing adult, migratory, spawning, and nursery habitat for local and regional fish populations. Up to 31 fish species—including two federally listed anadromous sturgeon species that are discussed further in Section 3.5.2.4—are included in the aquatic fauna found in the Potomac River (NAVFAC Washington, 2016a).

Anadromous fish species, such as striped bass (*Morone saxatilis*), hickory shad (*Alosa mediocris*), American shad (*A. sapidissima*), alewife (*A. pseudoharengus*), blueback herring (*A. aestivalis*), white perch (*Morone americana*), threespine stickleback (*Gasterosteus aculeatus*), and sea lamprey (*Petromyzon marinus*), occur in the Potomac River. Wetlands associated with Gambo Creek and Upper Machodoc Creek may provide nursery habitat for these species, including the alewife and blueback

herring (discussed in Section 3.5.2.4). The catadromous American eel (*Anguilla rostrata*) is also likely to be observed in the vicinity of the installation (Wray, 2013).

The Alliance for the Chesapeake Bay and NSF Dahlgren conducted fish sampling at two stations on the Potomac River and four stations on Upper Machodoc Creek between 1999 and 2002. A total of 27 fish species were collected at the Upper Machodoc Creek stations during these efforts. The most abundant species were white perch and Atlantic silverside (*Menidia menidia*) (Wray, 2013).

Essential Fish Habitat

NOAA Fisheries works with the regional fishery management councils to identify the essential habitat—EFH—for every life stage of each federally managed species using the best available scientific information. EFH includes all types of aquatic habitat including wetlands, coral reefs, seagrasses, and rivers, and all locations where fish spawn, breed, feed, or grow to maturity.

EFH has been designated for eight fish species in the vicinity of Gambo Creek at the confluence with the Potomac River. In accordance with the Magnuson-Stevens Fisheries Conservation and Management Act, consultation with NOAA Fisheries is required when any land use changes, shoreline stabilization, or military operations are planned that have the potential to affect EFH. EFH has been designated for the species listed in Table 3-7 in the vicinity of Gambo Creek, and descriptions of the species and their respective EFH follow. For context within the EFH descriptions below, the salinity of the Potomac River in the vicinity of NSF Dahlgren ranges from approximately 4 to 8 parts per thousand (ppt) (NAVFAC Washington, 2013). Ocean water is typically 35 ppt, and the Chesapeake Bay ranges from 25 to 30 ppt at its confluence with the Atlantic Ocean to 0.5 ppt at the head of the bay where it meets with freshwater rivers.

Of the species listed in Table 3-7, little skate, Atlantic herring, winter skate, and clearnose skate would not be expected to occur in the mixing salinity zone of Gambo Creek and the Potomac River as these species are found in high salinity zones. Therefore, these four species are not discussed further.

Bluefish (*Pomatomus saltatrix*): Bluefish is a highly migratory, schooling pelagic species found along the Atlantic coast. EFH for juvenile and adult bluefish includes the pelagic water column and inland with the mixing and seawater zones between 0.5 and 25 ppt, and greater than 25 ppt salinity, respectively. Generally, in Mid-Atlantic estuaries, juvenile bluefish occur from May through October and adult bluefish occur from April through October within the “mixing” and “seawater” zones.

Summer Flounder (*Paralichthys dentatus*): EFH for juvenile and adult summer flounder includes bottom waters, including tidal guts. Juveniles may use estuarine habitats such as salt marsh creeks, SAV beds, and open bay areas as nursery areas, in salinities from 10 to 30 ppt. Adults generally inhabit shallow estuarine waters during warmer months.

Red Hake (*Urophycis chuss*): Egg and larvae habitats for red hake includes the seawater salinity zone of the Chesapeake Bay. Juvenile and adult seasonal visitors in the Chesapeake Bay are common during the late winter and spring months. The species occurs in the deeper channels of the bay mainstem as well as the deep channels of Hampton Roads Harbor and occasionally in the upper bay extending as far north as the Patuxent River. However, juvenile and adult habitats normally occur within the seawater salinity zone of the Chesapeake Bay.

Table 3-7 Essential Fish Habitat and Life Stages Near Proposed Action

Common Name	Scientific Name	Eggs	Larvae	Juveniles	Adults
Bluefish	<i>Pomatomus saltatrix</i>	—	—	Yes	Yes
Summer flounder	<i>Paralichthys dentatus</i>	—	—	Yes	Yes
Little skate	<i>Leucoraja erinacea</i>	—	—	—	Yes
Atlantic herring	<i>Clupea harengus</i>	—	—	Yes	Yes
Red hake	<i>Urophycis chuss</i>	Yes	Yes	Yes	Yes
Windowpane flounder	<i>Scophthalmus aquosus</i>	—	—	Yes	—
Winter skate	<i>Leucoraja ocellata</i>	—	—	—	Yes
Clearnose skate	<i>Raja eglanteria</i>	—	—	Yes	Yes

Source: NOAA Fisheries, 2019a.

Windowpane Flounder (*Scophthalmus aquosus*): EFH for juvenile windowpane flounder includes bottom habitats with a substrate of mud of fine-grained sand, water temperatures below 77 degrees Fahrenheit, and salinities between 5.5 and 36 ppt.

No Habitat Areas of Particular Concern are present within the project site (NOAA Fisheries, 2019a).

Benthic Invertebrates

Animals that live on the sea floor are called benthos. Most of these animals lack a backbone and are called invertebrates. Benthic invertebrates include sea anemones, sponges, corals, sea stars, sea urchins, worms, bivalves, crabs, and many more.

The blue crab (*Callinectes sapidus*) and American oyster (*Crassostrea virginica*) are commercially important shellfish found in the waters around NSF Dahlgren. Other benthic insects and crustaceans are likely to be observed in the vicinity of the installation.

3.5.2.4 Rare, Threatened, and Endangered Species

All potential rare, threatened, and endangered species that may occur on NSF Dahlgren are summarized in Table 3-8. There is no designated critical habitat for any species on NSF Dahlgren (USFWS, 2019c).

Sensitive Joint-Vetch (*Aeschynomene virginica*)

Sensitive joint-vetch is a plant species that occurs in fresh to slightly brackish tidal river systems, within the intertidal zone, typically occurring at the outer fringe of marshes or shores (USFWS, 2010). A rare plant survey for several target species known to occur in the vicinity of NSF Dahlgren was completed in 2004. Although potential habitat exists for sensitive joint-vetch, the species was not found in the areas surveyed on the installation (Wray, 2013). An additional survey for sensitive joint-vetch was conducted in 2017, and no plants were found. No critical habitat for sensitive joint-vetch exists on NSF Dahlgren (USFWS, 2019c).

Monarch Butterfly (*Danaus plexippus*)

The USFWS is currently reviewing the status of the monarch butterfly. The monarch butterfly is a wide-ranging species that, over the course of several generations, migrates between summer habitat in the northern United States and Canada and winter habitat in Mexico (USFWS, 2019d). Monarch have been observed using the habitat at NSF Dahlgren; it is very likely that the monarch uses habitat at NSF Dahlgren during its seasonal migration.

Table 3-8 Rare, Threatened, and Endangered Species Known to Occur or Potentially Occurring at the Project Site, and Critical Habitat at the Project Site

<i>Common Name</i>	<i>Scientific Name</i>	<i>Federal Listing Status</i>	<i>State Listing Status</i>	<i>Critical Habitat Present?</i>
Plants				
Sensitive joint-vetch	<i>Aeschynomene virginica</i>	FT	ST	No
Invertebrates				
Monarch butterfly	<i>Danaus plexippus</i>	Under Review	None	No
Rusty-patched bumble bee	<i>Bombus affinis</i>	FE	None	No
Fish				
Atlantic sturgeon	<i>Acipenser oxyrinchus</i>	FE	SE	No
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	FE	SE	No
Alewife	<i>Alosa pseudoharengus</i>	—	SGCN	No
Blueback herring	<i>Alosa aestivalis</i>	—	SGCN	No
Reptiles				
Northern red-bellied cooter	<i>Pseudemys rubriventris</i>	Under Review	None	No
Spotted turtle	<i>Clemmys guttata</i>	Under Review	SGCN	No
Birds				
Peregrine falcon	<i>Falco peregrinus</i>	D; MBTA	ST	No
Mammals				
Northern long-eared bat	<i>Myotis septentrionalis</i>	FT	ST	No
Tri-colored bat	<i>Perimyotis subflavus</i>	Under Review	SE	No
Little brown bat	<i>Myotis lucifugus lucifugus</i>	Under Review	SE	No

Sources: Wray, 2013; Virginia Department of Conservation and Recreation, 2019; USFWS, 2019c.

Key: D = delisted; FE = federal endangered; FT = federal threatened; MBTA = Migratory Bird Treaty Act; SE = state endangered; SGCN = species of greatest conservation need (state designation); ST = state threatened.

Rusty-Patched Bumblebee (*Bombus affinis*)

The rusty-patched bumblebee was listed as federally endangered in 2017 (USFWS, 2019e). The species typically inhabits open grasslands and tallgrass prairies of the Upper Midwest and Northeast (USFWS, 2019f), though it was observed in 2014 at Sky Meadows State Park in Paris, Virginia, which is over 65 miles away (Johnson, 2018). There have been no sightings of this species at NSF Dahlgren, and it is not expected to be present due to the lack of suitable grassland habitat.

Atlantic Sturgeon (*Acipenser oxyrinchus*) and Shortnose Sturgeon (*A. brevirostrum*)

A limited number of shortnose sturgeon are currently found in the Potomac River, and the Atlantic sturgeon is well documented in the Potomac River. Through its Integrated Natural Resources Management Plan (Wray, 2013), NSF Dahlgren implements management practices to minimize potential impacts on these anadromous sturgeon species.

It is likely that sturgeon are present during the summer months in the Potomac River based on information collected from June through September. The locations of the sturgeon collected by the reward program are based on where fishermen are setting their fishing gear (Navy, 2013). Therefore, the sturgeon captures on the Potomac River may or may not reflect areas preferred by sturgeon.

Atlantic sturgeon spawning is thought to take place between the salt front and fall line of large rivers. In the Potomac River, this area is located below Little Falls Dam and extends up to Great Falls. However, there are no records of Atlantic sturgeon spawning in the Potomac River. In the Potomac River, a total of

226 Atlantic sturgeon have been reported, primarily through the Sturgeon Reward Program. Most Atlantic sturgeon have been captured below the Nice Bridge. The number reported varies annually and was highest from 2005 to 2008. The yearly fluctuations in the number of captures are thought to reflect changes in the sturgeon population. There seem to be stronger year classes of sturgeon that move up into the Chesapeake Bay in certain years but not others (Navy, 2013). It is considered highly unlikely that Atlantic or shortnose sturgeon would be present within Gambo Creek due to the small size of the creek and the shallow water depth at the mouth of the creek (Balazik, 2019).

Alewife (*Alosa pseudoharengus*) and Blueback Herring (*A. aestivalis*)

NOAA Fisheries recently reviewed the listing status of alewife and blueback herring and determined that listing either species as threatened or endangered at this time is not warranted; however, NOAA Fisheries noted there were significant data deficiencies such that their listed status would be reviewed in three to five years (NOAA Fisheries, 2019b). These species are found in the Potomac River and potentially occur in Gambo Creek (Wray, 2013). The alewife and blueback herring are anadromous species that migrate upstream to spawn in freshwater before returning to the sea. Spawning occurs in the spring, with the alewife first migrating upstream when water temperatures reach 51 degrees Fahrenheit, followed by blueback herring once temperatures reach 57 degrees (USFWS, n.d.[a]).

Northern Red-bellied Cooter (*Pseudemys rubriventris*)

The USFWS is currently reviewing the status of the northern red-bellied cooter. The species is relatively common within its core range of Maryland, Virginia, Delaware, and New Jersey, and it frequents tidal waters near the mouths of rivers. Spotted turtles have declined across their range and have been petitioned for federal listing under the Endangered Species Act (DoD PARC, 2017). Habitat requirements include a soft bottom and numerous basking sites, with aquatic plants present. NSF Dahlgren provides suitable habitat for the species, and it is relatively common on the installation. It was well documented during a 2014 herpetofauna survey (Wray, 2019b).

Spotted Turtle (*Clemmys guttata*)

The USFWS is currently reviewing the status of the spotted turtle. These species are semiaquatic and can be found in a variety of shallow waterbodies including streams, swamps, marshes, bogs, and permanent or seasonal pools and ponds. There is a historical record of spotted turtle on NSF Dahlgren from a 1977 survey, but the 2014 herpetofauna survey did not find the species on the installation. However, since the 2014 survey, two spotted turtle observations have been reported (Wray, 2019b).

Peregrine Falcon (*Falco peregrinus*)

The peregrine falcon potentially uses the installation and nearby Potomac River as foraging habitat but is very unlikely to nest anywhere on the installation. This species requires cliffs or tall man-made structures for nesting (Virginia Department of Game and Inland Fisheries, 2019b). The majority of peregrine falcons in Virginia nest within the Coastal Plain region on tall artificial structures, and peregrine falcons have been known to nest in the past on the nearby Nice Bridge over the Potomac River (Virginia Department of Game and Inland Fisheries, 2019b; Chesapeake Conservancy, 2019).

Northern Long-Eared Bat (*Myotis septentrionalis*)

The northern long-eared bat has not been observed on NSF Dahlgren (Wray, 2013), but it has the potential to occur in the region and is considered by USFWS to be potentially affected by activities in the area (USFWS, 2019c). The northern long-eared bat is found across much of the eastern and northcentral United States. The species is affected by white-nose syndrome, resulting in the species declining by up to 99 percent from pre-white-nose syndrome levels (USFWS, n.d.[b]). Acoustic monitoring surveys were conducted at NSF Dahlgren in 2015, 2017, 2018, and 2019, and mist net surveys were conducted in 2017 and 2019 to provide an inventory of bat species present at the installation, including the northern long-eared bat. The species was not detected on the installation (NAVFAC Washington, 2017; NAVFAC Washington, 2018; NAVFAC Washington, 2019). Known northern long-eared bat hibernacula within Virginia are limited to near the western border of the state, over 100 miles away; there are no known hibernacula near NSF Dahlgren. The nearest known occupied maternity roost is approximately 188 miles away (Virginia Department of Game and Inland Fisheries, n.d.).

Tri-colored Bat (*Perimyotis subflavus*)

The tri-colored bat is present at NSF Dahlgren. This species was detected along a tributary to Gambo Creek located approximately a half-mile northwest of the project location. This species has not been physically captured at the installation (NAVFAC Washington, 2019; NAVFAC Washington, 2017; NAVFAC Washington, 2018). The nearest known hibernaculum location is over 100 miles to the southwest, near Charlottesville, Virginia (Virginia Department of Game and Inland Fisheries, 2019c). This species uses both trees and human structures as maternity roosts (Virginia Department of Game and Inland Fisheries, 2016).

Little Brown Bat (*Myotis lucifugus lucifugus*)

The little brown bat is present at NSF Dahlgren. This species was detected along a tributary to Gambo Creek located approximately a half-mile northwest of the project location. This species has not been physically captured at the installation (NAVFAC Washington, 2019; NAVFAC Washington, 2017; NAVFAC Washington, 2018). The nearest known hibernaculum location is over 100 miles to the southwest, near Charlottesville, Virginia (Virginia Department of Game and Inland Fisheries, 2019c). This species uses both trees and human structures as maternity roosts (Virginia Department of Game and Inland Fisheries, 2016).

3.5.3 Environmental Consequences

This analysis focuses on wildlife or vegetation types that are important to the function of the ecosystem or are protected under federal or state law or statute. The potential for short- and long-term impacts is considered. The analysis for potential impacts on marine species considers the potential for impacts that may change the water quality, including both improvements and degradation of current water quality.

3.5.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and there would be no change in baseline conditions of biological resources. Therefore, no significant impacts on biological resources would occur with implementation of the No Action Alternative.

3.5.3.2 Alternative 1: Existing Bridge Alignment (Preferred Alternative) Potential Impacts

The study area for the analysis of effects on biological resources associated with Alternative 1 includes the lower portion of Gambo Creek and its confluence with the Potomac River, aquatic habitat, and surrounding vegetation in the vicinity of Alternative 1, with consideration for how changes during construction could affect other biological resources on the installation and surrounding community.

Short-term, negligible and minor, adverse impacts on biological resources would be expected from Alternative 1. Impacts would result from the following construction activities: bridge demolition, roadway construction, cofferdam installation, and pile driving for the new bridge. Construction activities would result in noise (including underwater acoustic noise resulting from pile driving), fugitive dust, increased sedimentation and turbidity within the water column, temporary alteration of the flow of Gambo Creek, and direct impacts on aquatic habitats (refer to Section 3.2.3.2 for impacts on wetlands). These would be short-term, negligible-to-minor impacts on biological resources on, near, and downstream of the project site. No long-term adverse impacts on biological resources are anticipated. Implementation of Alternative 1 would not result in significant impacts on biological resources, as discussed in the following subsections.

Vegetation

Under conservative estimates, the construction of the proposed bridge to replace the current bridge at the existing alignment would result in the loss of up to 3,340 square feet of trees and the disturbance of as much as 63,860 square feet of wetland habitat (refer to Section 3.2 for impacts on wetlands). Minimal permanent loss of habitat would be expected.

Terrestrial Wildlife

Short-term, negligible impacts on terrestrial wildlife species could occur from noise and disturbance associated with construction activities at the project site. Increases in noise levels from construction activities would be temporary. Minimal loss of forest

Biological Resource Potential Impacts:

- No Action: No change in baseline conditions. No significant impacts.
- Alternative 1: Short-term, negligible impacts on terrestrial wildlife, Atlantic and shortnose sturgeon, bald eagle, northern long-eared bat, tri-colored bat, little brown bat, and peregrine falcon. Short-term, minor impacts on vegetation, aquatic habitat, SAV, alewife, blueback herring, red hake, and monarch butterfly. No significant impacts.
- Alternative 2: Short-term, negligible impacts on Atlantic and shortnose sturgeon, northern long-eared bat, tri-colored bat, little brown bat, and peregrine falcon. Short-term, minor impacts on aquatic habitat, SAV, alewife, blueback herring, red hake, and bald eagle. Long-term, negligible impacts on vegetation, terrestrial wildlife, and monarch butterfly. No significant impacts.
- Alternative 3: Short-term, negligible impacts on Atlantic and shortnose sturgeon, northern long-eared bat, tri-colored bat, little brown bat, and peregrine falcon. Short-term, minor impacts on SAV, alewife, blueback herring, and red hake. Long-term, negligible impacts on bald eagle and terrestrial wildlife. Long-term, minor impacts on vegetation aquatic habitat, and monarch butterfly. No significant impacts.
- Option A: Additional short-term, negligible impacts on biological resources. No significant impacts.
- Option B: Additional short-term, negligible impacts on biological resources. No significant impacts.

and scrub-shrub habitat is expected to occur. Impacts on rare, threatened, or endangered terrestrial wildlife are included in that subsection.

The study area is in a region that serves as bald eagle foraging habitat but is not located within any buffer areas for active nests on NSF Dahlgren (Wray, 2013). Any impacts on this species resulting from Alternative 1 would be short term and negligible, given the abundance of foraging habitat in the surrounding area. Migratory birds at NSF Dahlgren may be temporarily displaced as a result of Alternative 1 but would be expected to relocate to similar habitats nearby.

Marine Species

Implementation of Alternative 1 would temporarily affect the water quality of Gambo Creek and the downstream Potomac River. Ground-disturbing activities lead to increased sedimentation and turbidity. Increased sediments and water turbidity adversely affect aquatic life by reducing light, which is necessary for aquatic plants. Localized loss of SAV coverage reduces habitat and sometimes prey availability for the invertebrate and fish species using that area. Sediments in the water column can also smother SAV or clog fish gills. Construction would directly affect Gambo Creek as construction occurs, and indirectly affect downstream water bodies. These impacts would be minimized through BMPs to protect against soil erosion and sedimentation into receiving water bodies. Sediments in this area of Gambo Creek may also be contaminated; disturbance of contaminants could be adverse on aquatic life when these contaminants are ingested, resulting in toxicity or possibly bioaccumulation in the food chain. As a precaution, soil and sediment samples would be taken prior to construction to determine if contaminants are present, and the Navy would remove and dispose of contaminated soil wastes appropriately.

The use of cofferdams during bridge construction would adversely affect Gambo Creek by altering the flow of the creek during construction. Cofferdams would be used as necessary for installing new bridge piers and would not completely block flow during construction activities. Cofferdams and construction equipment within Gambo Creek would likely loosen and introduce sandy sediments into the creek, increasing turbidity and reducing water quality. Although increases in turbidity may occur, impacts would be localized and temporary, lasting only as long as equipment and materials are used within the creek bed. After construction activity is complete, sedimentation and turbidity levels would return to pre-construction levels. Any potential impacts on SAV (e.g., reduced light for photosynthesis, direct loss during construction) would be short term and minor as SAV would be expected to recover following construction.

Essential Fish Habitat

EFH is in the vicinity of Gambo Creek at its confluence with the Potomac River for several species of fish. During the construction period for Alternative 1, fish may avoid the area immediately surrounding the Gambo Creek bridge due to in-water construction activity, increased noise, and a possible temporary decrease in water quality from turbidity. Impacts on EFH are summarized in the following text. In-water construction would occur in stages and would not at any time completely block the flow of Gambo Creek. As explained in Section 3.5.2.3, little skate, Atlantic herring, winter skate, and clearnose skate are unlikely to occur within the mixing salinity zone of Gambo Creek and the Potomac River and are not analyzed further.

Bluefish: Juvenile and adult bluefish EFH could be affected during construction activity. A highly mobile pelagic species, bluefish would be expected to avoid active construction areas, minimizing impacts on their EFH. Bluefish food sources would be available in adjacent, undisturbed areas. No long-term impacts on this EFH would be expected.

Summer Flounder: EFH occurs for juvenile and adult summer flounder, a bottom-dwelling species. Juvenile summer flounder are unlikely to occur within the salinity range that is present at the Gambo Creek and Potomac River area. Adult summer flounder are highly mobile and would be expected to vacate the area during active construction, minimizing impacts. No long-term impacts on this EFH would be expected.

Red Hake: EFH for all life stages of red hake is present in the seawater salinity zone of the Chesapeake Bay. While EFH occurs in the project vicinity, it is unlikely that the species would be present in any life stage. If the species is present in the egg or larval life stage, it could potentially experience short-term, minor impacts due to sedimentation. No long-term impacts on this EFH would be expected.

Windowpane Flounder: Windowpane flounder is a bottom-dwelling species that could be affected during construction activity. EFH occurs for juvenile and adult windowpane flounder, which is a highly mobile species. Individuals would be expected to vacate the area where active construction is occurring, thereby minimizing impacts. No long-term impacts on this EFH would be expected.

No Habitat Areas of Particular Concern are present within the project site.

Noise from construction activity, particularly from pile driving to support new bridge construction, would adversely affect EFH in the vicinity of Alternative 1. Underwater sound pressure caused by in-water pile driving could distress, injure, or kill fish in the vicinity. The thresholds of behavioral effects of pile-driving noise on fish that are considered harmful or harassment are not well known, and while fish may react to a sudden loud sound, they may also quickly habituate to the sound. NOAA Fisheries and USFWS generally use 150 decibels (root mean square) as the threshold for behavioral effects on Endangered Species Act-listed fish species, citing that this level and above can cause temporary behavioral changes that could decrease a fish's ability to avoid predators (CalTrans, 2015). Pile-driving activities could exceed this threshold. Avoidance and minimization measures and BMPs to reduce the impacts on fish and their habitat from pile-driving noise and sedimentation would be incorporated into the project during the design phase. Modifying the timing and duration of pile-driving so that this activity occurs outside of spawning season would also reduce impacts on fish within the vicinity.

As previously described, EFH in the vicinity of the project site is for highly mobile species and life stages, except egg and larval red hake. Juvenile and adult fish could avoid the project site during construction noise. The Navy would implement appropriate BMPs in accordance with regulations and ongoing consultation to reduce sound generated by construction activity, reducing the impact on fish in the vicinity. During construction, BMPs and minimization measures would be implemented on-land and in-water to minimize the effects of turbidity on EFH.

The Navy will consult with NOAA Fisheries Habitat Conservation Division regarding potential impacts on EFH.

Rare, Threatened, and Endangered Species

It is possible that alewife and blueback herring are present in or near Gambo Creek and that the Atlantic and shortnose sturgeon are present downstream in the Potomac River, but not within Gambo Creek (Wray, 2013). Furthermore, the monarch butterfly (under review for listing), peregrine falcon (federally

delisted, state threatened), northern red-bellied cooter (under review for listing), and tri-colored and little brown bat (federally under review, state endangered) likely use habitat within the study area. Spotted turtle (under review for listing) has been reported twice on NSF Dahlgren but is not common. Northern long-eared bat has not been observed on NSF Dahlgren but may be affected by activities in this region.

As discussed in Section 3.5.2.4, surveys have been conducted for sensitive joint-vetch; this species has not been documented at NSF Dahlgren and is unlikely to occur at the project site. Surveys have not been conducted for rusty-patched bumble bee, but as it prefers open grassland habitat, which is not present on NSF Dahlgren, it would not be expected to occur. Therefore, no impacts on these species are expected.

Monarch Butterfly

Vegetation that provides nectar and pollen is commonly found in scrub-shrub habitat along ecotones such as forest edges and in wetland habitat. Therefore, monarch butterflies likely use habitat at the project site during their annual migration. Potential impacts would be greatest from spring through the fall when this species lays its eggs on host plants. Outside of this period, between late fall and early spring, any indirect impacts on the species, via disturbance of wetlands and scrub-shrub habitat, is expected to be short term and minor. The Navy is currently preparing a Habitat Conservation Plan for the monarch butterfly at NSF Dahlgren as well as updating the NSF Dahlgren Integrated Natural Resources Management Plan (Wray, 2019b). Vegetation clearing would be reviewed according to the installation's Comprehensive Work Approval Process to minimize impacts on the monarch butterfly. Alternative 1 would result in short-term, minor impacts on this species.

Atlantic Sturgeon and Shortnose Sturgeon

A limited number of shortnose sturgeon have been found in the Potomac River, but the Atlantic sturgeon is well documented in the Potomac River. Through its Integrated Natural Resources Management Plan (Wray, 2013), NSF Dahlgren implements management practices to minimize potential impacts on these sturgeon species. Atlantic sturgeon and shortnose sturgeon are highly unlikely to be located within Gambo Creek (Balazik, 2019). The primary impacts from Alternative 1 potentially affecting these species are downstream sedimentation and acoustic disturbance (from pile driving).

Given the relatively small number of piles needed for the new bridge, a small area would be affected by noise from this activity. Considering the lack of sturgeons within Gambo Creek and the small number of sturgeons in the Potomac River, the probability of a sturgeon being affected by shockwaves associated with pile driving is extremely low.

Indirect effects on sturgeons from pile driving, cofferdam installation, and other bridge replacement work could include increased suspended sediments near the area where the bridge work is being conducted, impairment of water and/or sediment quality, and habitat disturbance (e.g., burial of prey by sediment resuspension). Under Alternative 1, it is anticipated that the sediments disturbed at the bridge site would quickly settle out of the water column and not affect populations of invertebrates that sturgeon feed upon. Increases in levels of suspended sediments caused by cofferdam installation and pile-driving would be localized, and this short-term activity would briefly affect the levels of suspended sediments found in the water column.

There is no evidence that sturgeon are spawning in the Potomac River (Navy, 2013). However, if they were, Alternative 1 would not disrupt potential spawning of the shortnose or Atlantic sturgeon. The proposed bridge would have no physical overlap with the Gambo Creek–Potomac River confluence or potential spawning grounds at the head of tide in the vicinity of Little Falls above Washington, DC (Navy, 2013). Therefore, the effect of Alternative 1 on the shortnose and Atlantic sturgeon is expected to be short term and negligible.

Alewife and Blueback Herring

The potential for short-term, minor impacts on alewife and blueback herring would be higher during the spawning season, when eggs are being laid and fertilized. Spawning occurs in the spring, with the alewife first migrating upstream when water temperatures reach 51 degrees Fahrenheit, followed by blueback herring once temperatures reach 57 degrees (USFWS, 2019g). Peak spawning season for the alewife runs from late March through April in Virginia. Peak spawning season for the blueback herring runs from April through May. While adults return to the sea soon after spawning, juveniles remain in freshwater during the spring and summer, migrating seaward in the fall (Virginia Institute of Marine Science, 2019). Given the small-scale and short-lived nature of sediment disturbance associated with Alternative 1, there is only the potential for short-term, minor impacts on these species as a result of construction activities.

Northern Red-bellied Cooter and Spotted Turtle

The northern red-bellied cooter is relatively common on NSF Dahlgren. The species is typically active from March through November, hibernating from December through February. The spotted turtle is not common on NSF Dahlgren, but two observations have been reported since 2014 (Wray, 2019b). Gambo Creek provides potential habitat for both species. The northern red-bellied cooter hibernates at the bottom of waterways by resting on the top of or burying itself into the mud bottom to a depth of three meters (Wray, 2019b). Spotted turtles rely on wetlands for overwintering, mating, foraging, and thermoregulating, and often use stream and river channels for dispersal and movements (DoD PARC, 2019). If present, both northern red-bellied cooter and spotted turtle would experience impacts under Alternative 1, particularly if construction occurred during the winter when it is more likely that turtles may be hibernating in the waterway or mud in and immediately surrounding Gambo Creek. Consistent with the NSF Dahlgren Integrated Natural Resources Management Plan update, which is currently being drafted, the Navy would review proposed wetland disturbances and in-water work projects related to construction through the installation's Comprehensive Work Approval Process to eliminate or minimize impacts on these habitats (Wray, 2019b). Alternative 1 would result in short-term, minor impacts on these species.

Peregrine Falcon

The peregrine falcon has nested nearby at the Nice Bridge over the Potomac River in the past, but it likely only uses NSF Dahlgren as foraging habitat when hunting for prey (Chesapeake Conservancy, 2019). The presence of humans and heavy machinery during construction has the potential to temporarily reduce prey availability within the immediate area, but overall short-term impacts on this species are anticipated to be negligible, with no long-term impacts expected.

Northern Long-eared Bat

Multiple bat surveys have been conducted on this installation, with no presence of this species indicated via acoustic or mist-net surveys (NAVFAC Washington, 2017; NAVFAC Washington, 2018; NAVFAC Washington, 2019). The USFWS IPaC report generated for this project indicates that this species is potentially present (USFWS, 2019c). However, to avoid potential impacts if the species were present and to fulfill project-specific section 7 responsibilities, the installation would conduct tree removal activities outside of the northern long-eared bat pup season (June 1–July 31). This allows NSF Dahlgren to rely upon the finding of the programmatic biological opinion for the 4(d) rule to fulfill its project-specific section 7 responsibilities (USFWS, 2019h). Following this measure, along with completing the determination key for this species in the IPaC process, allows the installation to avoid completing a formal section 7 consultation. It is anticipated that Alternative 1 would result in short-term, negligible impacts on this species.

Tri-colored Bat and Little Brown Bat

Both tri-colored and little brown bat have been determined to be present at NSF Dahlgren. These species were detected along a tributary to Gambo Creek located approximately a half-mile northwest of the project location. These species have not been physically captured at the installation (NAVFAC Washington, 2017; NAVFAC Washington, 2018; NAVFAC Washington, 2019). Following guidelines developed for the northern long-eared bat and avoiding tree removal activities during the pup season (June 1–July 31) would help to avoid potential impacts if these species happen to have a roost tree on or near the project location. It is anticipated that Alternative 1 would result in short-term, negligible impacts on these species.

3.5.3.3 Alternative 2: Southern Bridge Alignment Potential Impacts

The study area for the analysis of effects on biological resources associated with Alternative 2 is the same as for Alternative 1—the lower portion of Gambo Creek and its confluence with the Potomac River, associated aquatic habitat, and surrounding vegetation in the vicinity of Alternative 2, with consideration for how changes during construction could affect other water resources on the installation and surrounding community.

Short-term, negligible and minor, adverse impacts on biological resources would be expected from Alternative 2. Long-term, negligible, adverse impacts on vegetation and terrestrial wildlife would be expected from the tree loss that would occur. Impacts would result from the following construction activities: demolition of the existing bridge, creation of a new roadway approach for the new bridge that would be located south of the existing bridge and associated tree removal, installation of cofferdams, and pile driving for the new bridge. Construction activities would result in noise (including underwater acoustic noise resulting from pile driving), fugitive dust, increased sedimentation and turbidity within the water column, temporary alteration of the flow of Gambo Creek, loss of tree cover, and direct impacts on aquatic habitats (refer to Section 3.2.3.3 for impacts on wetlands). It is expected that these impacts would be short term and negligible to minor on biological resources on, near, and downstream of the project site. Implementation of Alternative 2 would not result in significant impacts on biological resources, as discussed in the following subsections.

Vegetation

The construction associated with Alternative 2 would have negligible long-term effects on up to 75,520 square feet of wetland habitat (refer to Section 3.2 for impacts on wetlands) that would be disturbed and up to 10,790 square feet of trees that would be lost. Therefore, Alternative 2 would result in short-term, minor impacts on the vegetation present in aquatic habitats and negligible, long-term impacts on trees and scrub-shrub habitat present at the site.

Terrestrial Wildlife

Short-term, negligible impacts on terrestrial wildlife species could occur from noise and disturbance associated with construction activities. Increases in noise levels from construction activities would be minor and temporary. There would also be some negligible, long-term impacts on terrestrial wildlife species due to the loss of a small area of scrub-shrub and forest habitat that would be converted into the roadway approach for the new bridge.

Similar to Alternative 1, impacts on bald eagles resulting from Alternative 2 would be short term and negligible, given the abundance of foraging habitat in the surrounding area. Migratory birds at NSF Dahlgren may be temporarily displaced from the project site but would be expected to relocate to similar habitats nearby.

Marine Species

Impacts on marine resources under Alternative 2 would be similar to those described for Alternative 1, but some impacts would be greater due to the new bridge footprint and alterations to the roadway under Alternative 2, which could result in some increase in sedimentation. Any potential impacts on SAV (e.g., reduced light for photosynthesis, direct loss during construction) would be short term and minor as SAV would be expected to recover following construction. There would be a greater increase in impervious surface under Alternative 2 as compared to Alternative 1; therefore, the potential for erosion and sedimentation would also increase, resulting in greater potential impacts on water quality and indirect impacts on aquatic vegetation, macroinvertebrates, and fish.

Implementation of Alternative 2 would temporarily affect the water quality of Gambo Creek and the downstream Potomac River. Ground-disturbing activities would lead to increased sedimentation and turbidity. Construction would directly affect Gambo Creek as construction occurs and indirectly affect downstream water bodies. These impacts would be minimized through BMPs to protect against soil erosion and sedimentation into receiving water bodies.

The use of cofferdams during bridge construction would impact Gambo Creek by altering the flow of the creek temporarily. Cofferdams and construction equipment within Gambo Creek would likely loosen and introduce sandy sediments into the creek, resulting in increases in turbidity and reducing water quality. Although increases in turbidity may occur, impacts would be localized and temporary, lasting only as long as equipment and materials are used within the creek bed. After construction activity is complete, sedimentation and turbidity levels would return to pre-construction levels.

Essential Fish Habitat

Impacts on EFH under Alternative 2 would be similar to those described for Alternative 1, but some impacts would be greater due to the new bridge footprint and alterations to the roadway, which could result in increased sedimentation.

Rare, Threatened, and Endangered Species

Monarch butterfly, Atlantic and shortnose sturgeon, alewife and blueback herring, peregrine falcon, northern red-bellied cooter, spotted turtle, tri-colored bat, and little brown bat may be present at or near the project site, and northern long-eared bat may be affected by activities in this region, and so these species are discussed further. As discussed in Section 3.5.2.4, sensitive joint-vetch and rusty-patched bumble bee would not be expected to occur; therefore, no impacts on these species are expected.

Monarch Butterfly

Similar to Alternative 1, monarch butterflies likely use habitat at the project site during their annual migration. Alternative 2 would result in the permanent loss of existing scrub-shrub and wetland habitat that may serve as a resource for the monarch butterfly, and the loss of existing habitat is a long-term, minor impact on the monarch butterfly. Vegetation clearing would be reviewed according to the installation's Comprehensive Work Approval Process to minimize impacts on the monarch butterfly.

Atlantic Sturgeon and Shortnose Sturgeon

Impacts on shortnose sturgeon would be similar to those described under Alternative 1. Given the relatively small number of piles that need to be driven, the small area that would be affected by noise from this activity, and the small number of sturgeons in the Potomac River, the probability of a sturgeon being affected by shockwaves associated with pile driving is extremely low.

It is anticipated that the sediments disturbed at the bridge site would quickly settle out of the water column and not affect populations of invertebrates that sturgeon feed upon. Increases in levels of suspended sediments caused by cofferdam installation and pile-driving activity would be localized, and this short-term activity would briefly affect the levels of suspended sediments found in the water column. The effect of Alternative 2 on the shortnose and Atlantic sturgeon is expected to be short term and negligible.

Alewife and Blueback Herring

Similar to Alternative 1, the potential for short-term, minor impacts on the alewife and blueback herring would be higher during the spawning season, when eggs are being laid and fertilized. However, given the small-scale and short-lived nature of sediment disturbance associated with Alternative 2, there is only the potential for short-term, minor impacts on these species as a result of construction activities.

Northern Red-bellied Cooter and Spotted Turtle

Similar to Alternative 1, short-term, minor impacts on these species could occur. Following the NSF Dahlgren Integrated Natural Resources Management Plan procedure to review the proposed project through the installation's Comprehensive Work Approval Process would minimize impacts on these turtle species, if present.

Peregrine Falcon

Similar to Alternative 1, it is anticipated that short-term impacts on this species would be negligible under Alternative 2, with no long-term impacts expected.

Northern Long-Eared Bat

Similar to Alternative 1, it is anticipated that Alternative 2 would result in short-term, negligible impacts on this species. Avoidance measures would be followed, as detailed under Alternative 1.

Tri-colored Bat and Little Brown Bat

Similar to Alternative 1, it is anticipated that Alternative 2 would result in short-term, negligible impacts on these species. Following guidelines developed for the northern long-eared bat and avoiding tree removal activities during the pup season (June 1–July 31) would assist in avoiding potential impacts if these species have a roost tree on or near the project location.

3.5.3.4 Alternative 3: Parallel Bridge Alignment Potential Impacts

The study area for the analysis of effects on biological resources associated with Alternative 3 is the same as for Alternative 1—the lower portion of Gambo Creek, its confluence with the Potomac River, associated aquatic habitat, and surrounding vegetation in the vicinity of Alternative 3, with consideration for how changes during construction could affect other biological resources on the installation and surrounding community.

Short-term, negligible and minor, adverse impacts on biological resources would be expected from Alternative 3. Long-term, negligible, adverse impacts on the bald eagle and terrestrial wildlife would be expected from the permanent loss of trees and scrub-shrub habitat that would occur, as well as the permanent addition of a second bridge that would negligibly decrease bald eagle foraging habitat. Long-term, minor, adverse impacts on vegetation, wetlands, and the monarch butterfly would be expected due to the permanent loss of additional wetlands and scrub-shrub habitat. Construction activities would result in noise (including underwater acoustic noise resulting from pile driving), fugitive dust, temporary increased sedimentation and turbidity within the water column, temporary alteration of the flow of Gambo Creek, loss of tree cover, and direct impacts on aquatic habitats (refer to Section 3.2.3.4 for impacts on wetlands). It is expected that these impacts would be short term and negligible to minor on biological resources on, near, and downstream of the project site. Implementation of the Alternative 3 would not result in significant impacts on biological resources, as discussed in the following subsections.

Vegetation

The construction associated with Alternative 3 would have short-term, minor effects on vegetation. Alternative 3 would have long-term, minor effects on up to 70,190 square feet of wetland habitat (refer to Section 3.2 for impacts on wetlands) that would be disturbed and up to 8,290 square feet of trees that would be lost. This forested area would be converted into the roadway approach for the new bridge located to the south of the existing bridge. Therefore, Alternative 3 would result in short-term, minor impacts on vegetation present and long-term, minor impacts on the aquatic and terrestrial habitat present at the site, including trees and scrub-shrub habitat.

Terrestrial Wildlife

Short-term, negligible impacts on terrestrial wildlife species could occur from noise and disturbance associated with construction activities. Increases in noise levels from construction activities would be minor and temporary. There would also be some long-term, negligible impacts on terrestrial wildlife species due to the loss of a small area of scrub-shrub and forest habitat that would be converted into the roadway approach for the new bridge.

Similar to Alternative 1, impacts on bald eagles would be short term and negligible. While there would be a permanent loss of foraging habitat equal to the additional area of the new bridge footprint over the creek and wetlands, there is an abundance of foraging habitat in the surrounding area. Migratory birds

at NSF Dahlgren could be temporarily displaced from the project site but would be expected to relocate to similar habitats nearby.

Marine Species

Impacts on marine resources under Alternative 3 would be similar to those described for Alternative 1, but some impacts would be greater due to the new bridge footprint and alterations to the bridge approaches, which could result in minor increases in sedimentation and impervious surface. Any potential impacts on SAV (e.g., reduced light for photosynthesis, direct loss during construction) would be short term and minor as SAV would be expected to recover following construction. There would be a greater increase in impervious surface under Alternative 3 as compared to Alternative 1; therefore, the potential for erosion and sedimentation would also increase, resulting in greater potential impacts on water quality and indirect impacts on aquatic vegetation, macroinvertebrates, and fish.

Implementation of Alternative 3 would temporarily affect the water quality of Gambo Creek and the downstream Potomac River. Ground-disturbing activities lead to increased sedimentation and turbidity. Construction would directly affect Gambo Creek as construction occurs and indirectly affect downstream water bodies. These impacts would be minimized through BMPs to protect against soil erosion and sedimentation into receiving water bodies.

The use of cofferdams during bridge construction would affect Gambo Creek by altering the flow of the creek during construction. Cofferdams would be used as necessary for installing new bridge piers and would not completely block flow during construction activities. Cofferdams and construction equipment within Gambo Creek would likely loosen and introduce sandy sediments into the creek, resulting in increases in turbidity and reducing water quality. Although increases in turbidity may occur, impacts would be localized and temporary, lasting only as long as equipment and materials are used within the creek bed. After construction activity is complete, sedimentation and turbidity levels would return to pre-construction levels.

Essential Fish Habitat

Impacts on EFH under Alternative 3 would be similar to those described for Alternative 1, but some impacts would be greater due to the new bridge footprint and alterations to the roadway, which could result in increased sedimentation.

Rare, Threatened, and Endangered Species

Monarch butterfly, Atlantic and shortnose sturgeon, alewife and blueback herring, peregrine falcon, northern red-bellied cooter, spotted turtle, tri-colored bat, and little brown bat may be present at or near the project site, and northern long-eared bat may be affected by activities in this region, and so these species are discussed further. As discussed in Section 3.5.2.4, sensitive joint-vetch and rusty-patched bumble bee would not be expected to occur; therefore, no impacts on these species are expected.

Monarch Butterfly

Similar to Alternative 1, monarch butterflies likely use habitat at the project site during their annual migration. Alternative 3 would result in the permanent loss of existing scrub-shrub and wetland habitat that may serve as a resource for the monarch butterfly, and the loss of existing habitat is a long-term, minor impact on the monarch butterfly. Vegetation clearing would be reviewed according to the installation's Comprehensive Work Approval Process to minimize impacts on the monarch butterfly.

Atlantic Sturgeon and Shortnose Sturgeon

Similar to Alternative 1, the primary potential impacts on sturgeon from Alternative 3 are sedimentation and acoustic disturbance (from pile driving). Under Alternative 3, it is anticipated that the sediments disturbed at the bridge site would quickly settle out of the water column and not affect populations of invertebrates that sturgeon feed upon. Increases in levels of suspended sediments caused by cofferdam installation and pile-driving activity would be localized, and this short-term activity would briefly affect the current levels of suspended sediments found in the water column. Similar to Alternative 1, the effect of Alternative 3 on the shortnose and Atlantic sturgeon is expected to be short term and negligible.

Alewife and Blueback Herring

Similar to Alternative 1, the potential for short-term, minor impacts on the alewife and blueback herring would be higher during the spawning season, when eggs are being laid and fertilized. However, given the small-scale and short-lived nature of sediment disturbance associated with Alternative 3, there is only the potential for short-term, minor impacts on these species as a result of construction activities.

Northern Red-bellied Cooter and Spotted Turtle

Similar to Alternative 1, short-term, minor impacts on these species could occur. Following the NSF Dahlgren Integrated Natural Resources Management Plan procedure to review the proposed project through the installation's Comprehensive Work Approval Process would minimize impacts on these turtle species, if present.

Peregrine Falcon

Similar to Alternative 1, it is anticipated that short-term impacts on this species are anticipated to be negligible under Alternative 3, with no long-term impacts expected.

Northern Long-Eared Bat

Similar to Alternative 1, it is anticipated that Alternative 3 would result in short-term, negligible impacts on this species. Avoidance measures would be followed, as detailed under Alternative 1.

Tri-colored Bat and Little Brown Bat

Similar to Alternative 1, it is anticipated that Alternative 3 would result in short-term, negligible impacts on these species. Following guidelines developed for the northern long-eared bat and avoiding tree removal activities during the pup season (June 1–July 31) would assist in avoiding potential impacts if these species have a roost tree on or near the project location.

3.5.3.5 Options for Bridge Utilities Potential Impacts**Option A: Aboveground Utilities**

The study area for the analysis of effects on biological resources associated with Option A includes Gambo Creek and habitat in the vicinity of the proposed bridge. Installing utility conduit on bridges would have negligible impacts on biological resources. The installation would include some minor trenching on land in the immediate area of the bridge, but this would be minimal. As previously discussed, erosion and sedimentation from ground disturbance can affect water quality in nearby water resources. Utility work would be expected to be completed concurrent with other bridge work and generate minimal additional impacts on the biological resources associated with Gambo Creek, downstream water bodies, and wetland habitats. No additional sedimentation would be expected to

result from Option A, so no additional impacts on rare, threatened, or endangered species would be expected to occur. Implementation of Option A, combined with any of the action alternatives, would not result in significant impacts on biological resources.

Option B: Underground Utilities

The study area for the analysis of effects on biological resources associated with Option B includes Gambo Creek and habitat in the vicinity of the proposed bridge. Short-term, negligible impacts are expected from installing underground utilities under this option. However, potential short-term, minor impacts on biological resources would occur if extensive utility repairs are required in the future. Some trenching would be required for utilities installation, but the Navy would use horizontal drilling methods to avoid dredging or using cofferdams. To achieve this, entry points would be drilled outside of the wetland areas, and then horizontal directional drilling would occur well below the wetlands and creek bed. In the long term, repairs to the utilities, if needed, would typically be addressed using a guided drill head at the same entry points used for installing the utility piping. If such extensive repairs were needed to require trenching within the wetland or creek bed, the Navy would adhere to all necessary permits and regulations. This more extensive utility repair work has the potential for a greater amount of impacts in the future, if required. Since the area in the vicinity of the proposed bridge would already be disturbed from bridge construction and demolition, impacts during utilities installation would be further minimized. Implementation of Option B, combined with any of the action alternatives, would not result in significant impacts on biological resources.

No additional impacts on vegetation, terrestrial wildlife, or marine species are expected to occur as a result of Option B, since any trenching for installing underground utilities on either side of the bridge would likely be within the footprint of existing disturbance that would occur under any of the alternatives.

Rare, Threatened, and Endangered Species

No additional impacts on any rare, threatened, or endangered species are expected to occur as a result of implementing Option B, since any trenching for utilities on either side of the bridge would likely be within the footprint of existing disturbance that would occur under any of the alternatives. No additional sedimentation would be expected to result from this option, so no additional impacts on rare, threatened, or endangered species would be expected to occur.

3.6 Infrastructure

This section discusses infrastructure such as utilities (including water distribution, wastewater collection, stormwater management, energy distribution, and communications) and bridge facilities.

3.6.1 Regulatory Setting

EO 13834, *Efficient Federal Operations*, requires federal departments and agencies to meet statutory requirements related to energy and environmental performance in a manner that increases efficiency, optimizes performance, eliminates unnecessary use of resources, and protects the environment. Agencies are directed to ensure that new construction conforms to applicable energy efficiency requirements and sustainable design principles, to implement space utilization and optimization practices, and to annually assess and report on building conformance to sustainability metrics.

Chief of Naval Operations Instruction 4100.5E outlines the Secretary of the Navy's vision for shore energy management. The focus of this instruction is establishing the energy goals and implementing strategies to achieve energy efficiency.

DoD Instruction 2000.16 incorporates all Antiterrorism/Force Protection standards through October 2006. The standards require all DoD components to adopt and adhere to common criteria and minimum construction standards to mitigate antiterrorism vulnerabilities and terrorist threats.

3.6.2 Affected Environment

The following section describes the existing conditions for each of the infrastructure categories at Gambo Creek Bridge.

3.6.2.1 Facilities

The existing Gambo Creek Bridge carries Tisdale Road traffic over Gambo Creek at NSF Dahlgren. The bridge is a reinforced concrete structure supported by 120 wooden piles. It was constructed in 1940 and spans 493 feet. The bridge has experienced significant deterioration over the years, leading to weight limit restrictions being imposed. Without intervention, it is anticipated that the bridge deck and support components would continue to deteriorate and could ultimately result in bridge failure.

3.6.2.2 Utilities

NSF Dahlgren maintains and monitors the utility systems that support the installation and its tenants. In general, the current capacity of the utility systems is adequate to support the demand (Navy, 2013). The utilities discussed in this section are routed along the existing bridge structure and include potable water, wastewater, stormwater, energy, and communications. These utilities serve NSF Dahlgren installation personnel only.

Potable Water

A 10-inch cast-iron watermain, owned and maintained by the Navy, conveys potable water across the existing bridge structure as part of a looped system providing potable water to installation personnel. The watermain is insulated and jacketed to minimize adverse impacts associated with being exposed to an open-air environment.

Sanitary Sewer

An existing four-inch cast-iron sanitary sewer force main crosses the existing bridge structure. This force main conveys sanitary sewer from portions of NSF Dahlgren located east of the Gambo Creek Bridge to a sewage treatment plant approximately one mile southwest of Gambo Creek Bridge. The pumping facility associated with the force main consists of a duplex system with two pumps rated at 250 gallons per minute (Sowell, 2019). The Navy owns, operates, and maintains the sanitary sewerage treatment plant and distribution system (Navy, 2013).

Stormwater

Stormwater runoff from the existing bridge deck is discharged directly to Gambo Creek via a series of drains and six-inch cast iron piping along either side of the bridge. NSF Dahlgren maintains a SWPPP for its industrial areas, which requires the implementation of both structural and non-structural controls to reduce the impact of stormwater runoff to the maximum extent practicable (Navy, 2013).

Energy

A conduit containing three-phase electrical power is routed along the existing bridge. Dominion Virginia Power provides electrical power to NSF Dahlgren via a 35-kilovolt switching station near the Main Gate

and distributes it through ten substations and switching stations (NAVFAC, 2016). The Navy owns, operates, and maintains the electrical transmission lines on NSF Dahlgren.

There is no natural gas service on the installation (Navy, 2013), and subsequently, no known natural gas mains on or adjacent to Gambo Creek Bridge.

Communications

Various communications lines cross the existing bridge, including a 25-pair coaxial cable with jacketing; a 100-pair telephone coaxial cable inside a rigid galvanized steel conduit; and multiple sealed galvanized steel conduits, ranging from two to eight inches, containing protected fiber optic lines. These communications lines are part of a looped system serving installation facilities (Sowell, 2019). Verizon provides telecommunications service, including telephone service, across the installation. The Navy owns the fiber optic network on the installation that connects to the Verizon hub. The network communication system is installed and maintained on-site.

3.6.3 Environmental Consequences

This section analyzes the magnitude of anticipated increases or decreases in public works infrastructure demands considering historic levels, existing management practices, and storage capacity; and evaluates potential impacts on public works infrastructure associated with implementation of the alternatives. Impacts are evaluated by whether they would result in the use of a substantial proportion of the remaining system capacity, reach or exceed the current capacity of the system, or require development of facilities and sources beyond those existing or currently planned.

3.6.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur. The current bridge would remain in use with minimal maintenance. The deterioration of the bridge deck and support components would continue under this alternative, possibly resulting in bridge failure and closure. Structural failure of the bridge would also likely result in the loss of utility services (water, sewer, electric power, and communication lines) to those portions of the installation served by the utilities that cross Gambo Creek on the existing bridge structure. Therefore, major impacts on infrastructure including the bridge and utilities would occur with implementation of the No Action Alternative.

Infrastructure Potential Impacts:

- No Action: Ongoing minimal maintenance could result in bridge closure and loss of utility services. Major impacts are possible.
- Alternative 1: Short-term, minor impacts on utility service. Long-term, beneficial effects from a safer, more reliable bridge. No significant impacts.
- Alternative 2: Short-term, minor impacts on utility service; possible relocation of communications panels or lines. Long-term, beneficial effects from a safer, more reliable bridge. No significant impacts.
- Alternative 3: Short-term, minor impacts on utility service; possible relocation of communications panels or lines. Improvements over No Action for long-term safety and reliability, but less beneficial than Alternatives 1 or 2. No significant impacts.
- Option A: Additional short-term, minor impacts on utility service. No significant impacts.
- Option B: Additional short-term, minor impacts on utility service. No significant impacts.

3.6.3.2 Alternative 1: Existing Bridge Alignment (Preferred Alternative) Potential Impacts

The study area for infrastructure associated with Alternative 1 includes the existing Gambo Creek Bridge, portions of Tisdale Road immediately east and west of the bridge, a laydown area west of the existing bridge, and all associated utility infrastructure that cross Gambo Creek on the bridge structure.

Facilities

Alternative 1 includes construction of a new bridge that would be sized to provide safe two-way vehicular traffic and, at a minimum, would be capable of supporting the local fire department's heaviest vehicle. The bridge would be constructed with steel pile foundations and a prestressed concrete box beam structure. It would be designed to meet FHWA standards, providing a safer, more reliable structure that would require less structural maintenance than that provided in the No Action Alternative, resulting in beneficial effects. In addition to reliability, Alternative 1 would improve upon the No Action Alternative by facilitating two-way traffic without the current weight limit restrictions.

Utilities

Alternative 1 includes in-kind replacement of all existing utilities (water, sewer, electric power, and communication lines) crossing Gambo Creek and would not change the existing capacity or demand of these utilities. Therefore, adverse impacts on sanitary sewer and energy are expected to be short term and occur in the form of service disruptions during connection and disconnection of the utilities. The duration of short-term disruptions would vary, but two to six hours per utility connection is anticipated. These service disruptions would be coordinated with the affected installation facilities and would likely occur during a weekend, minimizing their operational impacts. The electrical power crossing Gambo Creek only serves Terminal Range, and range operations do not occur on weekends (Sowell, 2019). Because the water main and various communications lines are part of a looped system, there would be no short-term disruption to these utility services. The existence, condition, and capacity of these looped systems should be confirmed during the design phases of the project.

Relative to the No Action Alternative, Alternative 1 would improve long term reliability of all utilities crossing Gambo Creek by reducing the risk of bridge failure. For impacts specifically related to the aboveground and underground design options for utilities see Section 3.6.3.5 below.

3.6.3.3 Alternative 2: Southern Bridge Alignment Potential Impacts

The study area for infrastructure associated with Alternative 2 includes the existing Gambo Creek Bridge, portions of Tisdale Road east and west of the bridge, an approximately 50-foot-wide corridor south of the existing bridge, a laydown area west of the existing bridge, and all associated utility infrastructure that cross Gambo Creek on bridge structure.

Facilities

Like Alternative 1, Alternative 2 would construct a new bridge that would be sized to provide safe two-way vehicular traffic and, at a minimum, would be capable of supporting the local fire department's heaviest vehicle. Construction style, impacts, and improved conditions under Alternative 2 would be similar to those under Alternative 1, including providing a safer, more reliable structure that would require less structural maintenance than that provided in the No Action Alternative, as well as facilitating two-way traffic without the current weight limit restrictions, resulting in beneficial effects.

Utilities

The alignment of the new bridge under Alternative 2 could conflict with communications lines that currently run along the southern edge of the existing bridge decking. The fiber runs for these fiber optic cables from the termination panels (one located near North Range Road and one located just on the eastern side of the bridge near Bone Yard Lane) are at the maximum pull distance for 32-count and 64-count fiber lines. The eastern side termination would need to be relocated farther east and pulling the fiber strands would be very difficult. Relocation of the termination panels and/or alternative routing of communications lines is anticipated with Alternative 2 and should be further evaluated during the design phases of the project. Additional routing of telecommunications lines could increase construction cost but would not further affect those serviced by the utility.

With the proposed in-kind replacement of all existing utilities (water, sewer, electric power, and communication lines) crossing Gambo Creek, impacts and improved conditions compared to the No Action Alternative under Alternative 2 would be similar to those under Alternative 1.

For impacts specifically related to the aboveground and underground design options for utilities see Section 3.6.3.5 below.

3.6.3.4 Alternative 3: Parallel Bridge Alignment Potential Impacts

The study area for infrastructure associated with Alternative 3 includes the existing Gambo Creek Bridge, portions of Tisdale Road east and west of the bridge, an approximately 50-foot-wide corridor south of the existing bridge, a laydown area west of the existing bridge, and all associated utility infrastructure that uses the bridge structure to cross Gambo Creek.

Facilities

Alternative 3 would rehabilitate the existing Gambo Creek Bridge and construct a new bridge to the south. The existing rehabilitated bridge would provide safe one-way travel but would maintain a weight limit restriction. The new bridge would be sized to provide safe one-way vehicular traffic in the opposite direction with the minimal capacity to support the local fire department's heaviest vehicle. Alternative 3 would improve upon the No Action Alternative by increasing reliability of the existing bridge and removing the current weight limit restriction to one-way traffic traveling from east to west, resulting in beneficial effects. The improved conditions associated with Alternative 3 would be less beneficial than those under Alternatives 1 and 2, as those alternatives facilitated two-way traffic without current weight limit restrictions.

Utilities

With the proposed in-kind replacement of all existing utilities (water, sewer, electric power, and communication lines) crossing Gambo Creek, impacts and improved conditions compared to the No Action Alternative under Alternative 3 would be similar to those under Alternative 2.

For impacts specifically related to the aboveground and underground design options for utilities see Section 3.6.3.5 below.

3.6.3.5 Options for Bridge Utilities Potential Impacts

Option A: Aboveground Utilities

Option A proposes in-kind replacement of the existing aboveground utilities that cross Gambo Creek via the existing bridge structure with new aboveground utilities across the new bridge structure in a similar

manner. This would require that appropriate protections be incorporated into the design of new utility lines to protect against inclement and winter weather conditions due to their exposure to an open-air environment.

For Alternative 1, temporary bypasses for sanitary sewer and energy would be needed to maintain existing utility services throughout the duration of construction. Specific utility bypasses would be developed during the design phases of the project to match the capacity as the existing utilities. Because the watermain and various communications lines are part of a looped system, there would be no short-term disruption to these utility services. The existence, condition, and capacity of these looped systems should be confirmed during the design phases of the project.

Alternatives 2 and 3 are similar to Alternative 1 except that proposed new utility pipes, conduits, and wiring could be installed during construction of the new bridge for connection/activation prior to demolition or rehabilitation of the existing bridge. Phasing construction in this manner would eliminate the need for temporary utility bypasses.

The impacts and benefits of Option A are similar for Alternatives 1, 2 and 3, with the exception of Alternative 1 requiring utility bypasses. Option A is a cost-effective option for replacement of utilities crossing Gambo Creek and would provide ease of access for future inspections and repairs. Conversely, because Option A exposes the utilities to an open-air environment, they would be more vulnerable to inclement weather and flood events than underground utilities.

Option B: Underground Utilities

Option B proposes to replace the existing aboveground utilities that cross Gambo Creek via the existing bridge structure with new underground utilities that would cross below Gambo Creek. The installation of these utilities would use a trenchless technique such as horizontal directional drilling or pipe jacking. Further investigation of site-specific conditions, including a subsurface investigation to determine soil and groundwater condition, would be necessary to evaluate the viability of such trenchless techniques for this application. These investigations, as well as additional site- and utility-specific analysis and an evaluation of existing upstream sanitary sewer pumping facilities, would need to be completed during the design phases of the project.

Under Alternatives 1 and 2, installation of new underground utilities would be completed prior to the start of bridge demolition to avoid the need for constructing temporary utility bypasses.

Under Alternative 3, the specific location of new underground utilities should be determined during design of the new bridge structure to avoid conflict of the new and existing bridge abutments with the underground utilities. New underground utility installation would be phased to occur after installing the new bridge abutments but prior to repairing the existing bridge to minimize the risk of damaging newly installed utilities and avoid the need for temporary utility bypasses.

The impacts and benefits of Option B are similar for Alternatives 1, 2 and 3. Option B would have a much higher cost than Option A but would eliminate exposure of the utilities to aboveground conditions such as inclement weather and flood events. Future access to the utilities for repair and/or replacement would be more difficult than that of Option A.

3.7 Hazardous Materials and Wastes

This section discusses hazardous materials, hazardous waste, toxic substances, and contaminated sites.

3.7.1 Regulatory Setting

Hazardous materials are defined by 49 CFR section 171.8 as “hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table, and materials that meet the defining criteria for hazard classes and divisions in 49 CFR part 173.” Transportation of hazardous materials is regulated by the U.S. Department of Transportation regulations.

Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments, as “a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.” Certain types of hazardous wastes are subject to special management provisions intended to ease the management burden and facilitate the recycling of such materials. These are called universal wastes and their associated regulatory requirements are specified in 40 CFR part 273. Four types of waste are currently covered under the universal waste regulations: hazardous waste batteries, hazardous waste pesticides that are either recalled or collected in waste pesticide collection programs, hazardous waste thermostats, and hazardous waste lamps such as fluorescent light bulbs.

Special hazards are those substances that might pose a risk to human health and are addressed separately from other hazardous substances. Special hazards include asbestos-containing material (ACM), polychlorinated biphenyls (PCBs), and lead-based paint (LBP). USEPA is given authority to regulate special hazard substances by the Toxic Substances Control Act (TSCA). Asbestos is also regulated by USEPA under the Clean Air Act and the Comprehensive Environmental Response, Compensation, and Liability Act.

The DoD established the Defense Environmental Restoration Program (DERP) to facilitate thorough investigation and cleanup of contaminated sites on military installations (active installations, installations subject to Base Realignment and Closure, and formerly used defense sites). The Installation Restoration Program and the Military Munitions Response Program are components of the DERP. The Installation Restoration Program requires each DoD installation to identify, investigate, and clean up hazardous waste disposal or release sites. The Military Munitions Response Program addresses nonoperational rangelands that are suspected or known to contain unexploded ordnance, discarded military munitions, or munitions constituent contamination. The Environmental Restoration Program is the Navy’s initiative to address DERP.

3.7.2 Affected Environment

The Navy has implemented a strict Hazardous Material Control and Management Program and a Hazardous Waste Minimization Program for all activities. These programs are governed Navy-wide by applicable Office of the Chief of Naval Operations instructions and at the installation by specific instructions issued by the Base Commander. The Navy continuously monitors its operations to find ways to minimize the use of hazardous materials and to reduce the generation of hazardous wastes.

3.7.2.1 Hazardous Materials

Various activities on the installation use different types of hazardous materials including paints, aerosols, oils, cleaning solutions, solvents, photographic chemicals, petroleum products, ordnance and explosives, and fluorescent bulbs. Underground storage tanks meet federal and state regulatory requirements for leak detection, secondary containment, and corrosion protection, or they undergo release detection groundwater monitoring. Aboveground storage tanks also meet federal and state regulatory requirements and are visually monitored on a regular basis. NSF Dahlgren maintains a spill prevention control and countermeasures plan that details applicable spill contingencies, and a SWPPP for maintaining and monitoring the industrial areas where these hazardous materials are stored and used. The installation also has a pollution prevention program aimed at reducing use and controlling, managing, and reusing hazardous materials (Navy, 2013).

3.7.2.2 Hazardous Waste

NSF Dahlgren is a large-quantity generator under RCRA, which means the installation generates at least 2,200 pounds of nonacute or more than 2.2 pounds of acute hazardous waste per calendar month. Common hazardous wastes generated at the installation include corrosive solutions, waste paint-related materials, lead-contaminated floor mats and rags, spent halogenated and non-halogenated solvents, waste photographic process chemicals, solvents, petroleum products such as used lubricating oils, ordnance and explosive materials, ash from open burning of ordnance materials, contaminated soil, and spent and expired laboratory chemicals. Hazardous waste is stored at Building 1425 and prepared for transportation to an off-site permitted treatment, storage, and disposal facility (Navy, 2013).

3.7.2.3 Special Hazards (Asbestos Containing Materials, Lead Based Paint, Polychlorinated Biphenyls)

Given the age of the existing Gambo Creek Bridge, it is possible that various components contain special hazards. ACMs were commonly used in pipe insulation, sprayed concrete/gunite, bridge expansion joints, gaskets around electrical components, and epoxy coatings. LBP was widely used prior to its ban in 1978. Similarly, PCBs were widely used in paint, caulk, and sealants prior to its ban in 1979.

3.7.2.4 Defense Environmental Restoration Program

Prior to the 1970s, debris, scrap metal, ordnance, petroleum-based liquids, electronic equipment components containing PCBs, and other materials were commonly disposed of by placing these wastes into unlined landfills. Leaking underground storage tanks, oil-water separators, and industrial activities also inadvertently released petroleum materials into the environment. These historic practices at NSF Dahlgren resulted in numerous areas of contamination: 42 active and 34 closed IR sites (Navy, 2013; NAVFAC Washington, 2016a). Of these, only three IR sites—IR Site 001, IR Site 006, and IR Site 061b—are within or adjacent to the project site. Five other IR sites—IR Site 005, IR Site 062, IR Site 021, IR Site 022, and IR Site 053—are within approximately 1,000 feet of construction activities; however, these five sites are not expected to affect or be affected by the Proposed Action because of distance and/or no further action being needed for cleanup. Table 3-9 summarizes IR sites within the affected environment. Figure 3-12 shows the locations of these IR sites.

IR Site 001, the Old Bombing Range, covers approximately 293 acres within an active range. This area was used as a bombing range pre-1945. Cleanup actions at this site will not be determined or occur until the range is closed, which is not anticipated in the foreseeable future. No land uses other than range operations are permitted within IR Site 001 (TetraTech, 2017).

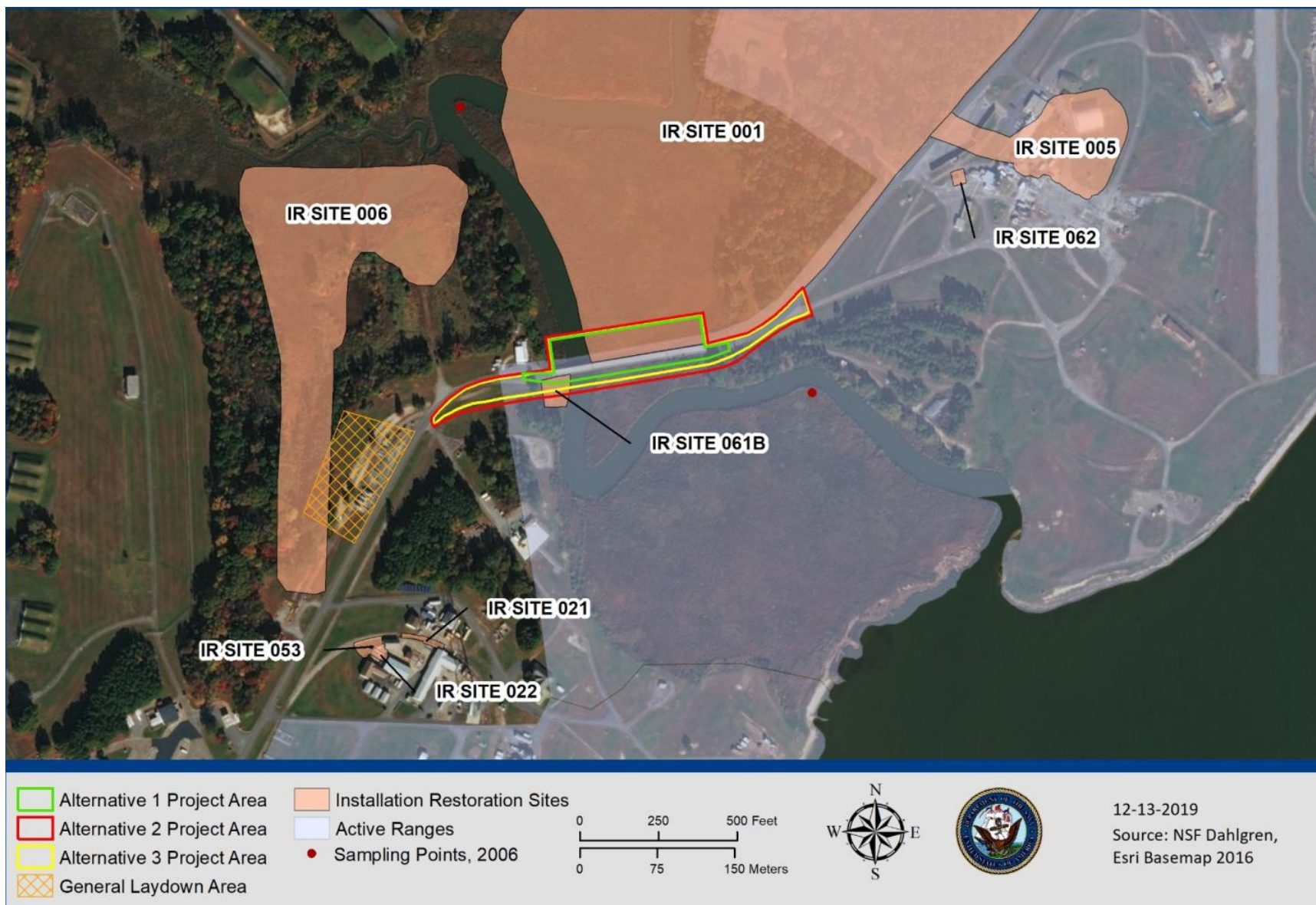


Figure 3-12 Installation Restoration Sites within Affected Environment

Table 3-9 Summary of Installation Restoration Sites within Affected Environment

Site Number	Site Name	Proximity to Project	Current Regulatory Status
IR Site 001	Old Bombing Range	IR Site 001 is adjacent to Gambo Creek Bridge, east of Gambo Creek, and north of Tisdale Road; bridge construction and/or demolition under any alternative would be adjacent to IR Site 001; temporary construction access for culvert installation would occur through IR Site 001	Decision Document—Action is deferred until the range is closed
IR Site 005	Projectile Disposal Area	IR Site 005 adjoins IR Site 005 approximately 600 feet north of the estimated extent of construction disturbance from any alternatives; would not be affected by construction	Decision Document—Action is deferred until the range is closed
IR Site 006	Terminal Range Airplane Park	IR Site 006 partially overlaps a portion of the proposed laydown area	Record of Decision—Remedial Action Completed; Wetland Monitoring Underway
IR Site 021	Gun Barrel Decoppering Area	IR Site 021 is approximately 450–500 feet south of the proposed laydown area; would not be affected by construction	Removal Action Completed; Decision Document— No Further Action
IR Site 022	Gun Barrel Degreasing Area	IR Site 022 is approximately 450–500 feet south of the proposed laydown area; would not be affected by construction	Removal Action Completed; Decision Document— No Further Action
IR Site 053	Oil and Water Separator 207 300	IR Site 053 is approximately 450–500 feet south of the proposed laydown area; not directly or indirectly affected by construction	Removal Action Completed; Decision Document— No Further Action
IR Site 061b	Gambo Creek Projectile Disposal Area	IR Site 006 overlaps the Alternative 2 and 3 project sites and is adjacent to the Alternative 1 project site	Closed— No Further Action
IR Site 062	Building 396	IR Site 062 is approximately 520 feet north of the estimated extent of construction disturbance from any alternatives; would not be affected by construction	Record of Decision-Remedial Investigation/Feasibility Study Completed; Removal Action Completed— No Further Action

Sources: Navy, 2013; TetraTech, 2017.

IR Site 006, Terminal Range Airplane Park/Solid Waste Management Unit 54, was used from the 1940s to 1992 to store scrap metallic items such as empty drums, inactive airplanes, and steel personnel and camera shelters; items waiting testing; drums of gun barrel preservative product; sandblasting agent product; and railroad ties and telephone poles. Waste drums were removed in 1992. Subsequent site investigation found semi-volatile organic compounds, pesticides, and metals in the soil and sediment, as well as evident transport of contaminants to the downgradient marshy area. Remediation included excavation with offsite disposal of buried wastes and contaminated soils and sediments in 2004. As part of the remediation, approximately 0.9 acre of new wetland was created, and this area was monitored until 2011 when it was determined that wetland restoration goals were achieved. This area is currently monitored for invasive species (TetraTech, 2017).

IR Site 061b, Gambo Creek Projectile Disposal Area, was a pile of gun projectiles of various sizes (three to eight inches in diameter), small pieces of scrap metal, and sand dating to the late 1930s to early 1940s. The projectiles appear to have been fired from a gun or used for ordnance testing operations (TetraTech, 2017). Site investigation found inorganics, volatile organic compounds, semi-volatile organic compounds, and pesticides in the surface soil, subsurface soil, surface water, and sediment, including contaminants of potential concern to human health risk in the surface soil and subsurface soil and other potential risks to ecological health and food chain bioaccumulation. Cleanup was achieved in 2004 by removing contaminated soil, scrap metals, and ordnance-related scrap. The Close-Out Decision Document recommending No Further Action was signed in 2005 (NAVFAC Washington, 2005; TetraTech, 2017). Active ranges on NSF Dahlgren, which are not subject to the Military Munitions Response Program, likely contain munitions constituents or UXO. Munitions constituents include various organic compounds, explosive compounds, and polycyclic aromatic hydrocarbons, but metals are the predominant constituents (Navy, 2013). Gambo Creek Bridge is within an active range area (see Figure 3-12). Gun-firing locations are not near the general project site, but ranges pose the potential for contaminants released from munitions or UXO to migrate off-range. No recent sampling near Gambo Creek Bridge has been conducted, but two samples from a 2006 study were just upstream (~830 feet) and downstream (~1,140 feet) of the bridge, as shown on Figure 3-12. All samples in the lower portion of Gambo Creek collected during the 2006 study detected numerous metals in creek sediments, including arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, and zinc, though primarily at relatively low concentrations. The upstream sample shown on Figure 3-12 contained elevated manganese, which was determined to most likely be associated with IR Site 006 just west of the sample point; the downstream sample did not reveal elevated concentrations of any contaminants (JM Waller Associates, Inc. and Tetra Tech NUS, Inc., 2008).

3.7.3 Environmental Consequences

The hazardous materials and wastes analysis contained in the respective sections addresses issues related to the use and management of hazardous materials and wastes as well as the presence and management of specific cleanup sites at NSF Dahlgren.

3.7.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and there would be no change associated with hazardous materials and wastes. The Navy would continue to maintain the existing Gambo Creek Bridge. Conducting minimal maintenance as needed on small portions is the status quo, which would have negligible impacts on hazardous materials and wastes due to the very small quantities

that could be used or generated for these repairs. Therefore, no significant impacts would occur with implementation of the No Action Alternative.

3.7.3.2 Alternative 1: Existing Bridge Alignment (Preferred Alternative) Potential Impacts

The study area for the analysis of effects on hazardous materials and wastes associated with Alternative 1 includes the existing bridge and immediately surrounding area (see Figure 3-12) where construction of the new bridge would occur, as well as the construction laydown area west of the project site.

Construction activities would use hazardous materials and generate hazardous wastes in small quantities. Common hazardous materials include diesel fuel, gasoline, propane, hydraulic fluids, oils, lubricants, and batteries. Common hazardous wastes include empty containers from hazardous materials, spent solvents, waste oil, lead-acid batteries, and any spill cleanup materials if used. Construction contractors are responsible for ensuring that the transport, use, storage, and disposal of hazardous materials and wastes complies with all applicable federal and state regulations. Adherence to policies, procedures, and regulations would minimize the potential impacts from exposure and accidental releases during construction. In the event of an accidental release, contaminated media would be treated on-site or would be promptly removed and disposed of in accordance with applicable Navy spill contingency plans and federal and state regulations.

Bridge demolition waste includes various components that could be hazardous waste or special hazards. The original bridge structure was constructed in 1940 as a railroad trestle, and then converted to a vehicular bridge, with attached utility conduits. Paints, coatings, joints, pipe insulation, gaskets, sprayed concrete, and any other materials potentially suspect for ACM, LBP, or PCBs must be properly characterized for appropriate disposal in accordance with federal and state regulations.

Much of the study area is within an active range. Areas where munitions are used or have historically been used may have organic compounds, explosive compounds, polycyclic aromatic hydrocarbons, and metals in soils or sediment. The study area on land for Alternative 1 that includes the existing bridge is previously disturbed and

Hazardous Material and Waste Potential Impacts:

- No Action: Continued operations with existing management plans and policies that govern hazardous materials and wastes. No significant impacts.
- Alternative 1: Short-term impacts associated with increased use of hazardous materials and generation of hazardous wastes. Demolished bridge components may contain special hazards; wastes would be characterized and disposed of appropriately. Short-term potential to encounter hazards associated with the active range and contamination from IR Site 001; surveys and clearing/remediation prior to beginning construction activities would occur. No significant impacts.
- Alternative 2: Similar to but greater than Alternative 1 because of the larger project site, which increases use of hazardous materials and generation of hazardous waste, and the potential for munitions-related hazards and contamination. No significant impacts.
- Alternative 3: Similar to but slightly less than Alternative 2 because the bridge would not be demolished, which decreases potential for hazardous waste or special hazards. No significant impacts.
- Option A: Negligible additional impacts. No significant impacts.
- Option B: Additional minor impacts from increased potential for munitions-related hazards and contamination and increased hazardous materials use during construction. No significant impacts.

previously scanned for UXO; areas with potential for UXO, including the area north of the bridge that would provide temporary construction access to install cofferdams, would be scanned and cleared prior to disturbance. Soil and sediment samples would be taken and characterized prior to construction within range areas to determine if contaminants are present. The Navy would conduct further surveying as necessary to remove and dispose of contaminated soil wastes appropriately. Metals have been detected in Gambo Creek sediments associated with IR sites and munitions use (JM Waller Associates, Inc. and Tetra Tech NUS, Inc., 2008). In-water construction, such as pile-driving for foundations, would use cofferdams or other BMPs to minimize the potential for disturbing sediments and releasing contaminant plumes in the water.

Bridge demolition and construction would occur to the immediate south of IR Site 001, the Old Bombing Range. IR Site 001 is believed to have levels of contamination at or above concentrations that are dangerous to life or health from its historic use as a bombing range, as well as munitions constituents and UXO from its current use as a range. Remediation of the contamination at this site is indefinitely deferred until such time as the range closes. The bridge would be constructed south of the delineated boundaries of IR Site 001. However, temporary access to the creek for installing cofferdams would occur through this IR site. Furthermore, contaminant migration can be a dynamic occurrence. Soil and groundwater sampling along the project boundaries within and near IR Site 001 would identify whether off-site remediation and cleanup would be needed prior to bridge construction.

Bridge demolition and construction would also occur north of and partially within IR Site 061b, Gambo Creek Projectile Disposal Area. Contamination was remediated in 2004, and post-remediation surveying determined that IR Site 061b poses no potential for future release (NAVFAC Washington, 2005). The site is closed with no further action. Therefore, any ground-disturbing activities would have no impact on or from IR Site 061b.

The laydown area would be within a portion of IR Site 006, Terminal Range Airplane Park. Contamination was remediated in 1992, with long-term wetlands restoration and monitoring through 2011. This area is planned to be used for equipment and materials storage. No clearing, grading, digging, or other ground-disturbing activities are planned at this site. Therefore, no impacts from or on IR Site 006 would be expected.

For these reasons, implementation of Alternative 1 would not result in significant impacts from hazardous materials and wastes.

3.7.3.3 Alternative 2: Southern Bridge Alignment Potential Impacts

The study area for the analysis of effects on hazardous materials and wastes associated with Alternative 2 includes the existing bridge where demolition would occur, the area south of the existing bridge and surrounding area (see Figure 3-12) where construction of the new bridge would occur, and the construction laydown area west of the project site.

The potential impacts on hazardous materials and wastes would be essentially the same as those described under Alternative 1 in Section 3.7.3.2. The study area for Alternative 2 extends further south of Alternative 1; construction would entail the same considerations regarding use and generation of hazardous materials and wastes during construction activities; potential for hazardous waste and special hazards associated with ACM, LBP, and PCBs during demolition of the existing bridge; and potential for contamination from IR Site 001 and munitions. As Alternative 2 involves a larger area for construction and road realignment, construction could generate higher quantities of hazardous materials and

hazardous wastes, but still well within the limits of existing management plans. The Alternative 2 study area includes a larger area with potential for UXO and munitions to occur, compared with Alternative 1; these areas would require UXO scanning and clearing (as needed), and soil and sediment sampling and removal (as needed) for munitions contaminants. Similar to Alternative 1, no impacts on or from IR Site 061b or IR Site 006 would be expected under Alternative 2. Therefore, implementation of Alternative 2 would not result in significant impacts from hazardous materials and wastes.

3.7.3.4 Alternative 3: Parallel Bridge Alignment Potential Impacts

The study area for the analysis of effects on hazardous materials and wastes associated with Alternative 3 includes the existing bridge where modification and repairs would occur, the area south of the existing bridge and surrounding area (see Figure 3-12) where construction of the new bridge would occur, and the construction laydown area west of the project site.

The potential impacts on hazardous materials and wastes would be similar to those described under Alternative 2 in Section 3.7.3.3; construction would entail the same considerations regarding use and generation of hazardous materials and wastes during construction activities; scanning and clearing for UXO; sampling for and removal of soil contaminated with munitions constituents from range use; and potential for contamination from IR Site 001 and munitions. The study area for Alternative 3 is generally the same as Alternative 2, but the existing bridge would undergo repairs and not be demolished. Some repair activities could involve removal or replacement of old materials potentially containing hazardous wastes or ACM, LBP, or PCBs, which would be properly characterized and disposed of, though the amount of waste would be minimal compared with Alternative 1 or Alternative 2. No impacts on or from IR Site 061b or IR Site 006 would be expected under Alternative 3. Therefore, implementation of Alternative 3 would not result in significant impacts from hazardous materials and wastes.

3.7.3.5 Options for Bridge Utilities Potential Impacts

Option A: Aboveground Utilities

The study area for the analysis of effects on hazardous materials and wastes associated with Option A would encompass the study areas of each alternative.

Option A would involve attaching utilities to the new bridge structure (under Alternative 1 or 2) or reattaching to the existing bridge, once repairs are made (under Alternative 3). Therefore, Option A would have no additional impacts on hazardous materials or wastes, combined with any of the action alternatives. The removal of old utility components, which could contain hazardous wastes or special hazards, is included under each alternative. Furthermore, attaching utilities to the bridge structure could require some short-term, minor activities that generate additional hazardous materials or hazardous wastes associated with equipment use, but these would have negligible additional impacts on hazardous materials and waste management. No additional potential exists for UXO/munitions constituents sweeps or contamination from IR sites beyond what has already been described for the action alternatives. Therefore, implementation of Option A, combined with any of the action alternatives, would not result in significant impacts from hazardous materials and wastes.

Option B: Underground Utilities

The study area for the analysis of effects on hazardous materials and wastes associated with Option B includes the surface and underground area of the existing bridge to the southern extent of the southern or parallel alignments, similar to the scope of Alternative 2.

The removal of old utility components, which could contain hazardous wastes or special hazardous materials, is included under each alternative. Furthermore, trenching or boring underground utility lines could require short-term, minor increases in activities, perhaps using some additional hazardous materials or generating some additional hazardous wastes such as drilling fluid, but these would have negligible additional impacts on hazardous materials and waste management.

Potential impacts associated with Option B primarily include the potential to encounter UXO or munitions constituents, or contamination migration from IR Site 001, similar to risks of general ground-disturbing activity associated with Alternatives 1, 2, and 3 (refer to discussion in Sections 3.7.3.2, 3.7.3.2, and 3.7.3.3). Areas with potential for UXO would be scanned and cleared prior to disturbance. Soil and groundwater samples would be taken and characterized prior to construction within range areas to determine if contaminants are present; the Navy would conduct further surveying as necessary to remove/remediate and dispose of contamination appropriately. Therefore, implementation of Option B, combined with any of the action alternatives, would not result in significant impacts with hazardous materials and wastes.

3.8 Summary of Potential Impacts on Resources

A summary of the potential impacts associated with each of the action alternatives and the No Action Alternative are presented in Table 3-10. Table 3-11 compares the potential impacts of implementing either of the utility options, one of which would be selected under any of the action alternatives. The impacts described in Table 3-11 would be in addition to those described in Table 3-10. These additional impacts from either utility option would not change the overall conclusion of the effects determination presented for each alternative and resource area.

Table 3-10 Summary of Potential Impacts on Resource Areas

<i>Resource Area</i>	<i>No Action Alternative</i>	<i>Alternative 1: Existing Bridge Alignment (Preferred Alternative)</i>	<i>Alternative 2: Southern Bridge Alignment</i>	<i>Alternative 3: Parallel Bridge Alignment</i>
Air Quality	Minor regional increases from growth in the county. No significant impacts.	Short-term, minor emissions from operating heavy equipment during site preparation, construction, and demolition activities. No increases in the long term. No significant impacts.	Short-term, minor emissions from operating heavy equipment during site preparation, construction, and demolition activities. No increases in the long term. No significant impacts.	Minor regional increases from growth in the county. No significant impacts.
Water Resources	No change in baseline conditions. No significant impacts.	Short-term, minor impacts on jurisdictional wetlands and water bodies from construction disturbance. New abutments and bridge apron would require fill within jurisdictional wetlands. Any fill within jurisdictional wetlands would be permitted and mitigated in accordance with Section 404 of the Clean Water Act. With mitigations and Section 404 permitting for impacts on jurisdictional wetlands, no significant impacts.	Similar to Alternative 1, but with increased impacts on jurisdictional wetlands and surface waters due to the larger footprint. With mitigations and Section 404 permitting for impacts on jurisdictional wetlands, no significant impacts.	No change in baseline conditions. No significant impacts.
Geological Resources	No change in baseline conditions. No significant impacts.	Short- and long-term, minor effects from construction and increases in impervious surface. No significant impacts.	Short- and long-term, minor effects from construction and increases in impervious surface. No significant impacts.	No change in baseline conditions. No significant impacts.

Resource Area	No Action Alternative	Alternative 1: Existing Bridge Alignment (Preferred Alternative)	Alternative 2: Southern Bridge Alignment	Alternative 3: Parallel Bridge Alignment
Cultural Resources	Long-term, minor, adverse effect on the Dahlgren Mainside Historic District due to bridge deterioration. No significant impacts.	Long-term, minor, adverse effect on the Dahlgren Mainside Historic District due to bridge demolition. Long-term, minor adverse effect on Site 44KG0157 due to bridge construction. With the execution of mitigation measures between the Navy and the SHPO in an MOA, no significant impacts.	Long-term, minor, adverse effect on the Dahlgren Mainside Historic District due to bridge demolition. Long-term, minor adverse effect on Site 44KG0157 due to bridge and road construction. With the execution of mitigation measures between the Navy and the SHPO in an MOA, no significant impacts.	Beneficial effects on the bridge due to planned repairs. Long-term, minor, adverse effect on Site 44KG0157 due to bridge and road construction. With the execution of mitigation measures between the Navy and the SHPO in an MOA, no significant impacts.
Biological Resources	No change in baseline conditions. No significant impacts.	Short-term, negligible impacts on terrestrial wildlife, Atlantic and shortnose sturgeon, bald eagle, northern long-eared bat, tri-colored bat, little brown bat, and peregrine falcon; these resources would be only temporarily or indirectly affected, if at all, during construction activities. Short-term, minor impacts on vegetation, aquatic habitat, SAV, alewife, blueback herring, red hake, and monarch butterfly; these resources could occur within the project area and be affected by construction but affected habitat and duration would be minimal. No significant impacts.	Short-term, negligible impacts on Atlantic and shortnose sturgeon, northern long-eared bat, tri-colored bat, little brown bat, and peregrine falcon; these resources would be only temporarily or indirectly affected, if at all, during construction activities. Short-term, minor impacts on aquatic habitat, SAV, alewife, blueback herring, red hake, and bald eagle; these resources could occur within the project area and be affected by construction but affected habitat and duration would be minimal. Long-term, negligible impacts on vegetation, terrestrial wildlife, and monarch butterfly. No significant impacts.	Short-term, negligible impacts on Atlantic and shortnose sturgeon, northern long-eared bat, tri-colored bat, little brown bat, and peregrine falcon; these resources would be only temporarily or indirectly affected, if at all, during construction activities. Short-term, minor impacts on SAV, alewife, and blueback herring, and red hake. Long-term, negligible impacts on bald eagle and terrestrial wildlife; these resources could occur within the project area and be affected by construction but affected habitat and duration would be minimal. Long-term minor impacts on vegetation, aquatic habitats, and monarch butterfly. No significant impacts.

Resource Area	No Action Alternative	Alternative 1: Existing Bridge Alignment (Preferred Alternative)	Alternative 2: Southern Bridge Alignment	Alternative 3: Parallel Bridge Alignment
Infrastructure	Ongoing minimal maintenance could result in bridge closure and loss of utility services. Major impacts are possible.	Short-term, minor impacts on utility service. Long-term beneficial effects from a safer, more reliable bridge. No significant impacts.	Short-term, minor impacts on utility service; possible relocation of communications panels or lines. Long-term beneficial effects from a safer, more reliable bridge. No significant impacts.	Short-term, minor impacts on utility service; possible relocation of communications panels or lines. Improvements over No Action for long-term safety and reliability, but less beneficial than Alternatives 1 or 2. No significant impacts.
Hazardous Materials and Wastes	Continued operation with existing management plans and policies that govern hazardous materials and wastes. No significant impact.	Short-term impacts associated with increased use of hazardous materials and generation of hazardous wastes. Demolished bridge components may contain special hazards; wastes would be characterized and disposed of appropriately. Short-term potential to encounter hazards associated with the active range and contamination from Installation Restoration Site 001; surveys and clearing/remediation prior to beginning construction activities would occur. No significant impacts.	Similar to but greater than Alternative 1 because of the larger project site, which increases use of hazardous materials and generation of hazardous waste, and the potential to encounter munitions-related hazards and contamination. No significant impacts.	Similar to but slightly less than Alternative 2 because the bridge would not be demolished, which decreases potential for hazardous waste or special hazards. No significant impacts.

Key: MOA = Memorandum of Agreement; SAV = submerged aquatic vegetation; SHPO = State Historic Preservation Officer.

Table 3-11 Summary of Potential Impacts for Bridge Utility Options

<i>Resource Area</i>	<i>Option A: Aboveground Utilities</i>	<i>Option B: Underground Utilities</i>
Air Quality	Negligible emissions during utility installation. No significant impacts when combined with any of the action alternatives described in Table 3-10.	Short-term, negligible-to-minor emissions from trenching and drilling equipment and associated fugitive dust during construction. No significant impacts when combined with any of the action alternatives described in Table 3-10.
Water Resources	Short-term, minor impacts. No significant impacts when combined with any of the action alternatives described in Table 3-10.	Short-term, minor impacts. Trenching and drilling for utilities would occur outside of and below wetlands. No significant impacts when combined with any of the action alternatives described in Table 3-10.
Geological Resources	Negligible impacts during construction. No significant impacts when combined with any of the action alternatives described in Table 3-10.	Short-term, minor impacts during construction. No significant impacts when combined with any of the action alternatives described in Table 3-10.
Cultural Resources	No adverse effects; no significant impacts when combined with any of the action alternatives described in Table 3-10.	If trenching or drilling for utilities avoids known archaeological sites, there is no need for mitigation measures. No significant impacts when combined with any of the action alternatives described in Table 3-10.
Biological Resources	Short-term, negligible impacts on biological resources. No significant impacts when combined with any of the action alternatives described in Table 3-10.	Short-term, negligible impacts on biological resources. No significant impacts when combined with any of the action alternatives described in Table 3-10.
Infrastructure	Short-term, minor impacts on utility service. No significant impacts when combined with any of the action alternatives described in Table 3-10.	Short-term, minor impacts on utility service. No significant impacts when combined with any of the action alternatives described in Table 3-10.
Hazardous Materials and Wastes	Negligible additional impacts when combined with any of the action alternatives described in Table 3-10.	Minor additional impacts from increased potential for munitions-related hazards and contamination and increased hazardous materials use during construction. No significant impacts when combined with any of the action alternatives described in Table 3-10.

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4 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 the proposed action may have with other actions; and (4) evaluates cumulative impacts potentially resulting from these interactions.

4.1 Definition of Cumulative Impacts

The approach taken in the analysis of cumulative impacts follows the objectives of the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations, CEQ guidance, and Navy regulations. A cumulative impact is defined in 40 Code of Federal Regulations (CFR) section 1508.7 as “the impact on the environment which results from the incremental impact of the action when added to the 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.”

To determine the scope of environmental impact analyses, agencies shall consider cumulative actions, which, when viewed with other proposed actions, have cumulatively significant impacts and should therefore be discussed in the same impact analysis document.

In addition, 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 EPA 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 near a 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 of 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?

4.2 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 identified in Chapter 3 for the respective resource areas. The time frame for cumulative impacts centers on the timing of the Proposed Action.

Another factor influencing the scope of cumulative impacts analysis involves identifying other actions to consider. Beyond determining that the geographic scope and time frame for the actions interrelate to the Proposed Action, the analysis employs the measure of “reasonably foreseeable” to include or exclude other actions. For the purposes of this analysis, public documents prepared by federal, state, and local government agencies form the primary sources of information regarding reasonably foreseeable actions. Documents used to identify other actions include management plans, land use plans, and other planning related studies.

4.3 Past, Present, and Reasonably Foreseeable Actions

This section will focus on past, present, and reasonably foreseeable future projects at, and near, the Proposed Action locale. In determining which projects to include in the cumulative impacts analysis, a preliminary determination was made regarding past, present, or reasonably foreseeable actions. Specifically, using the first fundamental question included in Section 4.1, 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 (CEQ, 2005), these actions that were 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 informed decision making. Projects included in this cumulative impacts analysis are listed in Table 4-1 and briefly described in the following subsections.

Table 4-1 Cumulative Action Evaluation

Action	Level of NEPA Analysis Completed
Past Actions	
Closure of the NSF Dahlgren Runway	N/A
Present and Reasonably Foreseeable Future Actions	
NSF Dahlgren Marple-Bronson Campus	Categorical Exclusion
NSF Dahlgren RDT&E Facility (P-327)	Categorical Exclusion
Navy Gateway Inns & Suites	Categorical Exclusion
NSF Dahlgren Integrated Air and Missile Defense Center	EA underway
Harry W. Nice Memorial Bridge replacement, Maryland Transportation Authority	EA completed in July 2009; Section 4(f) evaluation approved in November 2012; and FONSI issued October 2012
Long-Term Future Actions	
King George County Mixed-Use Development	N/A

Sources: Maryland Transportation Authority, 2016; Dyson, 2018.

Key: EA = Environmental Assessment; FONSI = Finding of No Significant Impact; N/A = Not applicable; NEPA = National Environmental Policy Act; NSF = Naval Support Facility; RDT&E = Research, Development, Testing, and Evaluation.

4.3.1 Past Actions

Closure of the NSF Dahlgren Runway: The NSF Dahlgren runway approximately a half-mile from the Gambo Creek alternative sites. This runway closed in 2018. The former airfield is expected to be developed in the future, but plans have not yet been developed.

4.3.2 Present and Reasonably Foreseeable Actions

Marple-Bronson Campus: The Marple-Bronson Campus Development Area is a 23-acre area on NSF Dahlgren bounded by Marple Road on the east and Bronson Road on the west. It is approximately one mile from the Gambo Creek alternative sites. The campus development is planned over five years, beginning in fiscal year 2017. Potential future development would likely consolidate tenants by department into one building or buildings closer in proximity (NAVFAC, 2016). The following projects at the Marple-Bronson Campus are either present or proposed:

- Completion of MILCON P-287 and Demolition of Building 1200 (completed fiscal year 2019). This new 57,646-square-foot facility would be constructed as an addition to Building 1560, north of the Marple-Bronson Campus Development Area, to replace Building 1200. This project would also renovate a portion of Building 1560 and add associated parking.
- Construction of a 10,000-square-foot minor construction project and associated parking (anticipated completion fiscal year 2020). This project would construct a one-story building and associated parking spaces to support accelerated mission growth for the Naval Surface Warfare Center Dahlgren Division.
- Addition of a temporary trailer complex across Marple Road from Building 185 (completed fiscal year 2018)
- Four potential small-scale construction projects, which will likely be 10,000-square-foot facilities with associated parking.

Research, Development, Testing, and Evaluation Facility (P-327): This unprogrammed military construction (MILCON) could occur within the next five years on the site of the former Building 1200, which has been demolished. This project is approximately one mile from the Gambo Creek alternative sites. Under MILCON P-327, a new standalone facility would be constructed to enhance RDT&E capabilities on NSF Dahlgren. It would replace temporary and deteriorating facilities and consolidate approximately 500 personnel and equipment that support the Weapons Systems Integration mission. Personnel are currently dispersed among three trailers and two buildings. MILCON P-327 would involve the demolition of 96,550 square feet of temporary trailers and technical support spaces, and the construction of a classified four-story 110,000-square foot facility. Vacated buildings would be converted to other uses.

Navy Gateway Inns & Suites: A three-story military lodging facility is planned to provide temporary lodging for transient officers, enlisted, authorized civilian guests, and distinguished visitors. The building will be located off Jenkins Road and replace the existing Navy Gateway Inns and Suites that is located off Dahlgren Road about a quarter-mile southeast of the new location, which is approximately one mile from the Gambo Creek alternative sites. The new Navy Gateway Inns & Suites is needed to meet lodging demands on the installation (NAVFAC Washington, 2016b).

NSF Dahlgren Integrated Air and Missile Defense Center. The Navy proposes to construct a low-rise Integrated Air and Missile Defense Center to accommodate the missions of the Naval Surface and Mine Warfighting Development Center Detachment Dahlgren, including the missions of the Integrated Air and

Missile Defense/Ballistic Missile Defense and Warfare Tactical Instructor. The Navy is considering three alternative locations for this facility. An EA is still in the early stages of preparation, so the timeline and specific location for this project are not certain.

Harry W. Nice Memorial Bridge Replacement: The Maryland Transportation Authority has been planning for the replacement of the Harry W. Nice Memorial Bridge (Nice Bridge) that spans the Potomac River between Charles County, Maryland, and King George, Virginia. The bridge is located near NSF Dahlgren, approximately two miles from the Gambo Creek alternative sites. The existing two-lane bridge will be replaced by a four-lane bridge to lessen existing impacts from daily traffic congestion. Construction is expected to begin in early 2020, with the opening of the new bridge projected for 2023. The new bridge is planned north of and parallel to the existing bridge, and the existing bridge will be demolished after the new bridge is completed. Minimal traffic impacts are expected during construction as the existing bridge would be open during the construction of the new bridge. Construction equipment and changes to the approach would occur during off-peak and nighttime hours to reduce impacts on traffic (Maryland Transportation Authority, 2016).

4.3.3 Long-Term Future Actions

King George County Mixed-Use Development: The King George County Board of Supervisors have approved a plan for mixed-use development along State Route 3 in the area of the King George Courthouse, down Route 3 until it intersects with U.S. Route 301, and along that highway until it meets State Route 206. This development would occur in the vicinity of NSF Dahlgren, near the U.S. Route 301/State Route 206 junction, which is approximately three miles from the Gambo Creek alternative sites. The approved mixed-use development ordinance would allow up to 18 dwelling units per acre, sidewalks on both sides of the street, and underground utilities (Dyson, 2018).

4.4 Cumulative Impact Analysis

Where feasible, the cumulative impacts were assessed using quantifiable data; however, for many of the resources included for analysis, quantifiable data are not available, and a qualitative analysis was undertaken. 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 3, which was used to determine potential impacts on the various resources analyzed in this document, was also used to determine cumulative impacts.

4.4.1 Air Quality

4.4.1.1 Description of Geographic Study Area

The study area for cumulative impacts on air quality is King George County, within the Northeastern Virginia Intrastate Air Quality Control Region.

4.4.1.2 Relevant Past, Present, and Future Actions

All present and reasonably foreseeable future actions listed in Table 4-1 and the Proposed Action have the potential to affect air quality.

4.4.1.3 Cumulative Impact Analysis

For present and future projects, any construction would generate short-term criteria pollutant and fugitive dust emissions while ground-disturbing activities are occurring. Air emissions are based on the size and complexity of the project and whether construction activities would occur on unpaved surfaces. All present and reasonably foreseeable future actions could collectively increase emissions of criteria air pollutants temporarily in and around the project sites at NSF Dahlgren, but variations in the timing of the present and future projects, and the relatively short durations of project-related effects, would distribute air quality impacts temporally and geographically. The Proposed Action would only have short-term construction-related contributions to air emissions. Projects identified in Table 4-1 could also have negligible-to-minor increases as well from the installation and operation of boilers or back-up generators, but long-term emissions increases would be cumulatively minor.

Cumulatively, emissions from all projects are negligible or minor and would occur within an attainment area. Furthermore, construction emissions would be temporary. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts within the study area.

4.4.2 Water Resources

4.4.2.1 Description of Geographic Study Area

The study area for assessment of cumulative impacts on water resources is NSF Dahlgren and adjacent areas that could be indirectly affected.

4.4.2.2 Relevant Past, Present, and Future Actions

All projects listed in Table 4-1 and the Proposed Action have the potential to affect water resources.

4.4.2.3 Cumulative Impact Analysis

For present and future projects, any construction has the potential to affect surface water, groundwater, and stormwater runoff while ground-disturbing activities are occurring. The Proposed Action could affect the inflow of surface water and sediments in Gambo Creek and potentially change local drainage patterns. However, impacts associated with erosion and sedimentation into water bodies would be limited by the implementation of appropriate BMPs to minimize soil and contaminated water from leaving construction sites.

In the long term, projects that would increase impervious surfaces could also cumulatively reduce groundwater infiltration, increase stormwater runoff, and decrease stormwater quality. Present and foreseeable future projects involving new structures must adhere to federal and state requirements of ensuring the post-development hydrology is the same as pre-development hydrology and treating 100 percent of the stormwater from new development.

Cumulatively, impacts on water resources would be negligible or minor and localized to individual project sites. In addition, projects on the installation would implement construction BMPs, follow stormwater management principles in the installation's stormwater pollution prevention plan, and preserve hydrology after development. Therefore, implementation of the Proposed Action, combined with past, present, and reasonably foreseeable future projects, would not result in significant impacts within the study area.

4.4.3 Geological Resources

4.4.3.1 Description of Geographic Study Area

The study area for assessment of cumulative impacts on geological resources is NSF Dahlgren.

4.4.3.2 Relevant Past, Present, and Future Actions

Present and foreseeable future actions described in Table 4-1 are considered in this cumulative impact analysis on geological resources for the Proposed Action.

4.4.3.3 Cumulative Impact Analysis

Cumulative impacts on geological resources from past, present, and future actions within the study area would be less than significant because impacts are location-specific. The present and foreseeable actions described in Table 4-1 may have impacts on soil and topography, but those would be bound by the site location. Furthermore, impacts from soil erosion would be limited by implementation of BMPs. The projects listed in Table 4-1 are not located in the immediate area of the alternative sites. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on the geological resources within the study area.

4.4.4 Cultural Resources

4.4.4.1 Description of Geographic Study Area

The study area for assessment of cumulative impacts on cultural resources is NSF Dahlgren.

4.4.4.2 Relevant Past, Present, and Future Actions

All past, present, and reasonably foreseeable future actions occurring at NSF Dahlgren listed in Table 4-1 have the potential to affect cultural resources within the study area. All individual projects that involve ground-disturbing activities or any changes within NRHP-eligible historic properties or districts, or within their viewshed, may directly or indirectly affect cultural resources.

4.4.4.3 Cumulative Impact Analysis

The Navy meets its stewardship requirements toward cultural resources under NHPA Sections 106 and 110. The installation has an Integrated Cultural Resources Management Plan that is a reference and planning tool for managing and preserving cultural resources while maintaining mission readiness (Navy, 2014). Any building demolition or construction of buildings within NRHP-eligible historic districts or their viewsheds would be mitigated in accordance with Section 106 of the NHPA. Any building renovations would be done in accordance with the Secretary of the Interior's Standards of Rehabilitation (36 CFR part 68). Any ground-disturbing activities in undeveloped areas would undergo surveys for archaeological artifacts, and/or project boundaries would be compared against known areas of archaeological sensitivity. Consultation with the State Historic Preservation Officer (and other appropriate parties) is undertaken prior to project commencement. In this way, the Navy works to identify, avoid, minimize, and/or mitigate any potential impacts on cultural resources when implementing individual projects.

Other present and future projects from Table 4-1 would be within the viewshed of the Dahlgren Mainside Historic District and/or Residential Historic District, including the runway, the Marple-Bronson Campus, the Integrated Air and Missile Defense Center, and MILCON P-327. Individually, each project

must undergo review and consultation. Cumulatively, impacts on cultural resources would not likely affect the status of contributing resources to the NRHP-eligible resources, namely the historic districts. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on cultural resources within the study area.

4.4.5 Biological Resources

4.4.5.1 Description of Geographic Study Area

The study area for assessment of cumulative impacts on biological resources is NSF Dahlgren and the surrounding biological community.

4.4.5.2 Relevant Past, Present, and Future Actions

All projects listed in Table 4-1 could contribute directly or indirectly to impacts on biological resources.

4.4.5.3 Cumulative Impact Analysis

For past, present, and future projects at NSF Dahlgren, construction projects would be expected to generate some noise and fugitive dust, which could directly or indirectly affect wildlife species. Individually, projects would be expected to have negligible to minor impacts, dependent on the biological community where the construction occurs, and would vary with the size, intensity, and duration of construction activities. Given the ample habitat on NSF Dahlgren, wildlife would be able to retreat if disturbed by noise, dust, or increased human activities.

Projects that could have cumulative impacts in combination with the Proposed Action would result in increased sedimentation and turbidity in downstream surface waters. However, the projects listed in Table 4-1 are not in close proximity to Gambo Creek Bridge and would not have direct increases in sedimentation and turbidity in Gambo Creek. In addition, construction projects would adhere to federal and state regulations and permits and would implement erosion- and sediment-control measures and stormwater management facilities, as required.

Cumulative projects that would develop currently undisturbed land would contribute to the cumulative loss of vegetation and wildlife habitat. However, most of the projects outlined in Table 4-1 are within the existing operational and support areas of NSF Dahlgren, much of which is either developed or maintained open space. These areas would be considered poor habitat and would have less cumulative contributions. Implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts within the study area.

4.4.6 Infrastructure

4.4.6.1 Description of Geographic Study Area

The study area for assessment of cumulative impacts on infrastructure is NSF Dahlgren.

4.4.6.2 Relevant Past, Present, and Future Actions

All past, present, and reasonably foreseeable future actions listed in Table 4-1 and the Proposed Action have the potential to affect infrastructure.

4.4.6.3 Cumulative Impact Analysis

Individual construction activities have varying infrastructure requirements. Utility system capacities on NSF Dahlgren are adequate. Individual projects could have temporary impacts during construction activities while systems are being interconnected, but these kinds of disruptions would be minor and short term in nature. Cumulatively, construction projects are expected to improve overall system reliability.

The Proposed Action would not increase demand for or change the capacity of the existing utility infrastructure, and therefore would not contribute cumulatively to impacts in these areas. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts in the study area.

4.4.7 Hazardous Materials and Wastes

4.4.7.1 Description of Geographic Study Area

The study area for the assessment of cumulative impacts on hazardous materials and wastes is NSF Dahlgren.

4.4.7.2 Relevant Past, Present, and Future Actions

All past, present, and reasonably foreseeable future actions listed in Table 4-1 have the potential to affect hazardous materials and wastes.

4.4.7.3 Cumulative Impact Analysis

Cumulative impacts associated with hazardous materials and wastes from past, present, and future actions within the study area would be less than significant. Construction and demolition activities would be expected to use small quantities of hazardous materials and generate small quantities of hazardous wastes while these activities are occurring. Activities would adhere to existing hazardous materials, waste, and spill management plans. The Navy continually monitors its operations to find ways to minimize the use of hazardous materials and to reduce the generation of hazardous wastes. Therefore, implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on hazardous materials and wastes within the study area.

5 Other Considerations Required by the National Environmental Policy Act

5.1 Irreversible or Irrecoverable Commitments of Resources

Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of non-renewable resources, such as metal and fuel, and natural or cultural resources. These resources are irretrievable in that they would be used for this project when they could have been used for other purposes. Human labor is also considered an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

Implementation of the Proposed Action would involve human labor; the consumption of fuel, oil, and lubricants for construction equipment and vehicles; and the potential to lose cultural resources including the bridge (a contributing resource to Dahlgren Mainside Historic District) and portions of Site 44KG0157 (NRHP-eligible). No long-term changes in operations would occur. The loss of natural resources would include up to 3,340 square feet of trees under Alternative 1; 10,790 square feet of trees under Alternative 2; or 8,290 square feet under Alternative 3. These resources are not rare or scarce on NSF Dahlgren; therefore, their use for the Proposed Action would not result in significant irreversible or irretrievable commitment of resources. In addition, there would be short-term losses of jurisdictional wetlands to include up to 63,860 square feet under Alternative 1; 75,520 square feet under Alternative 2; or 70,190 square feet under Alternative 3. Bridge designs have not been finalized, but any direct, long-term impacts (i.e., discharge of fill material) within the jurisdictional wetland would be permitted and mitigated in accordance with Section 404 of the Clean Water Act, to reduce impacts to less than significant.

5.2 Unavoidable Adverse Impacts

Implementing the Proposed Action would result in the following unavoidable environmental impacts. For all three alternative sites, there would be short-term, minor, adverse impacts on air quality, water resources, geological resources, biological resources, infrastructure and hazardous materials and wastes. There would also be long-term, minor, adverse impacts on water resources, cultural resources, biological resources, loss of trees, loss of wetlands, and an increase in impervious surfaces. The Proposed Action would have long-term, beneficial effects from upgrading and improving utilities on NSF Dahlgren.

Due to its location, the Proposed Action would have unavoidable impacts on wetlands and floodplains. The Navy would mitigate any impacts on jurisdictional wetlands in accordance with all permits and regulations. The Navy would restore and preserve the existing floodplain to the extent practicable to reduce flood risk. Avoiding archaeological site 44KG0157 is also not possible under Alternatives 2 and 3. The Navy would enter into an MOA concerning potential impacts on this site under any of the alternatives.

5.3 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.

In the short term, effects on the human environment with implementation of the Proposed Action would primarily relate to the construction activity itself. Air quality, and water, geological, and biological resources would be affected in the short-term during construction. In the long term, there would be a loss of trees, loss of vegetation, loss of wetlands, and an increase in impervious surface under any of the action alternatives. However, the loss of trees would be a fraction of the total existing forested areas on NSF Dahlgren. The construction and operation of proposed bridge would not significantly impact the long-term natural resource productivity of the area. The Proposed Action would not result in any impacts that would significantly reduce environmental productivity or permanently narrow the range of beneficial uses of the environment.

6 References

- Balazik, M. (2019, January 13). Email communication between Dr. Matthew Balazik, Research Ecologist USACE Engineering and Research and Development Branch and sturgeon specialist, and Travis Wray, NSF Dahlgren Natural Resources.
- Best and Hirrel. (1994). *Inventory of Standing Structures within the Operations and Industries Area at the Dahlgren Laboratory of the Dahlgren Division, Naval Surface Warfare Center*. Prepared for the Naval Facilities Engineering Command by R. Christopher Goodwin and Associates, Inc., Frederick, Maryland. As cited in Navy, 2014.
- CalTrans. (2015, November). *Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish*. California Department of Transportation Division of Environmental Analysis, Environmental Engineering, Hazardous Waste, Air, Noise, Paleontology Office. Retrieved March 2019, from http://www.dot.ca.gov/hq/env/bio/files/bio_tech_guidance_hydroacoustic_effects_110215.pdf
- CEQ. (1997). *Considering Cumulative Effects Under the National Environmental Policy Act*. Washington, DC.
- CEQ. (2005, June 24). *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis*.
- CEQ. (2019, June 26). Draft National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions. *Federal Register*, 30097–30099.
- Chesapeake Conservancy. (2019). *Peregrine Falcon*. Retrieved from Chesapeake Conservancy: <https://chesapeakeconservancy.org/what-we-do/explore/wildlife-webcams/peregrine-falcon/>
- CNIC. (2019, June). *CNIC Naval Support Facility Dahlgren*. Retrieved from https://www.cnic.navy.mil/regions/ndw/installations/nsa_south_potomac/installations/nsf_dahlgren/about.html
- Cowardin, L. M., Carter, V., Golet, F. C., & LaRoe, E. T. (1979). *Classification of Wetlands and Deepwater Habitats of the United States*. FWS/OBS-79/31. Office of Biological Services, Fish and Wildlife Service, United States Department of the Interior. Washington, DC. Retrieved from <https://www.fws.gov/wetlands/Documents/Classification-of-Wetlands-and-Deepwater-Habitats-of-the-United-States.pdf>
- DoD PARC. (2017, April). Fact Sheet: Spotted Turtles and the Department of Defense. Department of Defense Partners in Amphibian and Reptile Conservation.
- DoD PARC. (2019, March). Recommended Best Management Practices for the Spotted Turtle on Department of Defense Installations. *Department of Defense Legacy Resource Management Program*. Department of Defense Partners in Amphibian and Reptile Conservation.
- Dyson, C. (2018, September 20). King George approves mixed-use development, against planners' advice. *The Free Lance-Star*. Fredericksburg, VA. Retrieved December 27, 2018, from https://www.fredericksburg.com/news/local/king_george/king-george-approves-mixed-use-development-against-planners-advice/article_a798f70c-d4f5-5770-9bf8-d93409fc81ed.html

- Evans, J. (1979). Second Quarter Summary Progress Report, Archaeological Survey. Washington, DC: American Univeristy. Prepared for Naval Surface Warfare Center Dahlgren.
- Geil, M. (2019, October 30). Updated 2018 air emissions for NSF Dahlgren, provided via email by Mary Geil (NSF Dahlgren NEPA and Cultural Resources Manager).
- JM Waller Associates, Inc. and Tetra Tech NUS, Inc. (2008, May). *Final Gambo Creek Sediment Technical Memo, Naval Support Facility Dahlgren, Dahlgren, VA*. Prepared for NAVFAC Washington.
- Johnson, S. D. (2018, October 29). *New Rusty Patched Bumblebee Populations found near the Path of the Atlantic Coast Pipeline*. Retrieved from Wild Virginia: <http://wildvirginia.org/new-rusty-patched-bumblebee-populations-found-near-path-atlantic-coast-pipeline/>
- King George County Planning Commission. (2013, April 16). *King George County Comprehensive Plan*.
- Klein, M. J. (1998). *Phase I Archaeological Survey and Phase II Evaluation, Naval Surface Warfare Center, Dahlgren Laboratory, Dahlgren, King George County, Virginia*. Fredericksburg, Virginia: Prepared for Naval Surface Warfare Center Dahlgren by Mary Washington College Center for Historic Preservation.
- Marstel-Day and Versar. (2019, November). *Draft Report, Gambo Creek Bridge Wetland Delineation Area, Naval Support Facility Dahlgren, King George County, Virginia*. Submitted to NAVFAC Washington and Naval Support Facility Dahlgren.
- Maryland Transportation Authority. (2016, November 21). Governor Larry Hogan Announces \$765 Million for New Harry W. Nice Memorial Bridge. *MDTA News Releases*. Retrieved from <https://mdta.maryland.gov/blog-category/mdta-news-releases/governor-larry-hogan-announces-765-million-new-harry-w-nice-memorial-bridge>
- NAVFAC. (2016, August 8). *Marple-Bronson Campus Preliminary Site Development Study, Naval Support Facility Dahlgren, Final Submittal*. Dahlgren, VA: Prepared by Eastern Research Group, Inc. and Submitted by ADTEK Engineers, Inc.
- NAVFAC Washington. (2005, February). *Final Decision Document for Site 61b Gambo Creek Projectile Disposal Area at Naval District Washington, West Area, Dahlgren Site, Dahlgren, VA*. Submitted by JM Waller Associates, Inc.
- NAVFAC Washington. (2012). *NSF Dahlgren Transportation Improvement Plan*. Naval Facilities Engineering Command.
- NAVFAC Washington. (2013, May). Water Range Sustainability Environmental Program Assessment. *Potomac River Test Range Complex, Naval Surface Warfare Center Dahlgren Division*. Retrieved October 2019, from https://www.navsea.navy.mil/Portals/103/Documents/NSWC_Dahlgren/Resources/WRSEPA150225.pdf
- NAVFAC Washington. (2016a, March). Navy District Washington Resource Area Standard Language.
- NAVFAC Washington. (2016b, December). Design Charette Report (Nov. 15-17, 2016). *NGIS Navy Gateway Inns & Suites, NSA South Potomac, Dahlgren, VA*.

- NAVFAC Washington. (2017, January). *Report for Bat Surveys at Multiple Installations at NSF Dahlgren, Virginia; NSA Annapolis, NSF Carderock, and NAS Patuxent River, Maryland; and U.S. Naval Observatory and Joint Base Anacostia-Bolling, Washington, DC*. Prepared by Marstel-Day and Conservation and Management, Inc.
- NAVFAC Washington. (2018, January). *NSF Dahlgren and NSF Indian Head Bat Survey and Anabat Data Analysis*. Prepared by Marstel-Day, LLC and Conservation and Management, Inc.
- NAVFAC Washington. (2019, December). *Final Task Summary Report for Bat Survey at NSF Dahlgren*. Prepared by Marstel-Day, LLC and Conservation Management Institute.
- Navy. (2013, June). *Volume I Final Environmental Impact Statement Outdoor Research, Development, Test & Evaluation Activities Naval Surface Warfare Center, Dahlgren Division Dahlgren, Virginia*.
- Navy. (2014). *Integrated Cultural Resources Management Plan (2013-2018), Naval Support Facility, Dahlgren, Dahlgren, Virginia*. Prepared for Naval Support Facility Dahlgren by the Louis Berger Group, Inc.
- Navy. (2018, June 7). DD Form 1391/FY 2019 Special Projects Program for the Gambo Bridge Replacement (Project Number RM 18-1804).
- NOAA Fisheries. (2019a, October). Essential Fish Habitat mapper tool.
- NOAA Fisheries. (2019b, June 19). Endangered and Threatened Wildlife. *Federal Register*, 84(118), 28630–28666.
- NSA South Potomac. (2017, January 30). 2016 Emission Statement for Registration Number 40307, Annual Emissions Update for Calendar Year 2016, and Corrected 2016 Emission Statement. Certified by Jeffrey C. Bossart, NSASP Environmental Director.
- NSA South Potomac. (2018, February 7). 2017 Emission Statement for Registration Number 40307 and Annual Emissions Update for Calendar Year 2017. Certified by Jeffrey C. Bossart, NSASP Environmental Director.
- Shifflette, P. J. (2019, November 25). Gambo Creek Bridge Information provided by Patrick Shifflette (Senior Civil Design Engineer PMEB, NSF Dahlgren, NSA South Potomac).
- Sowell, J. (2019, November 14). Email communication regarding Gambo Creek utilities between Jeffrey Sowell (Asset Management, NAVFAC Washington) and Jennifer Steele (NAVFAC Washington).
- TetraTech. (2017, September 30). IRP Site Information Sheets for IR1, IR6, and IR61b (Rev 0).
- USEPA. (1999, May). *Consideration of Cumulative Impacts in EPA Review of NEPA Documents (EPA 315-R-99-002)*.
- USEPA. (2014). *2014 National Emissions Inventory (NEI) Data*. Retrieved November 13, 2018, from Air Emissions Inventories: <https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data>
- USEPA. (2016, June). *Technical Guidance for Assessing Environmental Justice in Regulatory Analysis*.

- USEPA. (2018, August 2). *EJSCREEN Report (Version 2018): King George County, Virginia, EPA Region 3*. Retrieved November 7, 2018, from EJSCREEN: Environmental Justice Screening and Mapping Tool: <https://www.epa.gov/ejscreen>
- USEPA. (2019, January 31). *Virginia Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants*. Retrieved February 8, 2019, from Green Book: https://www3.epa.gov/airquality/greenbook/anayo_va.html
- USFWS. (2010, October). Sensitive Joint-Vetch *Aeschynomene virginica*. U.S. Fish and Wildlife Service Virginia Field Office. Retrieved December 2018, from https://www.fws.gov/northeast/pdf/Sensitive_jointvetch.pdf
- USFWS. (2011a, September 27). *Long Beach Seedbox*. Retrieved December 12, 2019, from <https://ecos.fws.gov/ecp0/profile/speciesProfile?slid=9934>
- USFWS. (2011b, September). *Northeastern Beach Tiger Beetle *Cicindela dorsalis dorsalis**. Retrieved December 12, 2019, from https://www.fws.gov/northeast/Endangered/tiger_beetle/pdf/Tigerbeetle2_92711.pdf
- USFWS. (2019a, May 29). *Small whorled pogonia*. Retrieved from <https://www.fws.gov/midwest/endangered/plants/swpo/index.html>
- USFWS. (2019b). *Least, Virginia trillium (*Trillium pusillum virginianum*)*. Retrieved December 12, 2019, from <https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q23E>
- USFWS. (2019c, November 25). *IPaC Species Report*. Retrieved from IPaC Information for Planning and Consultation: <https://ecos.fws.gov/ipac/>
- USFWS. (2019d, June 17). *Featured Pollinator: Monarch Butterfly*. Retrieved from Pollinators: https://www.fws.gov/pollinators/features/Monarch_Butterfly.html
- USFWS. (2019e, May 29). *Rusty Patched Bumble Bee Questions and Answers*. Retrieved from Midwest Region Endangered Species: <https://www.fws.gov/midwest/endangered/insects/rpbb/FAQsFinalListing.html>
- USFWS. (2019f, May 29). *Fact Sheet Rusty Patched Bumble Bee (*Bombus affinis*)*. Retrieved from Midwest Region Endangered Species: <https://www.fws.gov/midwest/endangered/insects/rpbb/factsheetrpbb.html>
- USFWS. (2019g, September). *Fish and Aquatic Conservation*. Retrieved from Alewife and Blueback Herring: <https://www.fws.gov/fisheries/fishmigration/alewife.html>
- USFWS. (2019h, May 17). Retrieved from Key to the Northern Long-Eared Bat 4(d) Rule for Federal Actions that May Affect Northern Long-Eared Bats: <https://www.fws.gov/midwest/endangered/mammals/nleb/KeyFinal4dNLEBFedProjects.html>
- USFWS. (n.d.[a]). *River Herring: Alewife and Blueback Herring*. Retrieved from Fish and Aquatic Conservation: <https://www.fws.gov/fisheries/fishmigration/alewife.html>
- USFWS. (n.d.[b]). Species Profile for Northern Long-Eared Bat (*Myotis septentrionalis*). *Environmental Conservation Online System*. Retrieved January 2019, from <https://ecos.fws.gov/ecp0/profile/speciesProfile.action?spcode=A0JE>

- VDOT. (2019, October). *Level of Service*. Retrieved from Virginia Department of Transportation: <http://www.virginiadot.org/projects/resources/LOS-defined.pdf>
- Virginia Department of Conservation and Recreation. (2008, December). *Virginia Natural Heritage Fact Sheet - Northeastern Beach Tiger Beetle*. Retrieved December 12, 2019, from Division of Natural Heritage: <https://www.dcr.virginia.gov/natural-heritage/document/fsnebtigerbeetle.pdf>
- Virginia Department of Conservation and Recreation. (2019). *Virginia Natural Heritage Data Explorer (2.7)*. Retrieved December 12, 2019, from <https://vanhde.org/species-search>
- Virginia Department of Game and Inland Fisheries. (2016, February 16). *Guidance on Best Management Practices for Conservation of Little Brown Bats and Tri-Colored Bats*. Retrieved from https://www.dgif.virginia.gov/wp-content/uploads/LBBA_TCBA_Guidance.pdf
- Virginia Department of Game and Inland Fisheries. (2019a). *Eastern Tiger Salamander*. Retrieved December 12, 2019, from Virginia Department of Game and Inland Fisheries: <https://www.dgif.virginia.gov/wildlife/information/eastern-tiger-salamander/>
- Virginia Department of Game and Inland Fisheries. (2019b). *Breeding*. Retrieved from Virginia Department of Game and Inland Fisheries: <https://www.dgif.virginia.gov/wildlife/birds/peregrine-falcon/breeding/>
- Virginia Department of Game and Inland Fisheries. (2019c). *MYLU PESU Habitat*. Retrieved December 12, 2019, from <https://dgif-virginia.maps.arcgis.com/apps/webappviewer/index.html?id=15cf32b9c82b426fb6be47b6c8d5b624>
- Virginia Department of Game and Inland Fisheries. (n.d.). *NLEB Winter Habitat and Roost Trees*. Retrieved February 2019, from <https://dgif-virginia.maps.arcgis.com/apps/webappviewer/index.html?id=32ea4ee4935942c092e41ddcd19e5ec5>
- Virginia DEQ. (2016, June 17). Stationary Source Permit to Construct and Operate (Registration No. 40307).
- Virginia DEQ. (2019, July 1). *General VPDES Permit for Discharges of Stormwater from Construction Activities*. Retrieved from General Permit No.: VAR10: <https://www.deq.virginia.gov/Portals/0/DEQ/Water/StormwaterManagement/CGP%20ADA/CGP2019.pdf?ver=2019-05-06-131630-407>
- Virginia Institute of Marine Science. (2019, September). *River Herring Monitoring*. Retrieved from Alewife Life History: https://www.vims.edu/research/departments/fisheries/programs/american_shad/River%20Herring%20about/Alewife/index.php
- VTSO. (n.d.). *Virginia Earthquakes*. Retrieved from Virginia Tech Seismological Observatory: http://www.magma.geos.vt.edu/vtso/va_quakes.html#history
- Wray. (2013, October). *Integrated Natural Resources Management Plan Naval Facility Support Dahlgren, Dahlgren, Virginia*. Prepared by Dr. Thomas Wray II.

Wray, T. (2019a, September 23). Email communication between Travis Wray (Natural Resources Manager, NSF Dahlgren) and John Cannon (Marstel-Day) confirming there are no active bald eagle nests of the Gambo Creek Bridge project area.

Wray, T. (2019b, October). *Draft Update NSF Dahlgren Integrated Natural Resources Management Plan*. Spotted Turtle and Northern Red-bellied Cooter excerpts.

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Appendix A

Relevant Laws and Regulations

The Navy has prepared this Environmental Assessment (EA) based on federal and state laws, statutes, regulations, and policies pertinent to the implementation of the Proposed Action, including the following:

- National Environmental Policy Act (NEPA; 42 United States Code [U.S.C.] sections 4321–4370h), which requires an environmental analysis for major federal actions that have the potential to significantly impact the quality of the human environment
- Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] parts 1500–1508)
- Navy’s Procedures for Implementing NEPA (32 CFR part 775), which provides Navy policy for implementing Council on Environmental Quality regulations and NEPA
- Clean Air Act (42 U.S.C. section 7401 et seq.)
- Clean Water Act (33 U.S.C. section 1251 et seq.)
- Rivers and Harbors Act (33 U.S.C. section 407)
- Coastal Zone Management Act (16 U.S.C. section 1451 et seq.)
- National Historic Preservation Act (54 U.S.C. section 306108 et seq.)
- Endangered Species Act (16 U.S.C. section 1531 et seq.)
- Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (16 U.S.C. section 1801 et seq.)
- Marine Mammal Protection Act (16 U.S.C. section 1361 et seq.)
- Migratory Bird Treaty Act (16 U.S.C. section 703–712)
- Bald and Golden Eagle Protection Act (16 U.S.C. section 668–668d)
- Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. section 9601 et seq.)
- Emergency Planning and Community Right-to-Know Act (42 U.S.C. sections 11001–11050)
- Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. section 136 et seq.)
- Resource Conservation and Recovery Act (42 U.S.C. section 6901 et seq.)
- Toxic Substances Control Act (15 U.S.C. sections 2601–2629)
- Farmland Protection Policy Act (7 U.S.C. 4201 et seq.)
- Executive Order (EO) 11988, *Floodplain Management*
- EO 11990, *Protection of Wetlands*
- EO 12088, *Federal Compliance with Pollution Control Standards*
- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*
- EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*
- EO 13175, *Consultation and Coordination with Indian Tribal Governments*
- EO 13834, *Efficient Federal Operations*

Consistency with Other Federal, State, and Local Laws, Plans, Policies, and Regulations

In accordance with 40 CFR 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. Table A-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 A-1 Principal Federal and State Laws Applicable to the Proposed Action

<i>Federal, State, Local, and Regional Land Use Plans, Policies, and Controls</i>	<i>Status of Compliance</i>
NEPA; CEQ-NEPA implementing regulations; Navy procedures for implementing NEPA	This Environmental Assessment has been prepared in accordance with NEPA, as implemented by the CEQ and Navy regulations.
Clean Air Act	The Proposed Action would comply with applicable federal and state air quality regulations. King George County is in attainment for all criteria pollutants; a General Conformity applicability analysis and Record of Non-Applicability are not required.
Clean Water Act	All of the action alternatives would require an individual permit from USACE. As more than one acre of land, a Construction General Permit under the National Pollutant Discharge Elimination System would be required.
Rivers and Harbors Act	A permit for bridge construction under Section 9 would be required from the U.S. Coast Guard.
Coastal Zone Management Act	A Coastal Consistency Determination will be submitted to the Virginia Department of Environmental Quality for all action alternatives.
National Historic Preservation Act	The Navy will consult with the SHPO on mitigation measures regarding adverse effects from the bridge demolition and disturbance of existing and potential sites.
Endangered Species Act	No effect on threatened or endangered species would be expected. No formal consultation with the U.S. Fish and Wildlife Service or NOAA Fisheries under section 7 is required.
Magnuson-Stevens Fishery Conservation and Management Reauthorization Act	No significant impacts on essential fish habitat is expected. Informal consultation with NOAA Fisheries will occur.
Marine Mammal Protection Act	Marine mammals have not been observed near the project site and are not expected to be indirectly affected. No impacts are expected.
Migratory Bird Treaty Act	No impacts on migratory birds would be expected.
Bald and Golden Eagle Protection Act	No impacts on bald eagles would be expected.
Comprehensive Environmental Response, Compensation, and Liability Act	Not applicable. The Proposed Action does not involve using or storing hazardous or toxic chemicals, beyond minimal quantities associated with construction.
Emergency Planning and Community Right-to-Know Act	Not applicable. Chemical substances would remain the same; reporting requirements would continue.
Federal Insecticide, Fungicide, and Rodenticide Act	Not applicable. The Navy would continue to use any pesticides or pesticide-treated products in accordance with applicable labeling.
Resource Conservation and Recovery Act	No changes would occur in the way that hazardous wastes are handled, stored, or disposed of.

<i>Federal, State, Local, and Regional Land Use Plans, Policies, and Controls</i>	<i>Status of Compliance</i>
Toxic Substances Control Act	Not applicable. Chemical substances would remain the same; reporting requirements would continue.
Farmland Protection Policy Act	NSF Dahlgren soils, and projects that affect them, are not subject to Farmland Protection Policy Act requirements.
Executive Order 11988, <i>Floodplain Management</i>	Much of the project area is within the 100-year floodplain. If impacts cannot be avoided, minimization measures to restore and preserve the floodplain will be designed and implemented.
Executive Order 11990, <i>Protection of Wetlands</i>	The new bridge would unavoidably result in fill material in jurisdictional, tidal wetlands associated with Gambo Creek. Design plans have not yet been drafted, so the area of direct impacts is not known. The Navy will obtain all required permits pursuant to Section 404 of the Clean Water Act and implement all necessary mitigations, so there would be no net loss of wetlands pursuant Executive Order 11990. The Navy will also implement measures to minimize short-term disturbance of wetlands during bridge construction.
Executive Order 12088, <i>Federal Compliance with Pollution Control Standards</i>	The Proposed Action would comply with applicable pollution controls required by construction permits.
Executive Order 12898, <i>Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations</i>	No disproportionately high or adverse effects on minority or low-income populations would occur.
Executive Order 13045, <i>Protection of Children from Environmental Health Risks and Safety Risks</i>	No disproportionate effects on children would occur.
Executive Order 13089, <i>Coral Reef Protection</i>	Not applicable.
Executive Order 13175, <i>Consultation and Coordination with Indian Tribal Governments</i>	No traditional cultural properties are known to be located within or near the project site. Consultation will be initiated with federally recognized tribes.
Executive Order 13834, <i>Efficient Federal Operations</i>	The Proposed Action does not include changes in operations.

Key: CEQ=Council on Environmental Quality; NEPA=National Environmental Policy Act; NOAA=National Oceanic and Atmospheric Administration; NSF = Naval Support Facility; SHPO=State Historic Preservation Office; USACE=U.S. Army Corps of Engineers.

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Appendix B

Public Involvement and Agency Correspondence Materials

Contents of Appendix B

U.S. Fish and Wildlife Service List of Threatened and Endangered Species (IPaC).....B-3
Letter to Bettina Rayfield, Virginia Department of Environmental Quality (January 29, 2020).....B-10

U.S. Fish and Wildlife Service List of Threatened and Endangered Species (IPaC)**United States Department of the Interior**

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032
<http://www.fws.gov/northeast/virginiafield/>



In Reply Refer To:
Consultation Code: 05E2VA00-2020-SLI-0820
Event Code: 05E2VA00-2020-E-02224
Project Name: Gambo Creek Bridge Replacement

November 25, 2019

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered

11/25/2019

Event Code: 05E2VA00-2020-E-02224

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species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries

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Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office

6669 Short Lane

Gloucester, VA 23061-4410

(804) 693-6694

11/25/2019

Event Code: 05E2VA00-2020-E-02224

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Project Summary

Consultation Code: 05E2VA00-2020-SLI-0820

Event Code: 05E2VA00-2020-E-02224

Project Name: Gambo Creek Bridge Replacement

Project Type: BRIDGE CONSTRUCTION / MAINTENANCE

Project Description: The Navy is proposing to provide a bridge that carries Tisdale Road traffic over Gambo Creek at Naval Support Facility Dahlgren in Dahlgren, VA. Gambo Creek Bridge is a reinforced concrete structure that was built in 1940 primarily as a railroad trestle for the movement of 16-inch guns mounted on flatcars. When rail car movement was phased out, it became a vehicular bridge. The existing physical bridge is deteriorating, and inspections have concluded that the structure is structurally deficient, functionally obsolete by current FHWA standards, and in poor condition overall. Current conditions of the structure have resulted in vehicle weight restrictions that prohibit installation fire trucks from crossing the bridge. As a result, the Navy is proposing to replace the bridge to meet current FHWA engineering standards to safely and adequately support mission activities and safety requirements. The proposed bridge would be located either on the same footprint as the current bridge, or just south of the current alignment. The proposed bridge would be constructed of steel pile foundations and a prestressed concrete spread box beam structure. It would be sized for two-way traffic and capable of supporting a minimum of a 25.25 ton truck. Proposed site improvements include a bridge structure, steel piles, guardrails, concrete abutments, concrete wingwalls, and traffic control fencing and gates. Site preparation would include the excavation and the temporary shoring for abutments and piers. During construction, cofferdams would be used when work below the waterline is required. Utility lines that currently run either under or on the bridge structure would be relocated during construction. Utility lines would either be reattached to the proposed bridge or bored underneath Gambo Creek using a technique such as horizontal directional boring. Construction activities are anticipated to begin in fiscal year 2021.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/38.33282841534456N77.02305630329273W>

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Counties: King George, VA

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Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

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USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Letter to Bettina Rayfield, Virginia Department of Environmental Quality (January 29, 2020)



DEPARTMENT OF THE NAVY
NAVAL SUPPORT ACTIVITY SOUTH POTOMAC
6509 SAMPSON ROAD, BLDG 101
DAHLGREN, VIRGINIA 22448

5090
Ser PRSD41TW/005
January 29, 2020

Ms. Bettina Rayfield
Office of Environmental Impact Review
Virginia Department of Environmental Quality
1111 East Main Street, Suite 1400
PO Box 1105
Richmond, VA 23219

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR GAMBO CREEK BRIDGE
REPLACEMENT AT NAVAL SUPPORT FACILITY DAHLGREN, DAHLGREN, VIRGINIA

Dear Ms. Rayfield:

In accordance with the Federal Coastal Zone Management Act of 1972 (CZMA), as amended, Naval Support Activity South Potomac requests concurrence with the Federal Consistency Determination for the proposed replacement bridge to carry Tisdale Road traffic over Gambo Creek at Naval Support Facility Dahlgren, in King George County, Virginia.

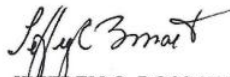
The Navy actions shall be carried out in a manner that are consistent to the maximum extent practicable with Virginia's enforceable policies. Pursuant to 15 CFR Section 930.41, the Navy shall presume concurrence if a response or request for extension is not received within 60 days from the receipt of this letter.

Please direct all written correspondence to:

ATTN: Director, Environmental Program
Department of the Navy
PWD South Potomac
18329 Thompson Road, Suite 226
Dahlgren, Virginia 22448-5110

For more information please contact Mr. Travis Wray at travis.wray@navy.mil and copy Ms. Jennifer Steele at jennifer.l.steele1@navy.mil, or by telephone at (540) 653-4186 and (202) 685-8008, respectively.

Sincerely,


JEFFREY C. BOSSART
By direction

Enclosures: 1. Coastal Zone Management Act Federal Consistency Determination

Copy to:
Ms. Jennifer Steele, NAVFAC Washington

**COASTAL ZONE MANAGEMENT ACT FEDERAL CONSISTENCY
DETERMINATION
FOR GAMBO CREEK BRIDGE REPLACEMENT
AT NAVAL SUPPORT FACILITY DAHLGREN, DAHLGREN, VIRGINIA**

This document provides the Commonwealth of Virginia with the Navy's Consistency Determination under Section 307(c) of the Coastal Zone Management Act and 15 CFR Part 930, subpart C, for the proposed replacement bridge to carry Tisdale Road traffic over Gambo Creek at Naval Support Facility (NSF) Dahlgren, Dahlgren, Virginia, which is located in King George County (see Figure 1 in Attachment C). The information in this Federal Consistency Determination is provided pursuant to 15 CFR 930.39.

Summary of Preferred Action and Alternatives

The Proposed Action would provide a bridge to carry Tisdale Road traffic over Gambo Creek at NSF Dahlgren. Gambo Creek Bridge (#158), the existing bridge, is a reinforced concrete structure that was built in 1940 primarily as a railroad trestle for the movement of 16-inch guns mounted on flatcars. When rail car movement was phased out, it became a vehicular bridge.

The proposed bridge would be constructed of steel pile foundations and a prestressed concrete spread box beam structure. It would be sized for two-way traffic and capable of supporting a minimum 50,500-pound (25.25-ton) truck, which is the heaviest vehicle in the fire department's fleet. Although the height of the proposed bridge is unknown at this time, it would likely be similar to the height of the existing bridge, which is 13 feet 3 inches from the bottom of concrete pier (pile caps) to the top of concrete decking (approximately 15 feet above mean sea level). The bridge would meet Federal Highway Administration engineering standards.

Utility lines would be relocated during construction. The following utilities would run either on the bridge structure or would be relocated under the creek bed: three-phase electrical lines and conduit; 6-inch cast iron drainage piping for storm drain for the bridge deck; 25-pair telephone coaxial cable and jacketing; 100-pair telephone coaxial cable inside a rigid galvanized steel conduit; 2- to 8-inch galvanized steel conduits with sealed joints containing protected network fiber optic lines; 4-inch cast iron sanitary sewer force main; and 10-inch cast iron potable waterline with insulation and jacketing. The Navy is considering the options of reattaching utilities to the proposed bridge or boring utilities underneath Gambo Creek using a technique such as horizontal directional drilling.

A laydown area for construction equipment would be west of the bridge in an area consisting of gravel and mowed grass. Temporary access roads would be built along the approach roadway. An additional temporary impact area to the north of the bridge is anticipated to be used to install cofferdams during in-water construction and allow minor diversions of flow on the eastern bank.

The Navy is analyzing three action alternatives and the No Action Alternative.

Enclosure 1

Under Alternative 1, which is the preferred alternative, the existing bridge would be completely demolished, and then rebuilt on the existing footprint. The new bridge would be approximately twice as wide as the existing bridge to carry two-way traffic and to support a 50,500-pound truck, at a minimum (see Figure 2 in Attachment C). Alternative 1 would result in the following:

- 8,730 square feet of bridge demolition
- 20,100 square feet of new bridge construction
- 63,860 square feet of temporary wetlands impacts
- 3,340 square feet of tree loss
- 2,920 square feet of new impervious surfaces

Under Alternative 2, a new bridge would be constructed to the south of the existing bridge, and the existing bridge would be demolished. The new bridge would be approximately twice as wide as the existing bridge to carry two-way traffic and to support a 50,500-pound truck, at a minimum (see Figure 3 in Attachment C). Alternative 2 would result in the following:

- 20,100 square feet of new bridge construction
- 67,520 square feet of temporary wetlands impacts
- 10,790 square feet of tree loss
- 30,040 square feet of new impervious surfaces

Under Alternative 3, a new bridge similar in width to the existing bridge would be constructed to the south of the existing bridge, and the existing bridge would be repaired. Given the advanced state of deterioration of the existing bridge, it cannot feasibly be repaired to return to its original weight limits. The new bridge would be capable of supporting a 50,500-pound truck, at a minimum. Traffic would be one-way on the new bridge but with contraflow lane reversal when necessary for large vehicles that cannot pass on the existing bridge (see Figure 4 in Attachment C). Alternative 3 would result in the following:

- 9,980 square feet of new bridge construction
- 70,190 square feet of temporary wetlands impacts
- 8,290 square feet of tree loss
- 22,210 square feet of new impervious surfaces

Under the No Action Alternative, the existing bridge would continue to be used with only minimal maintenance. The Gambo Creek Bridge could ultimately fail, putting missions, facilities, and operations at risk from loss of utility service.

The Navy has determined that implementation of the Proposed Action at any of the three alternatives would result in short-term, minor, adverse impacts on air quality, water resources including wetlands and the floodplain, geological resources, infrastructure, and hazardous materials and wastes during construction activities. There would also be long-term, minor, adverse impacts on water resources, cultural resources, and biological resources from the increase in impervious surfaces, loss of habitat, and impacts on cultural resources. Table 1

summarizes the potential effects of the alternatives on the natural and cultural resource areas evaluated in detail in the Environmental Assessment (EA). Table 2 compares the potential impacts of either reattaching utility lines to the bridge, similar to the current configuration, or using horizontal directional drilling or similar technique to bore utilities well below the existing creek bed and wetland areas.

All action alternatives would result in impacts on wetlands, an increase in impervious surface, unavoidable construction within the Gambo Creek floodplain, and potential impacts on cultural resources. In addition, Gambo Creek Bridge is adjacent to several installation restoration sites. Any fill within jurisdictional wetlands will be permitted and mitigated in accordance with Section 404 of the Clean Water Act. The Navy will also preserve and restore as much of the 100-year floodplain as possible, per Executive Order 11988. The Navy is consulting with the State Historic Preservation Officer regarding a Phase III Work Plan and Memorandum of Agreement for demolition of the bridge (Alternatives 1 and 2), which is a contributing element to a historic district, and impacts on an archaeological site.

Coastal Zone Enforceable Policies

The Virginia Coastal Zone Management Program contains nine enforceable policies. Attachment A presents each of the enforceable policies and the applicability of the Proposed Action to those policies.

Conclusion

Based upon these and other findings in the EA (see also Tables 1 and 2 in Attachment B for a summary of anticipated impacts), the Navy finds that the replacement of the Gambo Creek Bridge at NSF Dahlgren, Dahlgren, Virginia, is consistent to the maximum extent practicable with the enforceable policies of the Virginia Coastal Zone Management Program.

Pursuant to 15 CFR 930.41, the Virginia Coastal Zone Management Program has 60 days from the receipt of this letter in which to concur with or object to this Consistency Determination, or to request an extension under 15 CFR section 930.41(b). Virginia's concurrence will be presumed if its response is not received by the Navy on the 60th day from receipt of this determination. The State's response should be sent via mail to Jeffrey Bossart, PWD South Potomac, 18329 Thompson Road, Suite 226, Washington Navy Yard, Dahlgren, Virginia 22448-5110.

ATTACHMENT A: PROPOSED ACTION'S EFFECT ON COASTAL ZONE ENFORCEABLE POLICIES

Enforceable Policies	Federally Proposed Action's Effect
<p>Fisheries Management</p> <p>The program stresses the conservation and enhancement of finfish and shellfish resources and the promotion of commercial and recreational fisheries to maximize food production and recreational opportunities. This program is administered by the Marine Resources Commission (MRC) (Virginia Code §28.2-200 through §28.2713) and the Department of Game and Inland Fisheries (DGIF) (Virginia Code §29.1-100 through §29.1-570).</p> <p>The State Tributyltin (TBT) Regulatory Program has been added to the Fisheries Management program. The General Assembly amended the Virginia Pesticide Use and Application Act as it related to the possession, sale, or use of marine antifoulant paints containing TBT. The use of TBT in boat paint constitutes a serious threat to important marine animal species. The TBT program monitors boating activities and boat painting activities to ensure compliance with TBT regulations promulgated pursuant to the amendment. The MRC, DGIF, and Virginia Department of Agriculture and Consumer Services share enforcement responsibilities (Virginia Code §3.1-249.59 through §3.1-249.62).</p>	<p>Minor Effect</p> <p>Essential fish habitat for life stages of several species may occur in the vicinity of the Gambo Creek Bridge based on salinity and proximity to the Potomac River: juvenile/adult bluefish (<i>Pomatomus saltatrix</i>), juvenile/adult summer flounder (<i>Paralichthys dentatus</i>), egg/larvae/juvenile/adult red hake (<i>Urophycis chuss</i>), and juvenile windowpane flounder (<i>Scophthalmus aquosus</i>). No habitat areas of particular concern are present.</p> <p>Essential fish habitat in the vicinity of the project area is for highly mobile species and life stages, except for egg and larval red hake. Juvenile and adult fish could avoid construction noise and general disturbances within the project area. The Navy would implement appropriate best management practices in accordance with regulations and ongoing consultation with NOAA Fisheries to reduce the potential impact of construction noise on fish. During construction, best management practices and minimization measures would be implemented on-land and in-water to minimize the effects of turbidity on essential fish habitat.</p> <p>Implementation of the Proposed Action under any of the action alternatives would not be expected to have long-term impacts on finfish or shellfish resources, or adversely affect ongoing conservation or enhancement measures that promote fishery resources.</p> <p>No paints containing tributyltin would be used under this Proposed Action.</p>

Enforceable Policies	Federally Proposed Action's Effect
<p>Subaqueous Lands Management</p> <p>The management program for subaqueous lands establishes conditions for granting or denying permits to use state-owned bottomlands based on considerations of potential effects on marine and fisheries resources, wetlands, adjacent or nearby properties, anticipated public and private benefits, and water quality standards established by the DEQ Water Division. The program is administered by the MRC (Virginia Code §28.2-1200 through §28.2-1213)</p>	<p>No Effect</p> <p>None of the action alternatives would involve any encroachment in, on, or over state-owned subaqueous lands.</p>
<p>Wetlands Management</p> <p>The purpose of the wetlands management program is to preserve tidal wetlands, prevent their despoliation, and accommodate economic development in a manner consistent with wetlands preservation. (i) The tidal wetlands program is administered by the MRC (Virginia Code §28.2-1301 through §28.2-1320).</p> <p>The Virginia Water Protection Permit program administered by the DEQ includes protection of wetlands --both tidal and non-tidal. This program is authorized by Virginia Code § 62.1-44.15.5 and the Water Quality Certification requirements of §401 of the Clean Water Act of 1972.</p>	<p>Minor Effect</p> <p>The Proposed Action would unavoidably span Gambo Creek and associated estuarine subtidal and intertidal wetlands. Short-term disturbances of wetlands are estimated to affect all of the action alternatives and would, conservatively, include as much as 63,860 square feet under Alternative 1; 75,520 square feet under Alternative 2; and 70,193 square feet under Alternative 3. Indirect impacts would be minimized through stormwater management practices and structures as well as implementation of an erosion and sediment control plan. Construction disturbance would be short term and minor.</p> <p>Bridge designs have not been finalized, but the Navy will apply for permits and mitigate any discharge of fill material within jurisdictional wetlands associated with the construction of new abutments and aprons for the proposed bridge in accordance with Section 404 of the Clean Water Act.</p>

Enforceable Policies	Federally Proposed Action's Effect
<p>Dunes Management</p> <p>Dune protection is carried out pursuant to the Coastal Primary Sand Dune Protection Act and is intended to prevent destruction or alteration of primary dunes. This program is administered by the Marine Resources Commission (Virginia Code §28.2-1400 through §28.2-1420).</p>	<p>No Effect</p> <p>None of the alternatives would affect sand dunes; no sand dunes are located on NSF Dahlgren.</p>
<p>Non-point Source Pollution Control</p> <p>Virginia's Erosion and Sediment Control Law requires soil-disturbing projects to be designed to reduce soil erosion and to decrease inputs of chemical nutrients and sediments to the Chesapeake Bay, its tributaries, and other rivers and waters of the Commonwealth. This program is administered by the Department of Conservation and Recreation (DCR) (Virginia Code §10.1-560 <u>et seq.</u>).</p>	<p>Minor Effect</p> <p>The Proposed Action under any of the action alternatives would result in construction that exceeds 1 acre, requiring a General Permit for Stormwater on Construction Sites. As a component of the General Permit, the construction contractor would develop a stormwater pollution prevention plan (SWPPP) to address stormwater during construction, including erosion and sediment control. The permit also requires the contractor to regularly inspect stormwater discharges from construction at the site to ensure that BMPs are controlling the discharge of pollutants to the maximum extent practicable and are meeting water quality standards. Use of erosion and sediment control practices during the construction phase would minimize adverse impacts from non-point source pollution on surface water bodies.</p>

Enforceable Policies	Federally Proposed Action's Effect
<p>Point Source Pollution Control</p> <p>The point source program is administered by the State Water Control Board pursuant to Virginia Code §62.1-44.15. Point source pollution control is accomplished through the implementation of the National Pollutant Discharge Elimination System (NPDES) permit program established pursuant to §402 of the federal Clean Water Act and administered in Virginia as the VPDES permit program. The Water Quality Certification requirements of §401 of the Clean Water Act of 1972 is administered under the Virginia Water Protection Permit program.</p>	<p>No Effect</p> <p>Following construction, which would require permit coverage for construction activities, no new point sources of pollution are associated with the Proposed Action under any of the alternatives. The new bridge would comply with all post-development stormwater requirements associated with increases in impervious surfaces.</p>
<p>Shoreline Sanitation</p> <p>The purpose of this program is to regulate the installation of septic tanks, set standards concerning soil types suitable for septic tanks, and specify minimum distances that tanks must be placed away from streams, rivers, and other waters of the Commonwealth. This program is administered by the Department of Health (Virginia Code §32.1-164 through §32.1-165).</p>	<p>No Effect</p> <p>None of the alternatives would result in the installation of septic tanks along shorelines.</p>
<p>Air Pollution Control</p> <p>The program implements the federal Clean Air Act to provide a legally enforceable State Implementation Plan for the attainment and maintenance of the National Ambient Air Quality Standards. This program is administered by the State Air Pollution Control Board (Virginia Code §10.1-1300 through 10.1-1320).</p>	<p>Minor Effect</p> <p>Construction activities under any of the action alternatives would generate short-term, minor emissions of criteria pollutants while equipment is operating. These emissions would represent only a minor increase in regional emissions and would not be significant. No changes in long-term emissions would be expected. No violations of National Ambient Air Quality Standards would occur.</p>

Enforceable Policies	Federally Proposed Action's Effect
<p>Coastal Lands Management</p> <p>This program is a state-local cooperative program administered by the DCR's Division of Stormwater Management – Local Implementation (previously the Division of Chesapeake Bay Local Assistance) and 88 localities in Tidewater, Virginia established pursuant to the Chesapeake Bay Preservation Act; Virginia Code §§ 10.1-2100 through 10.1-2114 and Chesapeake Bay Preservation Area Designation and Management Regulations; Virginia Administrative code 9 VAC10-20-10 <u>et seq.</u></p>	<p>Minor Effect</p> <p>All alternative sites under the Proposed Action are within Resource Protection Areas associated with Gambo Creek and surrounding tidal wetlands.</p> <p>Since the new bridge is needed to replace (or supplement, under Alternative 3) an existing bridge across Gambo Creek, the bridge is inherently a water-dependent use, which is an allowable use so long as it does not conflict with the King George Comprehensive Plan, complies with performance criteria (which are defined in 9 Virginia Administrative Code 25-830-130), locates non-water-dependent uses outside the Resource Protection Area, and provides minimum disturbance necessary (9 Virginia Administrative Code 25-830-140 1 b). The Navy has prepared an EA, which contains detailed analyses on water resources; as bridge design progresses, the Navy will obtain all permits and comply with permit conditions for the protection of sensitive resources as discussed under preceding enforceable policies.</p>

ATTACHMENT B: IMPACT SUMMARY TABLES

Table 1 Summary of Potential Impacts on Resource Areas for No Action Alternative, Alternative 1, Alternative 2, and Alternative 3

<i>Resource Area</i>	<i>No Action Alternative</i>	<i>Alternative 1: Existing Bridge Alignment (Preferred Alternative)</i>	<i>Alternative 2: Southern Bridge Alignment</i>	<i>Alternative 3: Parallel Bridge Alignment</i>
Air Quality	Minor regional increases from growth in the county. No significant impacts.	Short-term, minor emissions from the operation of heavy equipment during site preparation, construction, and demolition activities. No increases in the long term. No significant impacts.	Short-term, minor emissions from the operation of heavy equipment during site preparation, construction, and demolition activities. No increases in the long term. No significant impacts.	Short-term, minor emissions from the operation of heavy equipment during site preparation, construction, and demolition activities. No increases in the long term. No significant impacts.
Water Resources	No change in baseline conditions. No significant impacts.	Short-term, minor impacts on jurisdictional wetlands and water bodies from construction disturbance. Final bridge designs would likely result in fill within the jurisdictional wetland to construct new abutments and bridge apron. Any fill within jurisdictional wetlands would be permitted and mitigated in accordance with Section 404 of the Clean Water Act. With mitigations and Section 404 permitting for impacts on jurisdictional wetlands, no significant impacts.	Similar to Alternative 1, but with increased impacts on jurisdictional wetlands and surface waters due to the larger footprint. With mitigations and Section 404 permitting for impacts on jurisdictional wetlands, no significant impacts.	Similar to Alternative 1, but with increased impacts on jurisdictional wetlands and surface waters due to the larger footprint. With mitigations and Section 404 permitting for impacts on jurisdictional wetlands, no significant impacts.
Geological Resources	No change in baseline conditions. No significant impacts.	Long- and short-term, minor effects on geological resources from increase in impervious surface and construction. No significant impacts.	Long- and short-term, minor effects on geological resources from increase in impervious surface and construction. No significant impacts.	Long- and short-term, minor effects on geological resources from increase in impervious surface and construction. No significant impacts.

<i>Resource Area</i>	<i>No Action Alternative</i>	<i>Alternative 1: Existing Bridge Alignment (Preferred Alternative)</i>	<i>Alternative 2: Southern Bridge Alignment</i>	<i>Alternative 3: Parallel Bridge Alignment</i>
Cultural Resources	Long-term, minor, adverse effect to the Dahlgren Mainside Historic District due to bridge deterioration. No significant impacts.	Long-term, minor, adverse effect on the bridge and Dahlgren Mainside Historic District due to demolition, and construction of wider bridge that would affect Site 44KG0157. Navy is preparing a Phase III Work Plan for Site 44KG0157 and the eastern side of bridge and a Memorandum of Agreement in consultation with the State Historic Preservation Officer. No significant impacts with execution of mitigation measures.	Long-term, minor, adverse effect on the bridge and Dahlgren Mainside Historic District due to demolition, and construction of wider bridge that would destroy Site 44KG0157. Navy is preparing a Phase III Work Plan for Site 44KG0157 and the eastern side of bridge and a Memorandum of Agreement in consultation with the State Historic Preservation Officer. No significant impacts with execution of mitigation measures.	Beneficial effects on the bridge due to planned repairs of the bridge. Long-term, minor, adverse effect from the construction of a second bridge that would affect Site 44KG0157. Navy is preparing a Phase III Work Plan for Site 44KG0157 and the eastern side of bridge and a Memorandum of Agreement in consultation with the State Historic Preservation Officer. No significant impacts with execution of mitigation measures.

<i>Resource Area</i>	<i>No Action Alternative</i>	<i>Alternative 1: Existing Bridge Alignment (Preferred Alternative)</i>	<i>Alternative 2: Southern Bridge Alignment</i>	<i>Alternative 3: Parallel Bridge Alignment</i>
Biological Resources	No change in baseline conditions. No significant impacts.	Short-term, negligible impacts on terrestrial wildlife, Atlantic and shortnose sturgeon, bald eagle, northern long-eared bat, tri-colored bat, little brown bat, and peregrine falcon; these resources would be only temporarily or indirectly affected, if at all, during construction activities. Short-term, minor impacts on vegetation, aquatic habitats, submerged aquatic vegetation, alewife, blueback herring, red hake, and monarch butterfly; these resources could occur within the project area and be affected by construction but affected habitat and duration would be minor. No significant impacts.	Short-term, negligible impacts on Atlantic and shortnose sturgeon, northern long-eared bat, tri-colored bat, little brown bat, and peregrine falcon; these resources would be only temporarily or indirectly affected, if at all, during construction activities. Short-term, minor impacts on aquatic habitats, submerged aquatic vegetation, alewife, blueback herring, red hake, and bald eagle; these resources could occur within the project area and be affected by construction but affected habitat and duration would be minor. Long-term, negligible impacts on vegetation, terrestrial wildlife, and monarch butterfly. No significant impacts.	Short-term, negligible impacts on Atlantic and shortnose sturgeon, northern long-eared bat, tri-colored bat, little brown bat, and peregrine falcon; these resources would be only temporarily or indirectly affected, if at all, during construction activities. Short-term, minor impacts on submerged aquatic vegetation, alewife, and blueback herring, and red hake; these resources could occur within the project area and be affected by construction but affected habitat and duration would be minor. Long-term, negligible impacts on bald eagle and terrestrial wildlife. Long-term minor impacts on vegetation, aquatic habitats, and monarch butterfly. No significant impacts.
Infrastructure	Ongoing minimal maintenance could result in bridge closure and loss of utility services. Major impacts are possible.	Minor, short-term impacts on utility service. Long-term beneficial effects from a safer, more reliable bridge. No significant impacts.	Minor, short-term impacts on utility service; possible relocation of communications panels or lines. Long-term beneficial effects from a safer, more reliable bridge. No significant impacts.	Minor, short-term impacts on utility service; possible relocation of communications panels or lines. Improvements over No Action for long-term safety and reliability, but less beneficial than Alternatives 1 or 2. No significant impacts.

<i>Resource Area</i>	<i>No Action Alternative</i>	<i>Alternative 1: Existing Bridge Alignment (Preferred Alternative)</i>	<i>Alternative 2: Southern Bridge Alignment</i>	<i>Alternative 3: Parallel Bridge Alignment</i>
Hazardous Materials and Wastes	Continued operation with existing management plans and policies that govern hazardous materials and wastes. No significant impact.	Short-term impacts associated with increased use of hazardous materials and generation of hazardous wastes. Demolished bridge components may contain special hazards; wastes would be characterized and disposed of appropriately. Short-term potential to encounter hazards associated with the active range and contamination from Installation Restoration Site 001; surveys and clearing/remediation prior to beginning construction activities would occur. No significant impacts.	Similar to but greater than Alternative 1 because of the larger project site, which increases use of hazardous materials and generation of hazardous waste, and the potential to encounter munitions-related hazards and contamination. No significant impacts.	Similar to but slightly less than Alternative 2 because the bridge would not be demolished, which decreases potential for hazardous waste or special hazards. No significant impacts.

Table 2 Summary of Potential Impacts on Resource Areas for Options for Bridge Utilities

<i>Resource Area</i>	<i>Option A: Aboveground Utilities</i>	<i>Option B: Underground Utilities</i>
Air Quality	Negligible emissions during utility installation. No significant impacts when combined with any of the action alternatives described in Table 1.	Short-term, negligible-to-minor emissions from trenching and drilling equipment and associated fugitive dust during construction. No significant impacts when combined with any of the action alternatives described in Table 1.
Water Resources	Short-term, minor impacts on water resources. No significant impacts when combined with any of the action alternatives described in Table 1.	Short-term, minor impacts on water resources. Trenching and drilling for utilities would occur outside of and below wetlands. No significant impacts when combined with any of the action alternatives described in Table 1.
Geological Resources	Negligible impacts during construction. No significant impacts when combined with any of the action alternatives described in Table 1.	Short-term, minor impacts during construction. No significant impacts when combined with any of the action alternatives described in Table 1.
Cultural Resources	No adverse effects; no significant impacts when combined with any of the action alternatives described in Table 1.	If trenching or drilling for utilities avoids known archaeological sites, there is no need for mitigation measures. No significant impacts when combined with any of the action alternatives described in Table 1.
Biological Resources	Short-term, negligible impacts on biological resources. No significant impacts when combined with any of the action alternatives described in Table 1.	Short-term, negligible impacts on biological resources. No significant impacts when combined with any of the action alternatives described in Table 1.
Infrastructure	Minor, short-term impacts on utility service. No significant impacts when combined with any of the action alternatives described in Table 1.	Minor, short-term impacts on utility service. No significant impacts when combined with any of the action alternatives described in Table 1.
Hazardous Materials and Wastes	Negligible additional impacts when combined with any of the action alternatives described in Table 1.	Minor additional impacts from increased potential for munitions-related hazards and contamination. No significant impacts when combined with any of the action alternatives described in Table 1.

ATTACHMENT C: FIGURES

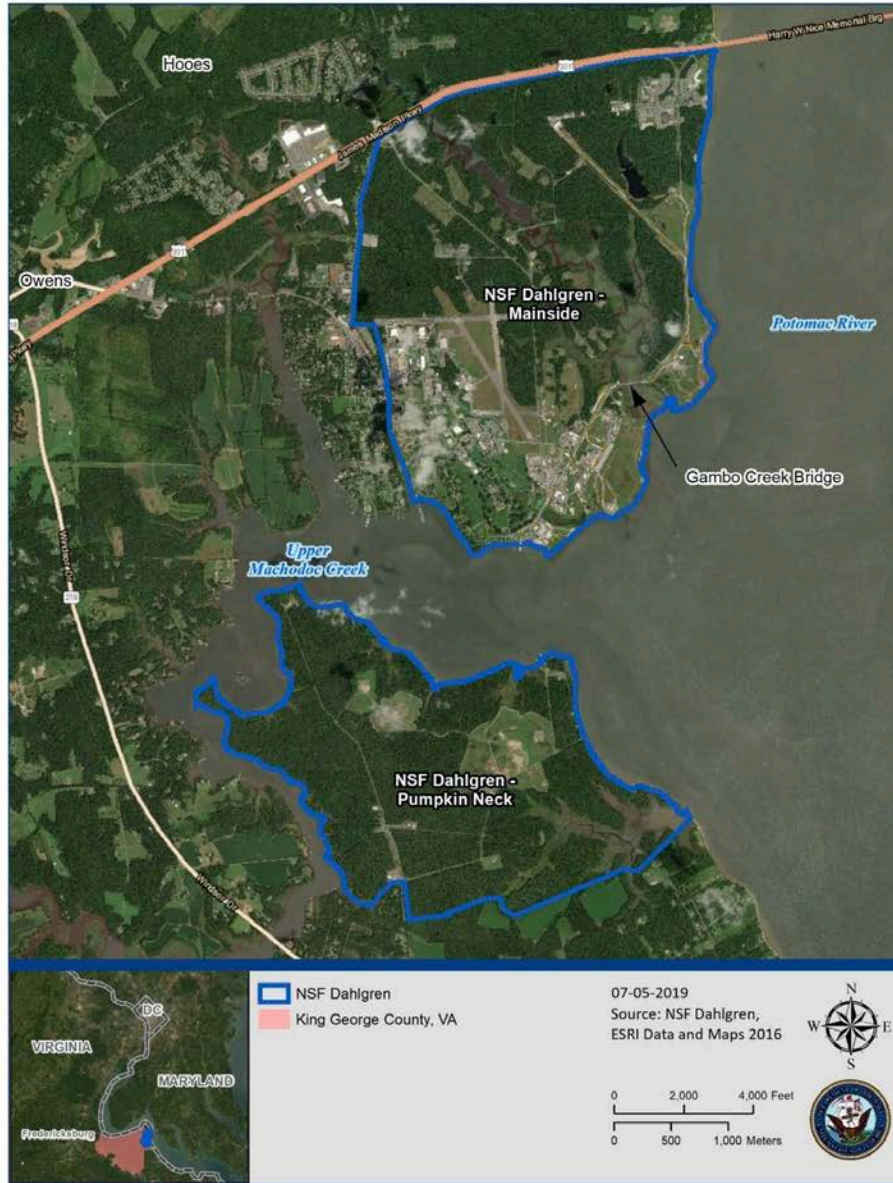


Figure 1 Naval Support Facility Dahlgren Location Map

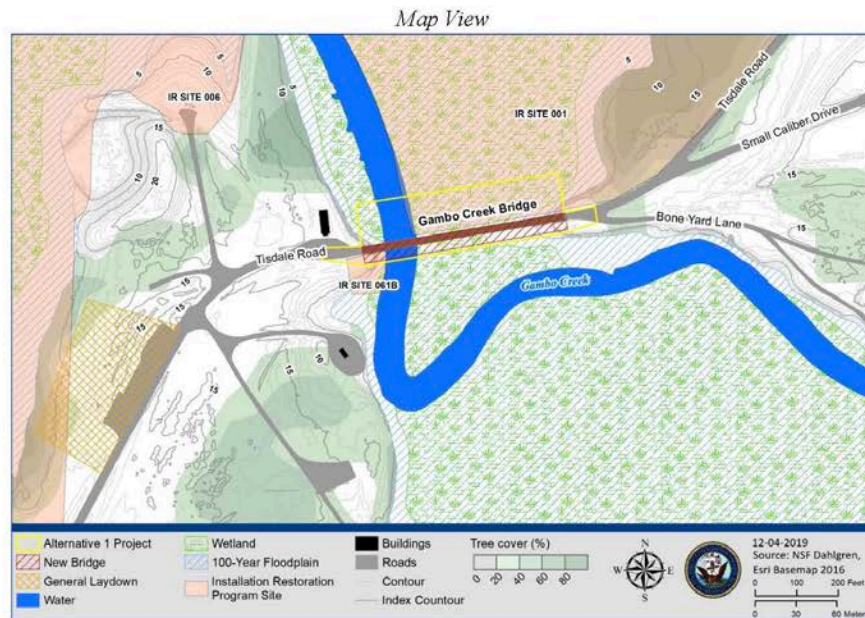


Figure 2 Alternative 1 (Existing) Alignment—Preferred Alternative

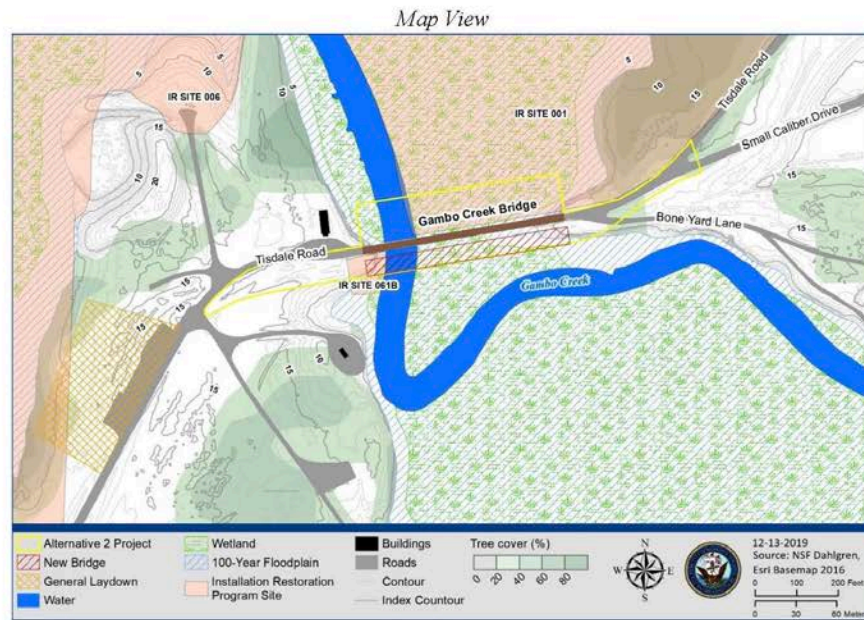


Figure 3 Alternative 2 (Southern) Alignment

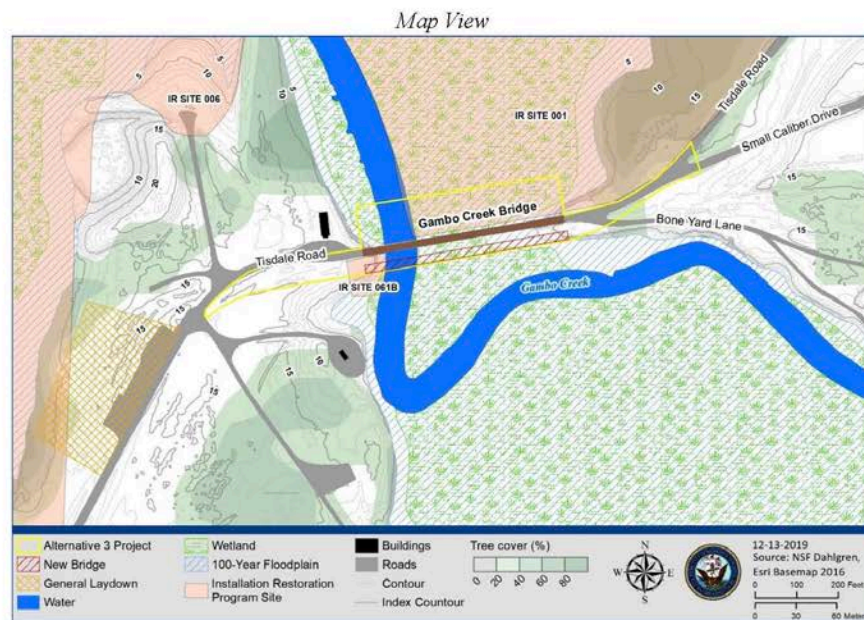


Figure 4 Alternative 3 (Parallel) Alignment

Appendix C

Air Quality Emissions Calculations

List of Air Quality Tables

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Air Quality Emissions Calculations

Project Introduction

The Navy proposed to provide a bridge to carry Tisdale Road traffic over Gambo Creek at Naval Support Facility (NSF) Dahlgren. Refer to Chapters 1 and 2 of the Environmental Assessment for more detailed information pertaining to this project's purpose, need, and detailed Proposed Action, including specifics regarding the three action alternatives being considered.

For the purposes of this air quality assessment, only Alternative 2, the Southern Bridge Alignment, is quantitatively estimated as Alternative 2 is believed to be representative of the maximum project emissions based on general construction and demolition activity. While Alternative 2 and Alternative 3 include comparable project areas, Alternative 3 does not include the bridge demolition activities that are part of Alternative 2. If either Alternative 1 or Alternative 3 were selected, estimated air emissions would be expected to be comparable to but slightly less than Alternative 2. The construction activities in Table 2-1 of the EA form the basis for estimating construction equipment operations and fugitive dust. Construction activities could begin in fiscal year 2021 and are anticipated to last approximately two years.

The Navy is also considering the option of installing utility lines on the bridge (Option A), or installing utility lines underground (Option B). Option A would be expected to require minimal, if any, trenching during construction. This analysis assumes that if Option A is selected, reinstalling utility lines on the bridge across Gambo Creek would be done concurrent with other bridge work and generate negligible additional emissions. If Option B is selected, it is assumed this work would require trenching or boring underground approximately 3,950 linear feet of utilities, with an approximate three-foot right-of-way, in addition to the emissions from general construction and/or demolition activities.

Once construction is complete, long-term operations from the new bridge would be comparable to existing conditions. The proposed bridge would have no new or modified operational air sources. No long-term changes in air emissions would occur.

King George County, Virginia, within which NSF Dahlgren is located, is in attainment for all criteria pollutants (USEPA, 2019). Therefore, an applicability analysis for a General Conformity Determination pursuant to the Clean Air Act is not required for this project.

Construction Emissions

Emissions resulting from the Proposed Action were estimated based on the expected number, type, and duration of construction operations to complete the Proposed Action. Construction emissions would result from the operation of heavy equipment, delivery trucks, and construction workers. The project would require a mix of construction equipment that would vary as the construction activity progresses. To estimate emissions, methodologies were used based on the kind of equipment (which all have varying rates of criteria pollutant emissions, referred to as emissions factors), and either the average time to complete the work or the average distance traveled. Nonroad emissions are those from the construction equipment operating immediately at the project site (including tractors, loaders, backhoes, graders, dozers, forklifts, cranes, and rollers). Onroad emissions are those that come to and leave the site via the road network on a more frequent basis (including heavy delivery trucks, concrete trucks, dump trucks, and passenger trucks from construction workers).

Nonroad Emissions from Construction Equipment

Conservative construction equipment assumptions were developed based on review of other projects. Emissions factors for nonroad equipment (fleet year 2021) were estimated using composite emissions factors. Table C-1 and Table C-2 contain the emissions factors and operating hours assumptions and the total estimated emissions for nonroad construction equipment, respectively.

Onroad Emissions from Construction Equipment

Conservative construction equipment assumptions were developed based on a review of other projects. Emissions factors for onroad equipment (2021 fleet year) were estimated using composite emissions factors. Table C-3 and Table C-4 show the emissions factors and vehicle miles traveled assumptions and the total estimated emissions for onroad construction equipment, respectively.

Fugitive Dust Emissions

Fugitive dust occurs directly from vehicles disturbing and suspending particulate matter while operating on unpaved surfaces, or from soil stockpiles on an active construction site; it also occurs indirectly from dust and dirt being brought onto paved surfaces from nonroad construction operations, and then disturbed and suspended as onroad vehicles drive over it. A conservative empirical estimate for fugitive dust was used for this analysis; actual fugitive dust emissions would likely be lower as they are directly proportional to the amount of activity that is being worked. Higher activity days have greater potential for generating fugitive dust than lower activity days that do not involve equipment actively disturbing the site; this analysis assumes that 50 percent of the site would be uncovered and worked at any given time during construction. Fugitive dust controls would be implemented; this analysis assumes an 80 percent fugitive dust control efficiency. See estimates and notes in Table C-5.

Option B Emissions

Trenching or boring of underground utilities would result in fugitive dust and criteria pollutant emissions similar to those described for general construction activities. Similar equipment and operations were used in estimating direct emissions from equipment operations and fugitive dust. See estimates and notes in Table C-6.

Results and Conclusion

Total estimated construction emissions from Alternative B and the Option B emissions for underground utilities are shown in Table C-7, compared with King George County's emissions. The total short-term construction emissions represent minor increases (less than one percent for each criteria pollutant) in regional air emissions, which is overly conservative as the construction emissions would occur over two years. No significant impacts on air quality would occur.

Table C-1 Nonroad Construction Equipment Emissions Factors and Operating Hours Assumptions (Fleet Year 2021)

<i>Equipment Description</i>	<i>Total Operating Hours</i>	<i>NO_x (lb/hr)</i>	<i>ROG (lb/hr)</i>	<i>CO (lb/hr)</i>	<i>SO_x (lb/hr)</i>	<i>PM (lb/hr)</i>
Site Preparation						
Tractors/Loaders/Backhoes Composite	672	0.251	0.041	0.361	0.001	0.011
Graders Composite	672	0.521	0.086	0.575	0.001	0.025
Rubber Tired Dozers Composite	672	1.466	0.202	0.766	0.002	0.058
Demolition						
Rubber Tired Dozers Composite	672	1.466	0.202	0.766	0.002	0.058
Excavators Composite	672	0.358	0.069	0.511	0.001	0.016
Tractors/Loaders/Backhoes Composite	672	0.251	0.041	0.361	0.001	0.011
Forklifts Composite	672	0.146	0.029	0.215	0.001	0.006
Construction						
Tractors/Loaders/Backhoes Composite	2,520	0.251	0.041	0.361	0.001	0.011
Forklifts Composite	2,520	0.146	0.029	0.215	0.001	0.006
Cranes Composite	5,040	0.603	0.085	0.387	0.001	0.023
Generator Sets Composite	2,520	0.298	0.036	0.271	0.001	0.013
Miscellaneous						
Rollers Composite	336	0.348	0.054	0.382	0.001	0.021
Paving Equipment Composite	336	0.446	0.071	0.406	0.001	0.029
Other Construction Equipment Composite	168	0.312	0.053	0.350	0.001	0.012

Source: SCAQMD, 2018.

Key: NO_x = nitrogen oxides; ROG = reactive organic gases (= volatile organic compounds); CO = carbon monoxide; SO_x = sulfur oxides; PM = particulate matter; lb = pounds; hr = hour.

Note: Particulate matter is estimated to be 10 microns with 92 percent of that fraction being less than 2.5 microns in diameter.

Table C-2 Construction: Total Estimated Emissions from Nonroad Equipment

<i>Activity</i>	<i>NO_x</i>	<i>VOC</i>	<i>CO</i>	<i>SO₂</i>	<i>PM₁₀</i>	<i>PM_{2.5}</i>
Total Nonroad Construction Emissions (tons)	4.1	0.6	3.4	0.01	0.2	0.2

Source: SCAQMD, 2018.

Key: NO_x = nitrogen oxides; VOC = volatile organic compounds; CO = carbon monoxide; SO₂ = sulfur dioxide; PM₁₀ = suspended particulate matter less than or equal to 10 microns in diameter; PM_{2.5} = fine particulate matter less than or equal to 2.5 microns in diameter.

Notes:

¹ Emissions (tons) = emissions factor (pounds/hour) × total hours operated × 1 ton/2,000 pounds, for each kind of equipment.

Example: Nonroad NO_x emissions = [(672 hr × 0.251 lb/hr) + (672 hr × 0.521 lb/hr) + (672 hr × 1.466 lb/hr) + (672 hr × 1.466 lb/hr) + (672 hr × 0.358 lb/hr) + (672 hr × 0.251 lb/hr) + (672 hr × 0.146 lb/hr) + (2,520 hr × 0.251 lb/hr) + (2,520 hr × 0.146 lb/hr) + (5,040 hr × 0.603 lb/hr) + (2,520 hr × 0.298 lb/hr) + (336 hr × 0.348 lb/hr) + (336 hr × 0.446 lb/hr) + (168 hr × 0.312 lb/hr)] × 1 ton/2,000 lb = 4.1 tons NO_x.

² For PM_{2.5}, the emissions factor was multiplied by 0.92 to obtain the PM_{2.5} fraction of total particulate matter.

Table C-3 Onroad Construction Equipment Emissions Factors and Vehicle Miles Traveled Assumptions (Fleet Year 2021)

<i>Equipment Description</i>	<i>VMT</i>	<i>NO_x</i> <i>(lb/mi)</i>	<i>ROG</i> <i>(lb/mi)</i>	<i>CO</i> <i>(lb/mi)</i>	<i>SO_x</i> <i>(lb/mi)</i>	<i>PM₁₀</i> <i>(lb/mi)</i>	<i>PM_{2.5}</i> <i>(lb/mi)</i>
Site Preparation, Construction Materials Delivery, Construction & Demolition Waste Removal: Heavy-Duty Diesel Truck (33,001+ lb) ¹	554,400	0.0118	0.001	0.005	0.00004	0.0006	0.0005
Passenger Vehicles, Gasoline ²	64,890	0.0004	0.0005	0.0040	0.00001	0.0001	0.0001

Sources: SCAQMD, 2008a, 2008b.

Key: NO_x = nitrogen oxides; ROG = reactive organic gases (=volatile organic compounds); CO = carbon monoxide; SO_x = sulfur oxides; PM₁₀ = particulate matter less than 10 microns in diameter; PM_{2.5} = particulate matter less than 2.5 microns in diameter; VMT = vehicle miles traveled; lb = pounds; mi = mile.

Notes:

¹ VMT = 20 trucks per day × 50 miles per day × 504 days of construction (this is a conservative approximation).

² VMT = 4 workers per day × 30 miles per day × 504 days of construction.

Table C-4 Construction: Total Estimated Emissions from Onroad Equipment

<i>Activity</i>	<i>NO_x</i>	<i>VOC</i>	<i>CO</i>	<i>SO₂</i>	<i>PM₁₀</i>	<i>PM_{2.5}</i>
Total Onroad Construction Emissions (tons)	3.3	0.29	1.5	0.011	0.17	0.14

Sources: SCAQMD, 2008a, 2008b.

Key: NO_x = nitrogen oxides; VOC = volatile organic compounds; CO = carbon monoxide; SO₂ = sulfur dioxide; PM₁₀ = suspended particulate matter less than or equal to 10 microns in diameter. PM_{2.5} = fine particulate matter less than or equal to 2.5 microns in diameter.

Notes: Emissions (tons) = emissions factor (pounds/hour) × total vehicle miles traveled × 1 ton/2,000 pounds, for each kind of equipment.

Example: Onroad NO_x emissions = [(554,400 mi × 0.0118 lb/mi) + (64,890 mi × 0.0004 lb/mi)] × 1 ton/2,000 lb = 3.28 tons NO_x.

Table C-5 Construction: Emissions from Fugitive Dust Emissions

<i>Activity</i>	<i>PM₁₀</i>	<i>PM_{2.5}</i>
Emissions factor (tons particulate matter/acre/month)	1.2	1.2
Fractional contents of particulate matter by size ¹	59.4%	21.2%
Total Emissions (tons)²	5.9	1.3

Sources: USEPA, 1996; SCAQMD, 2006.

Key: PM₁₀ = suspended particulate matter less than or equal to 10 microns in diameter; PM_{2.5} = fine particulate matter less than or equal to 2.5 microns in diameter.

Notes:

¹ PM₁₀ is assumed to be 59.4 percent of total particulate emissions, and PM_{2.5} is assumed to be 21.2 percent of PM₁₀.

² Construction Emissions PM₁₀ (tons) = 1.2 tons/acre/month × 0.594 × 1.73 acres × 24 months × (1 - 0.8);

Construction Emissions PM_{2.5} (tons) = PM₁₀ emissions in tons × 0.212.

Table C-6 Option B: Emissions from Trenching and Fugitive Dust

Activity	NO_x	VOC	CO	SO₂	PM₁₀	PM_{2.5}
Trenching (tons) ¹	0.04	0.01	0.04	0.0001	0.003	0.002
Fugitive dust (tons) ²	—	—	—	—	0.04	0.01
Total Option B Emissions (tons)	0.04	0.01	0.04	0.0001	0.05	0.01

Sources: SCAQMD, 2018; USEPA, 1996.

Key: NO_x = nitrogen oxides; VOC = volatile organic compounds; CO = carbon monoxide; SO₂ = sulfur dioxide; PM_{2.5} = fine particulate matter less than or equal to 2.5 microns on diameter.

Notes:

¹ One trencher would each operate a total of 168 hours. Emissions (tons) = emissions factor (pounds/hour) × total hours operated × 1 ton/2,000 pounds. Emissions factors for one trencher are 0.433 lb/hr NO_x, 0.087 lb/hr ROG, 0.423 lb/hr CO, 0.001 lb/hr SO_x, and 0.031 lb/hr PM. Refer to Table C-1 and Table C-2 for further information.

² Total area for trenching is estimated at 0.3 acre for a duration of 1 month. Refer to Table C-5 for further information.

Table C-7 Summary of Maximum Criteria Pollutant Emissions: Alternative B and Option B

Activity	NO_x	VOC	CO	SO₂	PM₁₀	PM_{2.5}
Maximum Estimated Emissions, Alternative 2 + Option B (total)	7.4	0.9	5.0	0.02	6.3	1.6
Construction (total tons)	7.4	0.9	5.0	0.02	6.2	1.5
<i>Construction Phase: Nonroad (tons)</i>	4.1	0.6	3.4	0.01	0.2	0.2
<i>Construction Phase: Onroad (tons)</i>	3.3	0.29	1.5	0.011	0.17	0.14
<i>Construction Phase: Fugitive Dust (tons)</i>	—	—	—	—	5.9	1.3
Total Option B Emissions (tpy)	0.04	0.01	0.04	0.0001	0.05	0.01
<i>Trenching (tons)</i>	0.04	0.01	0.04	0.0001	0.003	0.002
<i>Fugitive Dust (tons)</i>	—	—	—	—	0.04	0.01
Regional Emissions Inventory (Fiscal Year 2017, tons)	1,273	5,455	4,830	158	1,512	305
Maximum Emissions as a Percentage of Regional Air Emissions	0.6%	0.02%	0.1%	0.01%	0.4%	0.5%

Key: VOC = volatile organic compound; CO = carbon monoxide; NO_x = nitrogen oxides; SO₂ = sulfur dioxide; PM₁₀ = suspended particulate matter less than or equal to 10 microns in diameter; PM_{2.5} = fine particulate matter less than or equal to 2.5 microns in diameter; tpy = tons per year.

Note: Emissions may not total precisely due to rounding.

References

- SCAQMD. (2006). *Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM2.5 Significance Thresholds*.
- SCAQMD. (2008a, April 23). *On-Road Vehicles (Scenario Years 2007-2026) (xls file)*. Retrieved from Off-Road - Model Mobile Source Emission Factors: EMFAC 2007 (v2.3) Emission Factors: [http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/emfac-2007-\(v2-3\)-emission-factors-\(on-road\)](http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/emfac-2007-(v2-3)-emission-factors-(on-road))
- SCAQMD. (2008b, April 23). *Heavy-Heavy-Duty On-road Vehicles (Scenario Years 2007 – 2026) (xls file)*. Retrieved from Off-Road - Model Mobile Source Emission Factors: [http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/emfac-2007-\(v2-3\)-emission-factors-\(on-road\)](http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/emfac-2007-(v2-3)-emission-factors-(on-road))
- SCAQMD. (2018). *Off-road Mobile Source Emission Factors (Scenario Years 2007 – 2025) (xls file)*. Retrieved from Off-Road - Model Mobile Source Emission Factors: <http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/off-road-mobile-source-emission-factors>
- USEPA. (1996). Chapter 13.2.3 Heavy Construction Operations. In *AP-42, Volume I*. USEPA, Office of Air and Radiation.
- USEPA. (2014). *2014 National Emissions Inventory (NEI) Data*. Retrieved June 22, 2018, from Air Emissions Inventories: <https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data>
- USEPA. (2019, January 31). *Virginia Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants*. Retrieved February 8, 2019, from Green Book: https://www3.epa.gov/airquality/greenbook/anayo_va.html