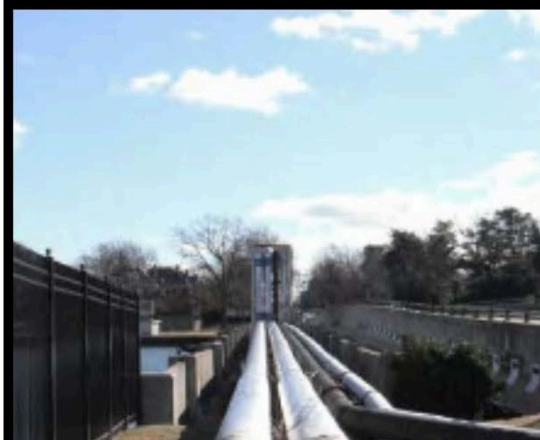
FINAL

ENVIRONMENTAL ASSESSMENT



Utility Bridge Replacement

Naval Support Activity Annapolis

Annapolis, Maryland

August 2022

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Abstract

Designation:	Environmental Assessment
Title of Proposed Action:	Utility Bridge Replacement
Project Location:	Naval Support Activity Annapolis, Maryland
Lead Agency for the EA:	Department of the Navy
Affected Region:	Annapolis, Maryland
Action Proponent:	Naval Support Activity Annapolis
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Date:	August 2022

The Department of the Navy is preparing 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. The Proposed Action would replace the utility bridge at College Creek at Naval Support Activity (NSA) Annapolis. Specifically, the Proposed Action includes construction of a new utility bridge, connection of new utility lines, and demolition and removal of the existing bridge. This project would incorporate a system for personnel to safely access the new structure to conduct inspections, maintenance, and repairs. In addition, an underground utility option will be analyzed per alternative. Under this option, all utilities would be installed underground via directional boring in the banks of College Creek, except for one utility line. The existing bridge is aging with multiple failed components and other components in critical need of repair related to the piles, support beams, reinforcements, and surface coatings. This EA evaluates in detail the potential environmental impacts associated with three action alternatives and the No Action Alternative on the following resource areas: air quality, water resources, geological resources, cultural resources, biological resources, noise, infrastructure, public health and safety, and hazardous materials and wastes.

[1] The previous email address used to receive comments during the Draft EA public review period has been updated with internal IT updates.

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Executive Summary

ES.1 Proposed Action

The Department of the Navy (Navy) proposes to replace the utility bridge at College Creek at Naval Support Activity (NSA) Annapolis. The utility bridge carries five utility lines over College Creek between the Upper Yard and the Lower Yard of the U.S. Naval Academy (USNA). If the bridge fails, utility services would be interrupted. The utility bridge is currently in a deteriorated state. The Proposed Action includes construction of a new utility bridge, connection of new utility lines, and demolition and removal of the existing bridge. This project would incorporate a system for personnel to safely access the new structure to conduct inspections, maintenance, and repairs. In addition, an underground utility option will be analyzed per alternative. Under this option, all utilities would be installed underground via directional boring in the banks of College Creek, except for one utility. Construction of the proposed utility bridge is estimated to occur in fiscal year 2026.

ES.2 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to ensure continued utility service to portions of the USNA. The Proposed Action is needed because the current utility bridge is in a severely deteriorated state and requires extensive repair.

The utility bridge carries five utility lines over College Creek between the Upper Yard and the Lower Yard of the USNA. An inspection of the utility bridge in 2019 determined the bridge is in poor condition overall, and numerous deficiencies require correction within 12 months. The 2019 inspection report concluded that the superstructure is in fair condition while the substructure is in poor condition. The inspection report also determined that the lack of catwalks and ladders to provide access for future inspection, maintenance, or repair posed a safety concern. If the bridge fails due to impaired superstructure components, utility services would be interrupted. Sudden failure of the bridge could sever the utility lines that cross College Creek, resulting in a rupture that is capable of damaging nearby infrastructure or natural systems.

ES.3 Alternatives Considered

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

- The bridge abutments must be on Navy property to provide security for military utility services.
- The utility lines need to be near existing infrastructure and utility connections; therefore, the utility bridge should be no further than approximately 350 feet to the northeast of the existing alignment.

The Navy is considering three action alternatives and the No Action Alternative:

- **No Action Alternative:** Under the No Action Alternative, the Proposed Action would not be implemented. Routine maintenance to the bridge would continue, but no major repairs would occur. If the bridge fails, utility services would be interrupted, which could interfere with the training of midshipmen. The worst-case scenario under the No Action Alternative would be a sudden failure of the bridge, possibly severing the utility lines that cross College Creek. Instantaneous ruptures of pressurized lines could be capable of damaging nearby infrastructure or natural systems. Infrastructure systems that cross on the utility bridge have emergency shut off protocols in place to minimize the likelihood for catastrophic damage under this worst-case scenario.

- **Alternative 1:** Under Alternative 1, the proposed utility bridge would be constructed within 50 feet of the existing utility bridge alignment, which is adjacent to the King George Street Bridge. Given that the King George Street Bridge and the installation boundary are directly south of the current utility bridge, the proposed bridge must be located to the northeast of the current utility bridge location. Therefore, under Alternative 1, the bridge could be constructed in any location between the current utility bridge alignment and 50 feet to the northeast. Upon completion of the new utility bridge, the existing bridge would be demolished, and the pile caps would be removed and hauled off-site. Alternative 1 is the Navy's preferred alternative.
- **Alternative 2:** Under Alternative 2, the proposed utility bridge would be constructed within 115 feet of the Decatur Avenue Bridge (Hill Bridge). The utility bridge needs to be situated southwest of the Decatur Avenue Bridge to tie back into utility infrastructure without major realignment. Upon completion of the new utility bridge, the existing bridge would be demolished, and the pile caps would be removed and hauled off-site.
- **Alternative 3:** Under Alternative 3, the proposed utility bridge would be constructed between the locations of Alternatives 1 and 2 (i.e., the remaining approximate 250-foot-width between Alternatives 1 and 2, while also avoiding Hubbard Hall [Building 260] and its associated docks). Upon completion of the new utility bridge, the existing bridge would be demolished, and the pile caps would be removed and hauled off-site.

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

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

The Proposed Action involves in-water demolition and construction, which has the potential to affect sensitive aquatic environments. A Federal Consistency Determination was prepared documenting the Navy's finding that the Proposed Action is consistent to the maximum extent practicable with Maryland's enforceable policies. USNA is a National Historic Landmark and listed on the National Register of Historic Places. Anne Arundel County is in nonattainment for ozone and sulfur dioxide; a conformity applicability analysis and Record of Non-Applicability have been prepared. An essential fish habitat assessment was prepared, and correspondence with the National Marine Fisheries Service identified conservation measures that the Navy will implement to minimize adverse effects on essential fish habitat.

This EA addresses in detail the following resource areas: air quality, water resources, geological resources, cultural resources, biological resources, noise, infrastructure, public health and safety, and hazardous materials and wastes. It does not analyze in detail resources for which potential impacts were considered negligible or nonexistent; these include land use, visual resources, airspace, transportation, socioeconomics, and environmental justice.

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

Table ES-1 summarizes the potential impacts on the resources associated with the No Action Alternative and the action alternatives analyzed in this EA, as well as the underground utility option.

Table ES-1 Summary of Potential Impacts on Resource Areas

Resource Area	*No Action Alternative*	*Alternative 1*	*Alternative 2*	*Alternative 3*	*Underground Utility Option*
Air Quality	Negligible air emissions from ongoing, routine maintenance. Temporary, minor, adverse, localized impacts from airborne dust and debris under a worst-case scenario of bridge failure. No significant impacts.	Similar to but slightly less than Alternative 2. No significant impacts.	Short-term, minor emissions during construction. No significant impacts.	Similar to but slightly less than Alternative 2. No significant impacts.	Short-term, minor emissions from operating boring equipment. No significant impacts, when combined with any of the action alternatives.
Water Resources	Short-term, moderate, adverse impacts from a worst-case scenario of a rupture that results in discharges into College Creek. No significant impacts.	Short-term, minor adverse impacts from construction within College Creek. No long-term impacts. No significant impacts.	Similar to Alternative 1 but slightly greater due to more trenching. No significant impacts.	Similar to Alternative 1. No significant impacts.	Negligible impacts since utilities would be below creek sediment bed. No significant impacts, when combined with any of the action alternatives.
Geological Resources	No change in baseline condition. No significant impacts.	Short-term, minor, adverse effects from soil erosion and sedimentation. Minor, localized changes in topography from bridge construction and demolition. No significant impacts.	Similar to Alternative 1 but slightly greater due to more trenching. No significant impacts.	Similar to Alternative 1. No significant impacts.	Short-term, minor potential for drilling fluid or other fluid to leak into soils. No significant impacts, when combined with any of the action alternatives.

Resource Area	***No Action Alternative***	***Alternative 1***	***Alternative 2***	***Alternative 3***	***Underground Utility Option***
Cultural Resources	Possible direct adverse effects from a worst-case scenario depending on the extent of a rupture. Possible indirect, adverse effects from the worst-case scenario due to the vibrations from a rupture. No significant impacts.	Minor-to-moderate, adverse effects on unknown archaeological deposits due to ground disturbance of the new bridge; a Phase I survey will be completed. No adverse effects on viewsheds in the APE. No adverse effects on the Colonial Annapolis Historic District. No significant impacts.	Minor-to-moderate, adverse effects on unknown archaeological deposits due to ground disturbance of the new bridge; a Phase I survey would be completed. No adverse effects on viewsheds in the APE. No adverse effects on the Colonial Annapolis Historic District. No significant impacts.	Minor-to-moderate, adverse effects on unknown archaeological deposits due to ground disturbance of the new bridge; a Phase I survey would be completed. No adverse effects on viewsheds in the APE. No adverse effects on the Colonial Annapolis Historic District. No significant impacts.	The Navy would follow the Standard Operating Procedure on unanticipated discoveries. No significant impacts, when combined with any of the action alternatives.
Biological Resources	Potential short-term, moderate adverse impacts from a worst-case scenario of a rupture that results in discharges into College Creek. No significant impacts.	Short-term, minor, adverse impacts from construction activity on marine species. The Navy will implement conservation measures during construction to minimize adverse effects on essential fish habitat. No significant impacts.	Similar to Alternative 1. No significant impacts.	Similar to Alternative 1. No significant impacts.	Short-term, minor impacts on bottom-dwelling species from vibrations during directional drilling. No significant impacts, when combined with any of the action alternatives.
Noise	Short-term, moderate impacts from a worst-case scenario of a rupture. No long-term impacts. No significant impacts.	Short-term, minor impacts on airborne and underwater receptors from construction. No long-term impacts. No significant impacts.	Similar to Alternative 1. No significant impacts.	Similar to Alternative 1. No significant impacts.	Short-term, minor impacts from construction; minor impacts from vibration. No long-term impacts. No significant impacts when combined with any of the action alternatives.

Resource Area	*No Action Alternative*	*Alternative 1*	*Alternative 2*	*Alternative 3*	*Underground Utility Option*
Infrastructure	Likely impacts include partial or total bridge failure affecting the distribution of utility service. Under a worst-case scenario of catastrophic bridge failure, impacts would be major, but utility service would be restored in the long term. Infrastructure deterioration is a driving need for the Proposed Action.	Short-term, minor impacts on utility service during interconnections. Long-term, beneficial effects from a safer, more reliable bridge to carry utilities. No significant impacts.	Similar to Alternative 1. No significant impacts.	Similar to Alternative 1. No significant impacts.	Short-term, minor impacts on utility service during interconnections. Long-term increased reliability and protection from lines being underground. No significant impacts, when combined with any of the action alternatives.
Public Health and Safety	The potential for a bridge failure is a public health and safety threat. Addressing infrastructure deterioration that threatens property damage or public safety is a driving need for the Proposed Action.	Short-term, minor adverse safety risks during construction and demolition. Long-term beneficial effects from improved bridge safety. No significant impacts.	Similar to Alternative 1. No significant impacts.	Similar to Alternative 1. No significant impacts.	Short-term, minor adverse safety risks during boring activities. Long-term beneficial effects from better-protected underground utilities. No significant impacts, when combined with any of the action alternatives.
Hazardous Materials and Wastes	Potential short-term, moderate adverse impacts from a worst-case scenario of a bridge failure or rupture resulting in special hazards such as lead and asbestos being released into the water, air, or surrounding area in the form of dust and debris. No significant impacts.	Short-term increase in use of hazardous materials and generation of hazardous wastes. Demolished bridge components may contain special hazards; wastes would be characterized and disposed of appropriately. No significant impacts.	Similar to Alternative 1. No significant impacts.	Similar to Alternative 1. No significant impacts.	Additional short-term, minor use of hazardous materials and generation of hazardous wastes. No significant impacts, when combined with any of the action alternatives.

Key: APE = Area of Potential Effect; NRHP = National Register of Historic Places.

ES.6 Public Involvement

The Navy published a Notice of Availability for the Draft EA for three consecutive days in the *Capital Gazette*, beginning June 26, 2020. The Draft EA was available at https://www.cnic.navy.mil/regions/ndw/installations/nsa_annapolis/om/environmental-/environmental-assessment.html for public review. The Final EA and FONSI will be available at https://ndw.cnic.navy.mil/Installations/NSA-Annapolis/Operations-and-Management/Environmental-Support/Environmental-Assessment/. The Navy coordinated or consulted with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Coast Guard, Maryland Department of the Environment, Maryland Department of Natural Resources, Maryland Department of Transportation, Maryland Historical Trust, Maryland Department of Planning (Maryland State Clearinghouse), and U.S. Army Corps of Engineers regarding the Proposed Action. In addition, a Federal Consistency Determination was submitted to the Maryland Department of the Environment. All comments received during agency and public review were considered in preparing the Final EA.

ENVIRONMENTAL ASSESSMENT
Utility Bridge Replacement at
Naval Support Activity Annapolis
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Abbreviations and Acronyms

Acronym	Definition
ACM	asbestos-containing materials
APE	area of potential effect
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CHRIMP	Consolidated Hazardous Material Reutilization and Inventory Management Program
dB	decibel
dBA	A-weight decibels
EA	Environmental Assessment
EFH	essential fish habitat
GHG	greenhouse gas
IPaC	Information for Planning and Consultation
LBP	lead-based paint
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MHT	Maryland Historical Trust
NAAQS	National Ambient Air Quality Standards
NAVFAC	Naval Facilities Engineering Systems Command
NEPA	National Environmental Policy Act
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NSA	Naval Support Activity
PCB	polychlorinated biphenyl
$PM_{2.5}$	fine particulate matter less than or equal to 2.5 micrometers in diameter
PM_{10}	suspended particulate matter less than or equal to 10 micrometers in diameter
PWD	Public Works Department
SAV	submerged aquatic vegetation
SHPO	State Historic Preservation Office
SOP	Standard Operating Procedure
U.S.	United States
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USNA	United States Naval Academy

1 Purpose of and Need for the Proposed Action

1.1 Introduction

The Department of the Navy (Navy) proposes to replace the utility bridge at College Creek at Naval Support Activity (NSA) Annapolis, Maryland. There are three main areas of NSA Annapolis: the Upper Yard and Lower Yard of the United States Naval Academy (USNA), and North Severn. NSA Annapolis supports multiple tenants, of which the USNA is the main tenant.

The utility bridge carries five utility lines over College Creek between the Upper Yard and the Lower Yard of the USNA. Each utility line is approximately 600 linear feet. The utility bridge is currently in a deteriorated state. The Proposed Action includes construction of a new utility bridge, connection of new utility lines, and demolition and removal of the existing bridge. During construction of the new utility bridge, the existing bridge and utilities would remain in place until the new structure is completed. This project would incorporate a system for personnel to safely access the new structure to conduct inspections, maintenance, and repairs. In addition, an underground utility option will be analyzed per alternative. Under this option, all except one utility line would be installed underground via directional boring in the banks of College Creek. Construction of the proposed utility bridge is estimated to occur in fiscal year 2026.

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

Utility bridges are structures that can be used for moving piping, equipment, and lines across rivers, railways, highways, or other obstructions. The utility bridge connects the Lower Yard and Upper Yard of USNA. The bridge was originally constructed in 1931 as a train trestle bridge and retrofitted in 1986 to its current use. During this rehabilitation process, the bridge was converted to carry steam infrastructure, and concrete encasements were installed at the piers. Currently, the utility bridge is a service infrastructure bridge; it does not support vehicular or pedestrian traffic. The bridge is composed of two rolled steel beams, seventeen reinforced concrete bents, and two reinforced concrete abutments. The existing utility bridge carries five utility lines over College Creek between the Upper Yard and the Lower Yard of USNA. Figure 1-1 is a photograph of the utility bridge.

The USNA was first established in 1845 and consisted of a naval school on a ten-acre parcel on Fort Severn, located along the Severn River in Annapolis, Maryland. The USNA grew over the next century, and the Navy commissioned Naval Station Annapolis in 1947 as a support facility for enlisted personnel assigned to USNA. In 2006, NSA Annapolis was established, which streamlined operations at the installation to better support the USNA and provide a more efficient and responsive organization for the training of Navy midshipmen and the support of USNA faculty, staff, and family members.

Figure 1-1 Utility Bridge, West View

NSA Annapolis projects power by expertly supporting the development of midshipmen into fleet leaders. The installation provides: exceptional security by maintaining a secure environment for 4,400 midshipmen and over 2,000 faculty, staff and active duty service members while managing thousands of special events and over 2 million annual visitors despite increased force protection pressure; stewardship by maintaining more than 120 aging, historic facilities and associated infrastructure in superb condition as required by university accreditation standards and as appropriate for being listed on the National Register of Historic Places (NRHP); and Community Relationships by promoting high services and quality of life initiatives, meanwhile coordinating closely and communicating openly with city, county, state and community leaders whose well-being is inextricably linked to that of the installation (CNIC Naval Support Activity Annapolis, 2019). As the supporting installation for the USNA, NSA Annapolis comprises the core USNA campus, as well as lands and facilities that support typical installation functions.

In addition to USNA, other large tenants at NSA Annapolis include the Naval Health Clinic Annapolis, Naval Facilities Engineering Systems Command, the USNA Alumni Association/Naval Academy Foundation, and the Naval Academy Athletic Association (NAVFAC Washington, 2018a).

1.3 Location

NSA Annapolis is in Anne Arundel County, Maryland, along the Severn River and Chesapeake Bay in Annapolis, approximately 30 miles southeast of Baltimore and 33 miles east of Washington, DC. There are three main areas of NSA Annapolis: the Upper Yard and Lower Yard of the USNA, and North Severn. The Upper Yard and Lower Yard along the southern shore of the Severn River are separated by College Creek (Figure 1-2). The USNA campus is within these areas. North Severn is on the northern shore of the Severn River at the confluence with the Chesapeake Bay. The Upper Yard and Lower Yard are surrounded by the fairly dense development of Annapolis, but the North Severn area is more suburban and buffered by forest.

Figure 1-2 Naval Support Activity Annapolis Location Map

1.4 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to ensure continued utility service to portions of the USNA. The Proposed Action is needed because the current utility bridge is in a severely deteriorated state and requires extensive repair.

The utility bridge carries five utility lines over College Creek between the Upper Yard and the Lower Yard of the USNA. If the bridge fails, utility services would be interrupted. Sudden failure of the bridge could sever the utility lines that cross College Creek, resulting in a rupture that is capable of damaging nearby infrastructure or natural systems.

An inspection of the utility bridge from June 2019 determined the bridge is in poor condition overall, and numerous deficiencies require correction within 12 months. The 2019 inspection report concluded that the superstructure is in fair condition while the substructure is in poor condition (NAVFAC EXWC, 2019). The bridge superstructure (i.e., the parts of the bridge that are mounted on a supporting system) includes the deck, slab, and girders. The bridge substructure supports the superstructure and transfers the structural load to the foundations (i.e., piers and abutments).

The existing bridge is aging with multiple failed components and other components in critical need of repair related to the piles, support beams, reinforcements, and surface coatings. Specific findings of the inspection report included the following:

- The transverse support beam at the top of the south tower is severely twisted, and two rollers are missing in the main span.
- The transverse support beam at the top of the tower over Pier 9 is severely twisted.
- The bottom of the pile caps at Piers 10 and 16 exhibit large spalls, with exposed longitudinal and transverse steel reinforcement members, and up to 100 percent section loss.
- Loose and corroded anchor bolt nuts are at the northwest and northeast columns of the north tower above Pier 10.
- Twisted pipeline transverse support beams are above Pier 7 and on the north approach.
- A large, scaled area is at the bottom of Abutment 1, with exposed and corroded steel reinforcement and up to 100 percent section loss at the ends.
- The abutments, concrete pile caps, pedestals, and fascia panels show vertical and horizontal cracks, peeling, and flaking, which leads to internal structural weakness.
- The steel superstructure, beams, main span frame members, bearings, and connection hardware have moderate surface corrosion.
- The bearing hardware (i.e., anchor rods, nuts, and washers) at the abutments and at isolated piers exhibit moderate-to-severe surface corrosion with up to 50 percent section loss.
- Twenty-three piles (16 percent of the total piles) are in critical or failed condition, and 14 piles (10 percent of the total piles) are in poor condition. These piles exhibit varying degrees of cracking and exposure of reinforcing steel.

The inspection report also determined that the lack of catwalks and ladders to provide access for future inspection, maintenance, or repair posed a safety concern.

1.5 Scope of Environmental Analysis

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, noise, infrastructure, public health and safety, and hazardous materials and waste. The study area for each resource analyzed may differ due to how the Proposed Action interacts with or impacts the resource. For instance, the study area for geological resources may only include the construction footprint of a facility whereas the noise study area would expand out to include areas that may be affected by facility operations, traffic, or construction.

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 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 are included in Appendix B.

The Navy published a Notice of Availability for the Draft EA for three consecutive days in the *Capital Gazette*, beginning June 26, 2020. The notice described the Proposed Action, solicited public comments on the Draft EA, provided dates of the public comment period (i.e., June 26–July 26, 2020), and announced the Draft EA was available for review at https://www.cnic.navy.mil/regions/ndw/installations/nsa_annapolis/om/environmental-/environmental-assessment.html. No public comments were received.

The Navy coordinated or consulted with the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service, Maryland Department of the Environment (MDE), Maryland Department of Natural Resources (MDNR), Maryland Department of Transportation, Maryland Historical Trust (MHT), Maryland Department of Planning (Maryland State Clearinghouse), and U.S. Army Corps of Engineers (USACE) regarding the Proposed Action. In addition, a Federal Consistency Determination was submitted to MDE. Results of consultations are also summarized in more detail with applicable resources in the analysis.

City of Annapolis Historic Preservation Division (letter dated July 22, 2020) did not concur with the findings in the Draft EA pertaining to effects on the Colonial Annapolis Historic District, as partial obstruction and minimal visibility of the new proposed utility bridge would still be visible, and, therefore, an adverse effect on the district under Alternative 1 and Alternative 3. The City of Annapolis Historic Preservation Division also found underground boring to have an adverse effect due to visibility from one utility remaining aboveground. Visual impacts on historic districts are discussed in Section 3.4, Cultural Resources.

Maryland Historical Trust (MHT; letter dated July 21, 2020) provided preliminary comments agreeing with the Navy's intent to conduct a Phase I archaeological survey as previous studies have demonstrated there is high potential for submerged and buried sites and materials. MHT also encouraged the Navy to explore and consider alternatives to avoid and minimize adverse effects to the USNA and Colonial Annapolis Historic District. As discussed in Section 3.4, Cultural Resources, MHT concurred on February 18, 2022, that the Alternative 1 location with a precast concrete bridge would have no adverse effect on historic properties. However, additional coordination will be needed as design plans progress. Specifically, the Navy will conduct a Phase I terrestrial archaeological survey on the southeastern shoreline of College Creek to encompass any on-land disturbance; the Navy will also conduct a Phase I underwater survey if, upon detailed design, any bottom elements would extend into a previously undisturbed area of College Creek. Once detailed design plans are available, these additional studies will be conducted and coordinated with MHT. If any terrestrial or submerged historic property would be adversely affected, the Navy would pursue a Memorandum of Agreement regarding adverse effects.

National Marine Fisheries Service Habitat Conservation Division (July 23, 2020) provided detailed comments regarding essential fish habitat (EFH) and trust species. Since that time, the Navy has prepared an EFH assessment and continued EFH coordination. Conservation recommendations—cushion blocks, soft starts, and maximizing the use of vibratory hammers in lieu of impact hammers during construction and removing piers to a depth of two feet below the mudline—would be implemented to minimize adverse effects on EFH. No additional consultation is necessary to implement the action as proposed (email dated June 30, 2022).

The Draft EA was distributed to multiple agencies through the Maryland State Clearinghouse (letter dated July 24, 2020). Maryland Military Department did not have comments. Anne Arundel County Real Estate Division indicated that the project does not affect the county. Maryland Department of General Services and the Maryland Department of Planning found the project to be consistent with plans, programs, and objectives. Maryland Department of General Services included some information about nearby bridges and roadways. The Maryland Department of Planning noted that the project is within the Priority Funding Area for Annapolis; while this project was not in the 2009 Annapolis Comprehensive Plan, Maryland Department of Planning believes it to be consistent with infrastructure needs.

MDE, through the Clearinghouse, found the project to be consistent with their plans, programs, and objectives and provided guidance regarding (1) asbestos, (2) fugitive dust, (3) potential for soil contamination, (4) solid waste disposal during general construction and demolition activities, (5) hazardous waste, (6) brownfields and voluntary cleanup programs, and (7) borrow areas. In a separate letter, MDE Wetlands and Waterways Program provided correction to the wording in the Draft EA that a joint federal and state permit would be needed for temporary and permanent impacts. Applicable text in Section 3.2 is corrected in the Final EA.

Maryland Department of Transportation found this project to be generally consistent with their plans, programs, and objectives.

MDNR qualified that their finding of consistency is contingent on the recommendation that no work that could affect waterfowl occur from November 15 through March 1 in any given year. The project is within a waterfowl concentration area, and this measure would protect overwintering waterfowl.

The Critical Area Commission (email dated July 28, 2020) only noted that any tree clearing that is required must be mitigated. The Navy sent the Federal Consistency Determination, dated May 7, 2020, during the Draft EA review period, and sent a follow-up email on November 30, 2020. No additional comments were received. In accordance with the 60-day timeframe established pursuant to the Coastal Zone Management Act, concurrence is presumed.

The Navy coordinated with the U.S. Coast Guard for bridge construction under Section 9 of the Rivers and Harbors Act. The U.S. Coast Guard determined that a bridge permit is not required for the Proposed Action (dated March 25, 2021). The Proposed Action is in the Advance Approval category per 33 Code of Federal Regulations (CFR) 115.70, with noted conditions in their letter in Appendix B.

All comments received during the Draft EA review period were considered in preparing the Final EA; all comments are included in Appendix B.

2 Proposed Action and Alternatives

2.1 Proposed Action

The Proposed Action involves replacing the utility bridge at College Creek at NSA Annapolis, Maryland. Specifically, this includes construction of a new utility bridge, connection of new utility lines, and demolition and removal of the existing bridge. During construction of the new utility bridge, the existing bridge and utilities would remain in place until the new structure is completed. The utility bridge over College Creek is approximately 18 feet wide and 474 feet long. The new bridge would be approximately the same width and length, and the bridge deck would be located at approximately the same elevation. The proposed bridge would be designed to ensure that boats, specifically those from the adjacent Hubbard Hall (Building 260), would be able to access the waterway on both sides of the bridge.

As previously discussed, the existing bridge carries five utility lines over College Creek between the Upper Yard and the Lower Yard of the USNA. All current utility connections would be included in the proposed utility bridge; there would be no long-term changes in services or capacity. Utilities would be reattached to the bridge structure; however, an underground utility option is also being considered per alternative as discussed in Section 2.1.1.

The existing utility bridge does not provide the infrastructure to access the bridge; as a result, the utilities currently must be inspected by boat. Under the Proposed Action, infrastructure would be included so that personnel could safely access the new bridge to conduct future inspections, maintenance, and repairs. Infrastructure to access the proposed bridge would likely include catwalks and ladders. In addition, the proposed bridge would meet codes for safety and security. Security measures would include devices such as fencing and locks.

Locations for laydown and staging areas during construction would be identified during the final project design. These would be coordinated with the Public Works Department (PWD) Annapolis and USNA.

2.1.1 Underground Utility Option

The five utility lines would be replaced and reattached for all the action alternatives. The Proposed Action includes reattaching the utilities to the bridge structure, which is how they are currently situated. 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 may also be more vulnerable to damage. In addition, implementing safety and security measures can be more difficult. Therefore, as part of the decision-making process, the Navy will evaluate an underground utility option per alternative to determine if there are substantial differences or notable environmental impacts associated with aboveground or belowground utilities for this Proposed Action.

Under the underground utility option, all the utilities would be situated underground except for one utility line that cannot be bored underground; therefore, one line would remain aboveground and attached to the proposed utility bridge structure.

Placing utilities underground provides increased protection of those infrastructure components from weather and accidents, which increases long-term utility reliability and safety. Codes for safety and security measures would be easier to implement if the utilities were underground. In addition, utilities are also often less affected by temperature and humidity because these factors are more constant underground. However, repair of underground utilities, if needed, can be more challenging due to limited access as compared to aboveground utilities.

Directional boring would occur on the banks of College Creek. Boring would occur for all alternatives at the same location regardless of bridge placement. The boring would start on the northern side of the creek bed and move towards the southern side. The boring would not directly affect water resources as it would occur on the banks and under the sediment bed. As a result, no dams or cofferdams would be used. At this time, the required depth of the borings has not been determined, but the area would likely be approximately 32 inches by 32 inches. An excavated pit on either side measuring 20 feet wide by 40 feet long (800 square feet) would be needed for drilling or boring entry and exit; the pit would be located to avoid existing structures or utilities.

2.2 Screening Factors

NEPA 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 that meet the purpose and need (see Section 1.4) require detailed analysis.

Potential alternatives that meet the Proposed Action's purpose and need were evaluated against the following screening factors:

- The bridge abutments must be on Navy property to provide security for military utility services.
- The five utility lines need to be near existing infrastructure and utility connections. Rerouting the utility lines to the northeast of Decatur Avenue (Hill Bridge) would involve extensive relocation to tie back into utility infrastructure. In addition, the creek bed on the southern side of College Creek curves further south, expanding the width of the creek in this region. Therefore, the length of the utility bridge immediately northeast of Decatur Avenue would be considerably longer. Consequently, the utility bridge should be no further than approximately 350 feet to the northeast of the existing alignment.

Various alternatives were evaluated against the screening factors. The alternatives considered include the following, which are shown on Figure 2-1:

- No Action Alternative
- Alternative 1: King George Street Bridge Alignment
- Alternative 2: Decatur Avenue Bridge Alignment
- Alternative 3: Between King George Street and Decatur Avenue Bridge Alignment

Alternative 1 is the Navy's preferred alternative.

2.3 Alternatives Carried Forward for Analysis

Based on the reasonable alternative screening factors and meeting the project purpose and need, three action alternatives were identified and are analyzed in the EA, as well as the No Action Alternative, as further described in the following text.

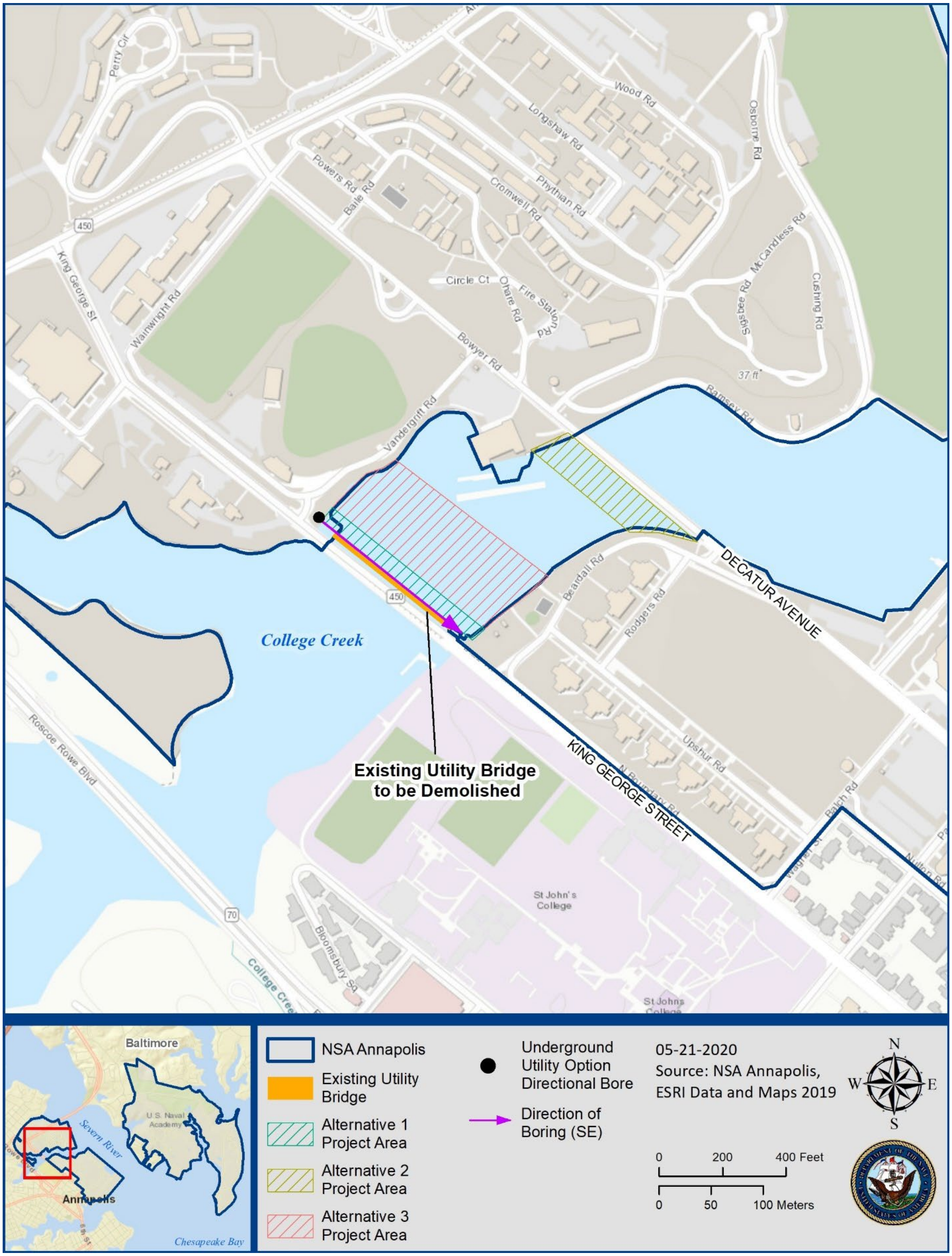

Figure 2-1 Locations of Alternatives

2.3.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. The existing utility bridge would continue to deteriorate until failure is imminent or occurs. As discussed in Section 1.4, the utility bridge over College Creek carries five utility lines between the Upper Yard and the Lower Yard of the USNA. If the bridge fails, these services would be interrupted, which could interfere with the training of midshipmen.

Currently, the bridge undergoes routine maintenance to ensure the utilities and the surrounding populations are safe. Routine maintenance to the bridge would continue, but no major repairs would occur. The worst-case scenario under the No Action Alternative would be a sudden failure of the bridge, possibly severing the five utility lines that cross College Creek. Instantaneous ruptures of pressurized lines could be capable of damaging nearby infrastructure or natural systems. Infrastructure systems that cross on the utility bridge have emergency shut-off protocols in place to minimize the likelihood for catastrophic damage under this worst-case scenario.

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: King George Street Bridge Alignment

Under Alternative 1, which is the Navy's Preferred Alternative, the proposed utility bridge would be constructed within 50 feet of the existing utility bridge alignment, which is adjacent to the King George Street Bridge (see Figure 2-2). Given that the King George Street Bridge and the installation boundary are directly south of the current utility bridge, the proposed bridge must be located to the northeast of the current utility bridge location. Therefore, under Alternative 1, the bridge could be constructed in any location between the current utility bridge alignment and 50 feet to the northeast.

The Proposed Action would be implemented as discussed in Section 2.1. During construction of the new utility bridge, the existing bridge and utilities would remain in place until the new structure is completed. Upon completion of the new utility bridge, the existing bridge would be demolished, and the pile caps would be removed and hauled off-site. Pile driving and minor excavation for new pile caps would likely occur. This alternative includes consideration of the environmental impacts associated with the aboveground utility option. A discussion of an underground utility option will also be included, as noted in Section 2.1.1.

2.3.3 Alternative 2: Decatur Avenue Bridge Alignment

Under Alternative 2, the proposed utility bridge would be constructed within 115 feet of the Decatur Avenue Bridge (Hill Bridge) (see Figure 2-3). As discussed in Section 2.2, the utility bridge needs to be situated southwest of the Decatur Avenue Bridge to tie back into utility infrastructure without major realignment. The Proposed Action would be implemented as discussed in Section 2.1, and construction would occur as discussed under Alternative 1 (Section 2.3.2). This alternative includes consideration of the environmental impacts associated with the aboveground utility option. A discussion of an underground utility option will also be included, as noted in Section 2.1.1.

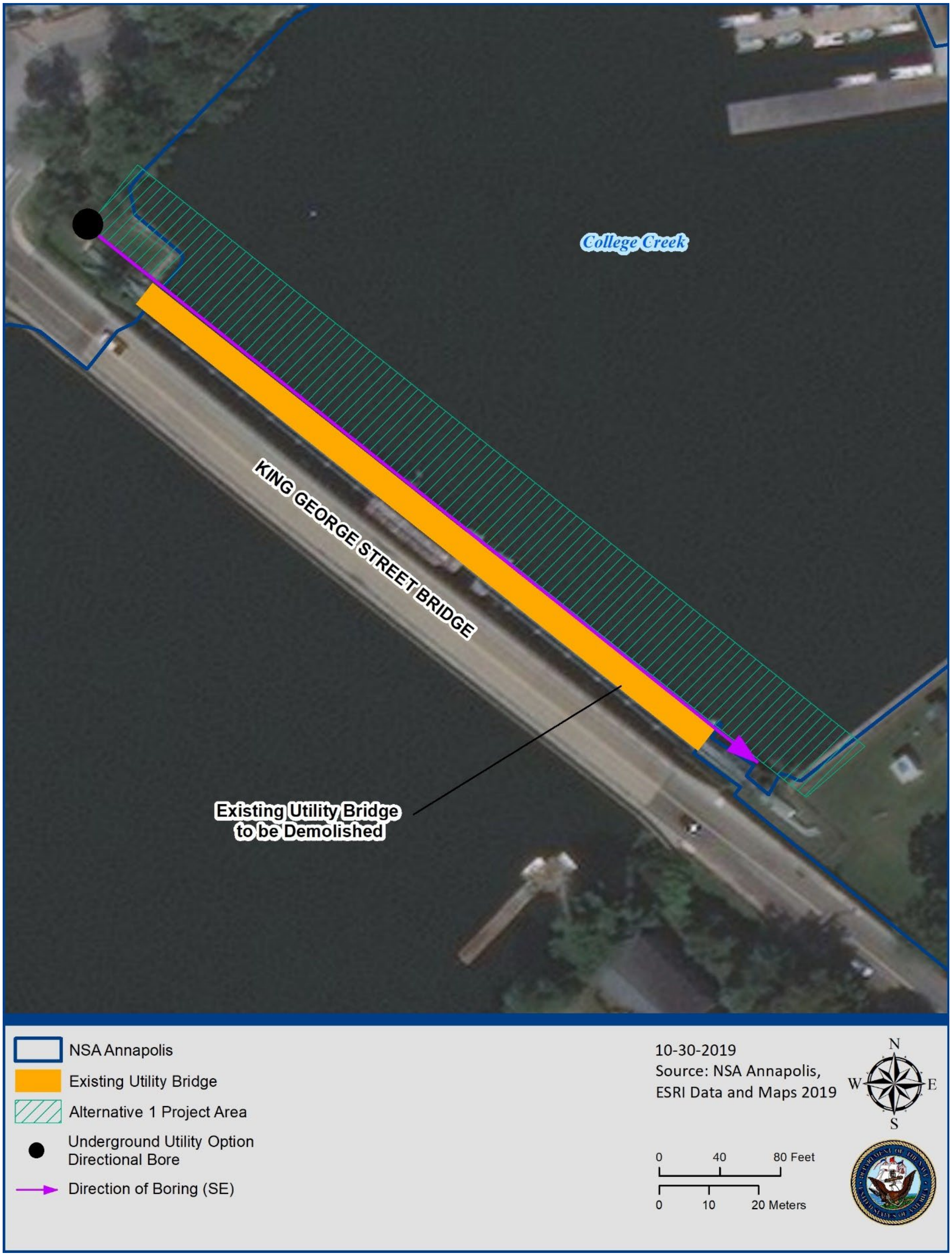

Figure 2-2 Alternative 1 Site General Location

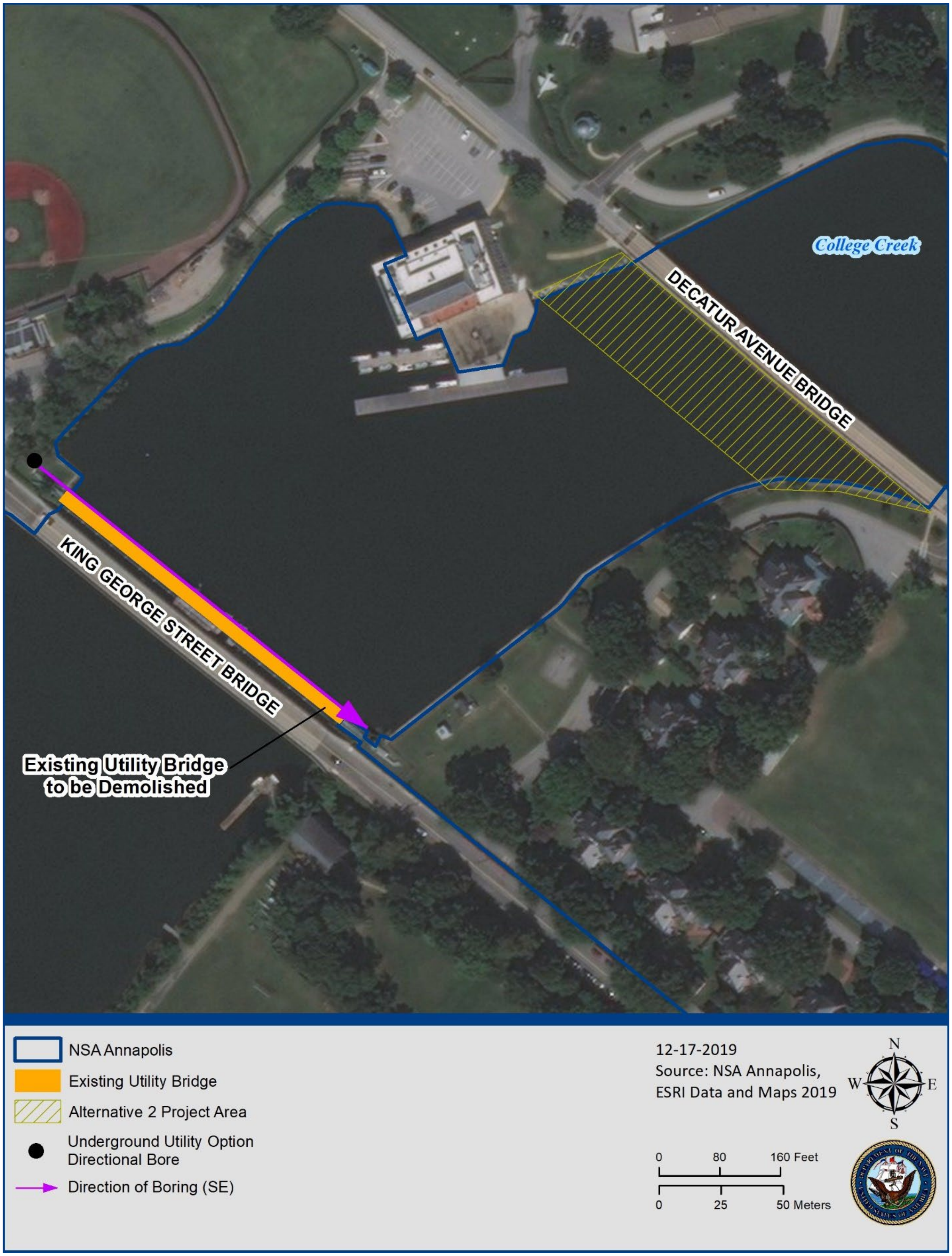

Figure 2-3 Alternative 2 Site General Location

2.3.4 Alternative 3: Between King George Street and Decatur Avenue Bridge Alignment

Under Alternative 3, the proposed utility bridge would be constructed between the locations of Alternatives 1 and 2 (i.e., the remaining approximate 250-foot-width between Alternatives 1 and 2, while also avoiding Hubbard Hall [Building 260] and its associated docks) as shown on Figure 2-4. The Proposed Action would be implemented as discussed in Section 2.1, and construction would occur as discussed under Alternative 1 (Section 2.3.2). This alternative includes consideration of the environmental impacts associated with the aboveground utility option. A discussion of an underground utility option will also be included, as noted in Section 2.1.1.

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 because they did not satisfy the screening factors in Section 2.2. The three alternatives discussed in Sections 2.3.2, 2.3.3, and 2.3.4 are the only alternatives that fully meet the purpose and need discussed in Section 1.4.

2.4.1 Repair of Existing Utility Bridge

As discussed in Section 1.4, the existing utility bridge structure is aging with multiple failed components and other components in critical need of repair related to the piles, support beams, reinforcements, and surface coatings. Repair of the existing bridge as a possible alternative was considered to extend its life by 5 to 10 years. However, due to the advanced state of deterioration present, the bridge cannot be feasibly repaired to return it to its original weight limits capable of supporting the utilities distribution system. Logistically, bridge repairs would be challenging given that utility lines would have to be removed, which would interrupt service. Therefore, this alternative was eliminated from further analysis.

2.4.2 Attach Utilities to Decatur Avenue Bridge

Placing the five utility lines on the existing Decatur Avenue Bridge was considered as an alternative. While Decatur Avenue Bridge is in fair condition, repairs are recommended within 24 months, and the bridge will likely need to be replaced in 5 to 10 years. Due to the fact that the Proposed Action is estimated to occur in fiscal year 2026, the new utilities would only be in service on Decatur Avenue Bridge for a few years before undergoing additional replacement as a result of the need to replace the Decatur Avenue Bridge. Therefore, this alternative was eliminated from further analysis.

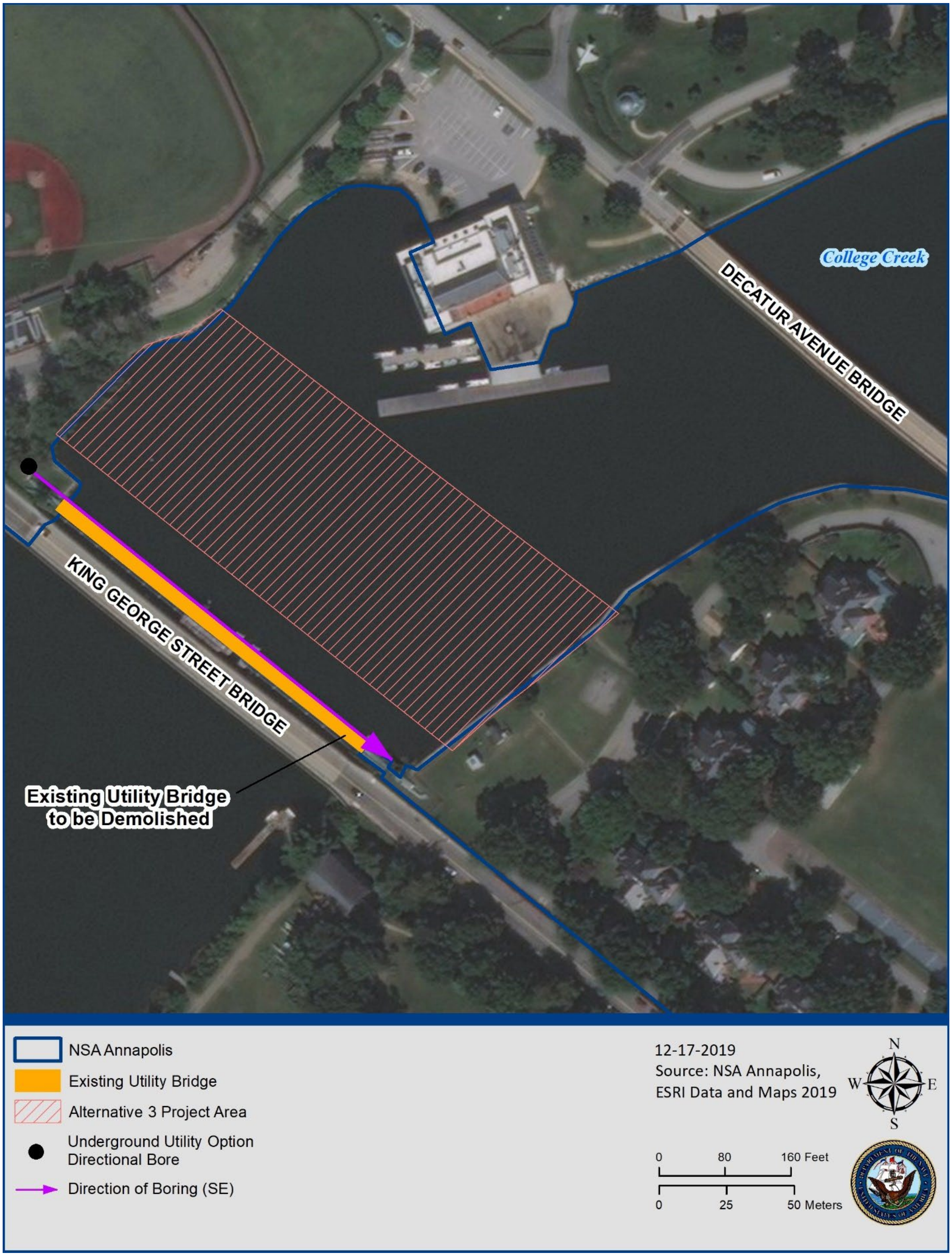

Figure 2-4 Alternative 3 Site General Location

2.5 Best Management Practices Included in the Proposed Action

This section presents an overview of the best management practices (BMPs) that are incorporated into the Proposed Action in this document. BMPs are existing policies, practices, and measures that the Navy 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 2-1 includes a list of BMPs. Mitigation measures, if applicable, will be discussed separately in Chapter 3.

Table 2-1 Best Management Practices

Best Management Practice	***Description***	***Impacts Reduced/Avoided***
Fugitive dust practices	Examples of measures could include wetting soil, covering soil stockpiles, and ceasing operations during high winds.	Control fugitive dust emissions.
Construction equipment	Good housekeeping measures for construction equipment (i.e., petroleum, oil, and/or lubricants) for optimal performance.	Prevent leeching of contaminants into groundwater and surface water.
Erosion and sediment control	Would depend on site conditions and design. Could include silt fences, silt or turbidity curtains, inlet and outlet protection, erosion-control matting, sediment logs, construction entrances, temporary and permanent seeding, mulching, and check dams.	Minimize sediment transport into surface water.

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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 EA. In compliance with NEPA per CEQ and 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 needs to be in order to be considered significant.

This chapter discusses in detail air quality, water resources, geological resources, cultural resources, biological resources, noise, infrastructure, public health and safety, and hazardous materials and wastes. The potential impacts on the following resource areas are considered to be negligible or nonexistent, so they were not analyzed in detail in this EA.

Land Use: The Proposed Action would replace a deteriorating utility bridge. There would be no long-term changes in functional land use at NSA Annapolis; land use off the installation; or regulations, policies, or zoning that could affect land use. Therefore, land use is not analyzed in detail.

Visual Resources: Under the Proposed Action, a replacement bridge would not be expected to dramatically change the viewshed or degrade the visual character of NSA Annapolis. The existing bridge is deteriorating; if left as-is, the bridge would continue to degrade and would be more of a visual detraction. The replacement bridge would be constructed with similar materials and have similar proportions as the existing bridge. Potential visual impacts on historic resources are discussed in Section 3.4, Cultural Resources. Therefore, visual impacts are not analyzed in detail.

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

Transportation: The existing and proposed utility bridge is a service infrastructure bridge; it does not support vehicular or pedestrian traffic. The Proposed Action would result in short-term, localized increases in construction-related traffic in the vicinity of the utility bridge. Gate 6 at the Vandergrift Road intersection is the closest access point to the site alternatives. This gate is along King George Street and provides access to the ballfield area, with the existing utility bridge, Alternative 1 site, and Alternative 3 site to the immediate right upon entering. However, Gate 8 on Bowyer Road is the main access point for contractors, deliveries, and large automobiles, and this is the gate that would likely be used for any project-related construction activities (NAVFAC Washington, 2018a).

Large construction equipment would be transported to the site and generally remain for the duration of construction (approximately one year). Others, such as heavy trucks for hauling construction/demolition debris and delivering construction materials, would arrive more frequently, perhaps one to several per day, depending on the intensity of construction. 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 NSA Annapolis. Therefore, transportation is not analyzed in detail.

Socioeconomics: Direct, beneficial effects on the local economy would be expected from the generation of short-term construction jobs, as well as indirect, beneficial effects on the economy from the increase in jobs and income in the area. These effects would be negligible given the size of the regional economy and workforce and would not result in noticeable changes in the population, employment characteristics, schools, or housing occupancy status in the region. No long-term socioeconomic impacts would occur. Therefore, socioeconomic resources are not analyzed in detail.

Environmental Justice: Anne Arundel County is in the 42nd (state) and 23rd (national) percentiles for low-income populations and 39th (state) and 50th (national) for minority populations (USEPA, 2019a). 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 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. A more detailed discussion of the full regulatory setting applicable to air quality is in Appendix A.

3.1.1 Affected Environment

Under the Clean Air Act, USEPA established National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) for principal pollutants. These pollutants, called "criteria pollutants," include carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, suspended particulate matter less than or equal to 10 micrometers in diameter (PM_{10}), fine particulate matter less than or equal to 2.5 micrometers in diameter ($PM_{2.5}$), and lead. Areas that violate a federal air quality standard are designated as nonattainment areas. State Implementation Plans are then prepared to identify the measures by which that area will achieve attainment. 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.

NSA Annapolis is in Anne Arundel County, which is within the Metropolitan Baltimore Intrastate Air Quality Control Region (40 CFR 81.28). MDE is responsible for implementing and enforcing state and federal air quality regulations in Maryland. Anne Arundel County is designated as a nonattainment area for eight-hour ozone, with a classification of moderate for the 2008 standard and marginal for the 2015 standard (USEPA, 2019b). A portion of the county, which includes NSA Annapolis, is also in nonattainment for sulfur dioxide under the 2010 standard. Anne Arundel County was formerly classified as a maintenance area for the 1997 $PM_{2.5}$ standard, but this standard was revoked in 2016.

NSA Annapolis is also within an ozone transport region, meaning that regional urban influences from well outside Annapolis and the Metropolitan Baltimore Intrastate Air Quality Control Region also contribute substantially to local ozone pollution. The ozone transport region was established by the 1990 Clean Air Act Amendments and includes Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, the District of Columbia, and portions of the Northern Virginia suburbs. Because Anne Arundel County is in nonattainment for ozone and sulfur dioxide, a General Conformity evaluation is required.

The emissions inventory for Anne Arundel 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. New emissions data for Anne Arundel County has since been released, but this data would not change the outcome of the analysis in this EA.

USNA operates under Title V permit no. 24-003-00310 that includes a central heating plant, portable boilers, water heaters, a spray paint booth, and emergency generators (MDE, 2019a). Recent annual criteria pollutant and hazardous air pollutants emissions for USNA are shown in Table 3-2. New emissions data for 2020 and 2021 exists for USNA; no significant changes in emissions were identified that would change the outcome of the analysis in this EA.

In addition to criteria pollutants, USNA quantifies and reports facility-wide GHG emissions annually under the Title V permit requirements, though Prevention of Significant Deterioration requirements for GHG emissions have not been triggered for any construction projects to date. Recent GHG emissions for USNA are shown in Table 3-3. New emissions data for 2020 and 2021 exists for USNA; no significant changes in emissions were identified that would change the outcome of the analysis in this EA.

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. The John T. Harrison Health Center at St. John’s College, just outside the Lower Yard boundary, is a medical facility within one mile of the project area. Preschools and schools within one mile of the utility bridge include Annapolis Elementary School; St. Mary’s Elementary, Middle, and High Schools; Adams Park Elementary School; Calvary Center School; Book of Life Academy; West Annapolis Elementary School; and The Learning Community. Furthermore, Eastport Elementary School, Sunny Acre Private School, Wiley Bates Middle School, Germantown Elementary School, Phoenix Academy, and Weems Creek Nursery School and Kindergarten are just outside the one-mile-radius from the project area. Family housing areas on NSA Annapolis and other residences outside of NSA Annapolis are also within one mile of the project area.

Table 3-1 Anne Arundel County Air Emissions Inventory (2011)

Location	*NO_x (tpy)*	*VOC (tpy)*	*CO (tpy)*	*SO_2 (tpy)*	*PM_{10} (tpy)*	*$PM_{2.5}$ (tpy)*
Anne Arundel County	16,008	10,652	66,357	13,696	5,477	1,895
Metropolitan Baltimore Intrastate Air Quality Control Region	59,761	45,570	278,054	18,164	40,537	10,332

Source: USEPA, 2014

Note: The Metropolitan Baltimore Intrastate Air Quality Control Region includes Anne Arundel, Baltimore, Carroll, Harford, and Howard Counties and Baltimore City. New emissions data for Anne Arundel County is now available, but this data would not change the outcome of the analysis in this EA.

Key: NO_x = nitrogen oxides; VOC = volatile organic compound; CO = carbon monoxide; SO_2 = sulfur dioxide; PM_{10} = suspended particulate matter less than or equal to 10 micrometers in diameter; $PM_{2.5}$ = fine particulate matter less than or equal to 2.5 micrometers in diameter; tpy = tons per year.

Table 3-2 U.S. Naval Academy Air Emissions Inventory

Year	*NO_x (tpy)*	*VOC (tpy)*	*CO (tpy)*	*SO_2 (tpy)*	*PM_{10} (tpy)*	*Total HAP (tpy)*
2017	13.7	0.8	16.3	0.1	0.30	0.0450
2018	8.2	0.8	11.6	0.8	0.34	0.0140
2019	9.5	0.8	12.5	0.1	0.30	0.0140
Total Potential to Emit	219	8.48	112	446	25.3	2.58

Sources: MDE, 2019a; USNA, 2018

Note: New emissions data for 2020 and 2021 exists for USNA; no significant changes in emissions were identified that would change the outcome of the analysis in this EA.

Key: NO_x = nitrogen oxides; VOC = volatile organic compound; CO = carbon monoxide; SO_2 = sulfur dioxide; PM_{10} = suspended particulate matter less than or equal to 10 micrometers in diameter; HAP = hazardous air pollutants; tpy = tons per year.

Table 3-3 U.S. Naval Academy Greenhouse Gas Emissions Summaries

Year	*CO_2e from CO_2 (tpy)*	*CO_2e from CH_4 (tpy)*	*CO_2e from N_2O (tpy)*	*Total CO_2e (tpy)*
2017	14,959	0.61	0.27	**15,055**
2018	17,450	0.325	0.313	**17,551**
2019	16,947	0.357	0.309	**17,048**
Total Potential to Emit	237,779	3.18	3.31	**238,845**

Sources: MDE, 2019a; USNA, 2018

Note: New emissions data for 2020 and 2021 exists for USNA; no significant changes in emissions were identified that would change the outcome of the analysis in this EA.

Note: Conversion factors for CO_2e are different for each greenhouse gas. CO_2 = 1, CH_4 = 25, and N_2O = 298.

Key: CO_2e = carbon dioxide equivalents; CO_2 = carbon dioxide; CO_4 = methane; N_2O = nitrous oxide; tpy = tons per year.

3.1.2 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 the air basin in which the project is located, the Metropolitan Baltimore Intrastate Air Quality Control Region.

Estimated emissions from a proposed federal action are typically compared with relevant national and state standards to assess the potential for increases in pollutant concentrations.

Air Quality Potential Impacts:

- No Action: Negligible air emissions from ongoing, routine maintenance. Temporary, minor, adverse, localized impacts from airborne dust and debris under a worst-case scenario of bridge failure. No significant impacts.
- Alternative 1: Similar to but slightly less than Alternative 2. No significant impacts.
- Alternative 2: Short-term, minor emissions during construction. No significant impacts.
- Alternative 3: Similar to but slightly less than Alternative 2. No significant impacts.
- Option: Additional, short-term, minor emissions from operating boring equipment. No significant impacts.

3.1.2.1 No Action Alternative

Annapolis is a developed, urban area. Air quality in Anne Arundel County and the Metropolitan Baltimore Intrastate Air Quality Control Region would continue to be affected by local and regional urban influences, such as mobile emissions from vehicles, area sources (e.g., drycleaners and consumer products), and stationary sources (e.g., power plants), as well as sources outside the Metropolitan Baltimore Intrastate Air Quality Control Region as evidenced by Maryland's designation as an ozone transport region. Regional population is expected to increase gradually in the long term, an estimated 6 percent increase from 2015 to 2035 in Anne Arundel County (Anne Arundel County, 2009). Air quality is expected to continue to be adversely affected by these sources, with some increases possible from the additional population, though continued enforcement of criteria pollutant limits and control measures established in Maryland's State Implementation Plans would continue to be enacted with the long-term goal of achieving attainment with the NAAQS.

Under the No Action Alternative, the Proposed Action would not occur. The Navy would continue to maintain the bridge portions of the structure, which could have localized, intermittent, negligible air emissions from operation of small, hand-held equipment while these activities occur. Conducting routine maintenance as needed is the status quo and would have no noticeable effects on air quality. Under a worst-case scenario of a bridge failure, airborne dust and debris would settle out shortly and have temporary, minor, adverse, localized impacts on air quality. Therefore, no significant impacts on air quality or air resources would occur under the No Action Alternative.

3.1.2.2 Alternative 1 Potential Impacts

Alternative 1 would result in short-term, minor air emissions during construction-related activities. For this analysis, construction activities include both construction of the new utility bridge and demolition of the existing utility bridge. No increases in long-term emissions would be expected because there would be no changes in operations associated with the new utility bridge or new stationary sources of air emissions. Estimated construction emissions would be comparable to but slightly less than those discussed in Section 3.1.2.3 for Alternative 2 because Alternative 1 would require less trenching.

Appendix C contains more detailed information about project inputs and assumptions used in estimating air emissions. Implementation of Alternative 1 would not result in significant impacts.

3.1.2.3 Alternative 2 Potential Impacts

Alternative 2 would result in short-term, minor air emissions during construction-related activities. For this analysis, construction activities include both construction of the new utility bridge and demolition of the existing utility bridge. Estimated construction emissions are shown in Table 3-4. Appendix C contains more detailed information about project inputs and assumptions used in estimating air emissions. Implementation of Alternative 2 would not result in significant impacts on air quality, as discussed in the following analysis.

Table 3-4 Estimated Air Emissions from Proposed Construction Activities

Activity	*NO_x (tpy)*	*VOC (tpy)*	*CO (tpy)*	*SO_2 (tpy)*	*PM_{10} (tpy)*	*$PM_{2.5}$ (tpy)*
Total Construction (1 Year)	0.44	2.06	2.62	0.01	1.07	0.31
Applicable *de minimis* Thresholds	100	50	–	100	–	–

Key: NO_x = nitrogen oxides; VOC = volatile organic compound; CO = carbon monoxide; SO_2 = sulfur dioxide; PM_{10} = suspended particulate matter less than or equal to 10 micrometers in diameter; $PM_{2.5}$ =fine particulate matter less than or equal to 2.5 micrometers in diameter; tpy = tons per year.

Criteria Pollutants

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., PM_{10} 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, though construction is estimated to occur in fiscal year 2026. The emissions from the total construction project were estimated based on averages of criteria pollutants emitted from a variety of construction equipment over time or the estimated total miles vehicles would operate. Emissions would include those emitted directly from the construction site, including tractors, loaders, backhoes, graders, dozers, forklifts, cranes, rollers, and trenchers; and those emitted indirectly from various diesel-powered heavy delivery trucks, concrete trucks, and dump trucks and gasoline-powered passenger trucks from construction workers that would travel to and from the site from outside NSA Annapolis. As shown in Table 3-4 and Appendix C, construction equipment emissions would be minor.

Fugitive dust emissions would also occur during construction activities. 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 vehicles drive over it. Site preparation and grading activities generally have the greatest potential to generate fugitive dust because excavation, clearing, grading, digging, earthwork, and temporary soil stockpiling are at the highest levels. Measures would be implemented to control fugitive dust emissions, such as wetting dry soil to minimize wind erosion, stabilizing/covering soil stockpiles, or stabilizing/planting disturbed areas that are not being actively worked.

Construction activities would increase the concentration of criteria pollutants in the environment immediately surrounding the construction site. Ambient air quality is generally marginal in and around NSA Annapolis, as evidenced by its status as an ozone and sulfur dioxide nonattainment area. However, estimated emissions under Alternative 2 would not be expected to noticeably diminish air quality or affect sensitive receptors such as nearby medical facilities, schools, and residences outside NSA Annapolis because project emissions would be well below *de minimis* thresholds. Furthermore, emissions would be short term, produced only during construction activities. Projected emissions from Alternative 2 would represent minor regional increases within Anne Arundel County and the Metropolitan Baltimore Intrastate Air Quality Control Region (refer to Table 3-4) and would not violate any NAAQS. Therefore, implementation of Alternative 2 would not result in significant impacts on air quality from criteria pollutant emissions.

General Conformity

A Record of Non-Applicability was prepared and is included in Appendix C. As demonstrated in the Air Conformity Applicability Analysis, also in Appendix C, air emissions would be well below *de minimis* thresholds. Therefore, a full conformity determination is not required.

Greenhouse Gases

Implementation of Alternative 2 would contribute directly to emissions of greenhouse gases from the combustion of fossil fuels. Construction and demolition activities would generate approximately 690 tons (626 metric tons) of carbon dioxide equivalents. These limited emissions would have a negligible effect on the concentration of GHG emissions in the region. Therefore, implementation of Alternative 2 would not result in significant impacts on air quality from GHG emissions.

3.1.2.4 Alternative 3 Potential Impacts

Alternative 3 would result in short-term, minor air emissions during construction-related activities. For this analysis, construction activities include both construction of the new utility bridge and demolition of the existing utility bridge. Estimated construction emissions would be comparable to but slightly less than those discussed in Section 3.1.2.3 for Alternative 2 because Alternative 3 would require less trenching. Appendix C contains more detailed information about project inputs and assumptions used in estimating air emissions. Implementation of Alternative 3 would not result in significant impacts on air quality.

3.1.2.5 Potential Impacts of Underground Utility Option

Short-term, minor emissions would be expected during directional boring to install utilities underground. Estimated utility emissions, which would be in addition to those for general bridge construction and demolition activities, are shown in Table 3-5. Appendix C contains more detailed information about project inputs and assumptions used in estimating air emissions. For a maximum impact scenario, it is assumed that the directional bore would be powered by several large diesel-powered engines, generating localized, short-term, criteria pollutant and GHG emissions. Given the small size of the bore and pit areas, fugitive dust emissions would be negligible. Implementation of the underground utility option, combined with any of the action alternatives, would not result in significant impacts on air quality.

Table 3-5 Estimated Air Emissions from Proposed Construction Added to Underground Utility Option

Activity	***NO_x (tpy)***	***VOC (tpy)***	***CO (tpy)***	***SO_2 (tpy)***	***PM_{10} (tpy)***	***$PM_{2.5}$ (tpy)***
Total Construction (see Table 3-4)	0.44	2.06	2.62	0.01	1.07	0.31
Total Underground Utility Option	2.03	0.06	0.46	0.68	0.06	0.06
Total Construction + Option Emissions	**2.47**	**2.12**	**3.08**	**0.69**	**1.13**	**0.36**
Applicable *de minimis* Thresholds	100	50	–	100	–	–

Key: NO_x = nitrogen oxides; VOC = volatile organic compound; CO = carbon monoxide; SO_2 = sulfur dioxide; PM_{10} = suspended particulate matter less than or equal to 10 micrometers in diameter; $PM_{2.5}$ =fine particulate matter less than or equal to 2.5 micrometers in diameter; tpy = tons per year.

3.2 Water Resources

This discussion of water resources includes groundwater, surface water, wetlands, floodplains, shorelines, and coastal zone management. This section also discusses the physical characteristics of water and wetlands; wildlife and vegetation are addressed in Section 3.5, Biological Resources. Bathymetry is discussed in Section 3.3, Geological Resources.

3.2.1 Affected Environment

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

3.2.1.1 Groundwater

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.

Drinking water for the USNA is provided from the Patapsco Aquifer by three groundwater wells located in the Upper and Lower Yards (NSA Annapolis, 2012). The Patapsco Aquifer, which is approximately 600 to 700 feet below the ground surface, continues to experience additional demand as saltwater intrusion concerns for more shallow aquifers has encouraged increased use of this deeper aquifer (U.S. Geological Survey, 2012). The NSA Annapolis Environmental Department monitors groundwater to ensure that surface activities do not affect water quality. A wellhead protection plan was finalized and implemented in 2021.

3.2.1.2 Surface Water

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 water body can be deemed impaired if water quality analyses conclude that exceedances of water quality standards occur.

The Chesapeake Bay and Severn River are the major surface water features in the vicinity of NSA Annapolis. NSA Annapolis is within the Severn River watershed, which has a drainage area of 70 square miles (USNA, 2001). The Severn River watershed is within the Chesapeake Bay watershed, which comprises all tributaries, backwaters, and side channels and their watersheds that drain into the

Chesapeake Bay in Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia, and the District of Columbia. The Severn River watershed contains the following subbasins near the project area: Carr Creek, College Creek, Mill Creek, Severn River, Shady Lake, and Spa Creek. This portion of the Severn River is at its confluence with the Chesapeake Bay, so tidally interconnected surface waters are brackish in salinity.

The 12.5-mile-long Severn River is a tidal tributary of the Chesapeake Bay. It was declared a Scenic River by the General Assembly of Maryland in 1971. Maryland water quality standards specify that all surface waters of the State shall be protected for water contact recreation, fishing, and protection of aquatic life and wildlife. The designated use of the Severn River is Class II, Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting. MDE has identified the waters of the Severn River as impaired by the nutrients nitrogen and phosphorus (1996), sediments (1996), fecal coliform in tidal portions of the basin (1996), and polychlorinated biphenyls (PCBs) in fish tissue (2006) (MDE, 2019b). MDE classifies the tidal areas of the Severn River for nursery use from February 1 to May 31, shallow water submerged aquatic vegetation use from April 1 to October 30 to a depth of one meter, and open water fish and shellfish use year-round (COMAR, 2014).

College Creek is a small tidal creek that flows into the Severn River. The USNA is located at the mouth of College Creek at its confluence with the Severn River. The shoreline of College Creek is mostly natural and forested above the King George Street Bridge, and mostly altered (i.e., bulkhead and riprap shoreline) below the King George Street Bridge along the areas owned by USNA. A watershed assessment was conducted for the College Creek Watershed in 2007, and water quality in the creek was similar to what was measured in the nearby Severn and Magothy Rivers (Friends of College Creek, 2007).

3.2.1.3 Wetlands

Wetlands are jointly defined by USEPA and the 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.”

An estimated 56 acres of wetlands are found at NSA Annapolis within the installation boundary. At the USNA, the National Wetlands Inventory conducted by the Department of the Interior identified approximately two acres of estuarine emergent and scrub-shrub wetlands adjacent to Shady Lake in the northern Upper Yard. The Shady Lake site is composed of a shallow tidal lagoon connected to the Severn River by a narrow tidal connection. There are no jurisdictional wetlands on NSA Annapolis near the College Creek utility bridge and the action alternatives considered in this EA.

Outside of the installation boundary, the National Wetlands Inventory has defined the surface waters adjacent to the installation (i.e., College Creek, Carr Creek, Mill Creek, Spa Creek, and the Severn River) as estuarine and marine deepwater systems. The estuarine system consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land (NWI, 2013). There are estuarine and marine wetland and freshwater forested/shrub wetlands located in College Creek above the Rowe Boulevard Bridge and within the upland College Creek stream corridor, respectively (NWI, 2019).

3.2.1.4 Floodplains

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 a proposed action to floodplains.

At the USNA, approximately 44.5 acres (13 percent) are within the 100-year floodplain and another 76.59 acres (22 percent) are within the 500-year floodplain. The existing utility bridge is located within the 100-year floodplain, and the three areas analyzed within this EA for the replacement utility bridge are also located within the 100-year floodplain (see Figure 3-1). The 500-year floodplain is just outside of the alternative project boundaries to the south of College Creek.

3.2.1.5 Shorelines

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

The USNA has approximately four miles of shoreline along the Severn River, College Creek, and Spa Creek. The College Creek shoreline below the King George Street Bridge, where the action alternatives would occur, consists of hardened seawalls, such as bulkhead and riprap. The seawalls along this shoreline have been assessed as being in varying condition, and the Navy plans to restore and repair all the College Creek seawalls below the King George Street Bridge over the next 20 years as funding becomes available (Navy, 2020).

3.2.1.6 Coastal Zone Management

The USNA is located entirely within Maryland’s coastal zone. Activities conducted along shorelines are reasonably likely to affect use of lands, waters, or natural resources of the coastal zone beyond the boundaries of federal property and must be consistent to the maximum extent practicable with the enforceable policies of Maryland’s Coastal Zone Management Program in accordance with the federal Coastal Zone Management Act of 1972. Maryland’s Coastal Zone Management Program addresses coastal hazards, growth management, habitat and living resources, non-point source pollution, non-tidal wetlands, provision of public access, and tidal wetlands, and it encompasses several state laws and regulatory programs, of which the Clean Water Act is specifically applicable to the Proposed Action.

A memorandum of understanding between the State of Maryland and the Department of Defense, signed May 2013, outlines the application and implementation of certain enforceable policies of Maryland’s Coastal Zone Management Program as they relate to federal actions (State of Maryland and Department of Defense, 2013).

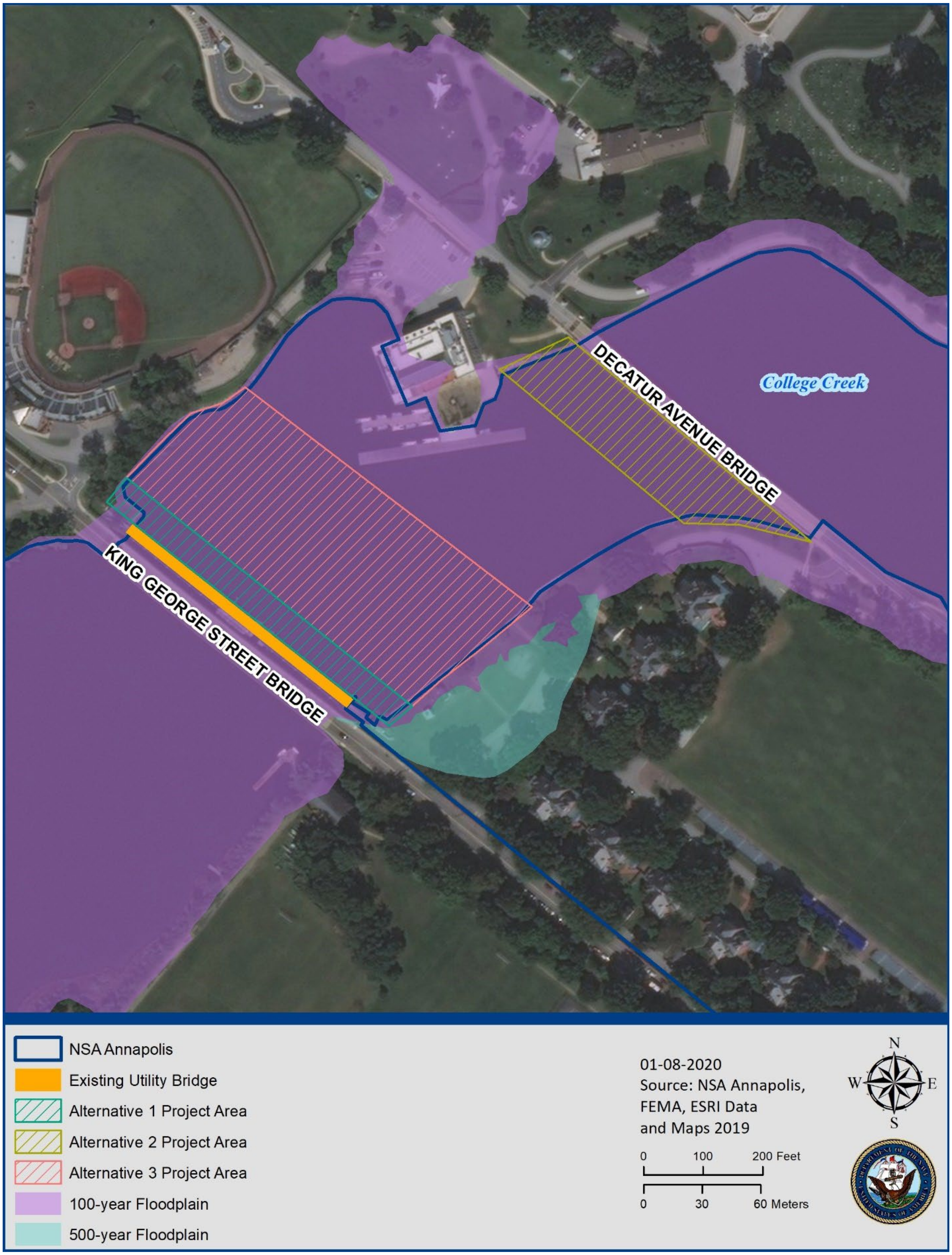


Figure 3-1 Floodplains near the Utility Bridge

3.2.2 Environmental Consequences

In this EA, the analysis of water resources looks at the potential impacts on groundwater, surface water, wetlands, floodplains, shorelines, and coastal zone management. 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 could change the water quality, including both improvements in and degradation of current water quality. The impact assessment of wetlands considers the potential for impacts that could 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 could impede the functions of floodplains in conveying floodwaters. The analysis of shorelines considers if the Proposed Action would affect shoreline ecological functions such as channel movement and hydrological systems, flooding or storm surge areas, areas of erosion and sedimentation, water quality and temperature, presence of nutrients and pathogens, and sites with the potential for protection or restoration. Coastal zone management discusses the Proposed Action's consistency with the federally enforceable policies of Maryland's Coastal Zone Management Program, as outlined in the 2013 memorandum of understanding (State of Maryland and Department of Defense, 2013).

Water Resources Potential Impacts:

- No Action: Short-term, moderate adverse impacts from a worst-case scenario of a rupture that results in discharges into College Creek. No significant impacts.
- Alternative 1: Short-term, minor adverse impacts from construction within College Creek. No long-term impacts. No significant impacts.
- Alternative 2: Similar to Alternative 1 but slightly greater due to more trenching. No significant impacts.
- Alternative 3: Similar to Alternative 1. No significant impacts.
- Option: Additional negligible impacts since utilities would be below creek sediment bed. No significant impacts.

3.2.2.1 No Action Alternative

Under the No Action Alternative, the proposed utility bridge replacement would not occur. The conditions of the current utility bridge would continue to decline. According to the 2019 inspection report, the bridge is in poor condition overall, and numerous deficiencies require correction within 12 months. Direct, short-term, moderate impacts on College Creek would be expected under the No Action Alternative if the bridge failed. Under a worst-case scenario of a bridge failure, five utility lines could be severed. A sudden discharge of materials into College Creek could kill aquatic wildlife and vegetation and locally decrease dissolved oxygen levels. The depletion of dissolved oxygen would likely create a temporary "dead zone" within College Creek from hypoxia until the creek recovers. Given the proximity of the utility bridge to the confluence with the Severn River, indirect, adverse impacts on water quality within the Severn River would also be expected in the event of a sudden bridge failure.

No impacts on groundwater, wetlands, floodplains, or shorelines would be expected. The potential impacts on surface water would be temporary, and the College Creek aquatic system would recover in time. Therefore, the No Action Alternative would not result in significant impacts.

3.2.2.2 Alternative 1 Potential Impacts

The study area for water resources under Alternative 1 includes groundwater, surface water, wetlands, floodplains, shorelines, and coastal waters in the vicinity of the existing utility bridge and the Alternative 1 project area where construction would occur. Implementation of Alternative 1 would not result in significant impacts on water resources, as discussed in the following sections.

Groundwater

Use of BMPs (e.g., good housekeeping measures for construction equipment containing petroleum, oil, and/or lubricants) would prevent leeching of construction-related contaminants into groundwater resources. Furthermore, implementation of Alternative 1 would not increase the demand on pumped groundwater. Therefore, no effects on groundwater resources would be expected as a result of implementing Alternative 1.

Surface Water

Implementation of Alternative 1 would temporarily affect the water quality of College Creek. Potential impacts would occur during in-water demolition and construction of the utility bridge (bridge piles and supports) from ground disturbance, which leads to increased sedimentation and turbidity. Construction would directly affect surface water within College Creek and indirectly affect surface water bodies downstream from the project area (i.e., the Severn River). Use of BMPs such as turbidity or silt curtains would minimize underwater sediment transport and minimize the short-term impacts on water quality. Although increases in turbidity would occur, impacts would be localized and temporary, lasting only during the removal and installation of bridge piles and supports. Sediments would resettle to the creek bed following completion of in-water activities.

Impacts on water resources from runoff during land construction activities would be minimized by construction management and planning. The Navy would prepare a soil erosion- and sediment-control plan and a stormwater management plan when proposed earth disturbance is more than 5,000 square feet or 100 cubic yards. These plans would be developed in accordance with Maryland soil erosion- and sediment-control guidelines. BMPs specific to each construction site would be identified in these plans. Examples of such BMPs include silt fences, silt or turbidity curtains, inlet and outlet protection, erosion-control matting, sediment logs, construction entrances, temporary and permanent seeding, mulching, check dams, and other measures deemed appropriate for that specific action. The use of appropriate sediment- and erosion-control BMPs during the construction phase would minimize short-term adverse impacts on water resources. Therefore, no significant impacts on surface water would be expected.

Wetlands

Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into waters of the United States. USACE and MDE jointly issue this permit, which requires that steps be taken to avoid impacts on aquatic resources, that potential impacts be minimized, and that compensation be provided for all remaining unavoidable impacts. Although the specific construction methods for the proposed bridge have not been determined, Alternative 1 would require a joint license application from USACE and MDE, and the Navy would comply with any provisions determined under the permit. No jurisdictional wetlands are within or near this area. The Navy has also coordinated with the U.S. Coast Guard regarding authorization for bridge construction under Section 9 of the Rivers and Harbors Act. The U.S. Coast Guard determined that a bridge permit for this action is not required; the project is in the

Advance Approval category under 33 CFR 115.70. See letter, dated March 25, 2021, for more information, including application conditions for construction in Appendix B.

College Creek is a non-jurisdictional estuarine and marine deepwater wetland, and work would occur within this tidal wetland. Consequently, a joint federal and state license application for the Alteration of Any Tidal Wetland and/or Tidal Waters in Maryland would be required for any temporary or permanent impacts. This license would require that the action implement BMPs applicable to work in tidal waters and wetlands to mitigate adverse effects. Impacts within College Creek would be temporary and minimized by these BMPs. As such, there would be no net long-term, adverse impacts on estuarine and marine deepwater wetlands from implementation of Alternative 1.

Floodplains

Alternative 1 would be within the 100-year floodplain. Executive Order 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. Under Alternative 1, there would be short-term, minor impacts on floodplains from construction activities adjacent to the shoreline. After construction and demolition are completed, equipment would be removed from the floodplains and the disturbed area restored to the extent practicable to preconstruction conditions. There would be no increase in impervious surface associated with Alternative 1, so runoff characteristics within the floodplain would not be expected to change. Therefore, no significant impacts on floodplains would occur.

Shorelines

Under Alternative 1, the riprap and bulkhead shoreline along College Creek would be integrated or avoided during design or repaired as necessary. The utilities would interconnect just beyond the seawalls on USNA property. Therefore, no significant impacts on shorelines would occur.

Coastal Zone Management

The Alternative 1 project area is within Maryland’s coastal zone. In accordance with Section 307 of the Coastal Zone Management Act, the Navy submitted a Federal Consistency Determination to MDE. The determination shows that the Navy finds the activities conducted under Alternative 1 are consistent to the maximum extent practicable with the enforceable policies of Maryland’s Coastal Zone Management Program as they relate to federal actions. The Critical Area Commission only noted that any tree clearing would require mitigation (Appendix B, email dated July 28, 2020), which would be accomplished by planting trees on a one-to-one basis for trees removed during construction. No additional comments were received from MDE concerning the Navy’s determination; in accordance with the 60-day timeline specified in the Coastal Zone Management Act, concurrence can be presumed. All correspondence is included in Appendix B of this EA.

3.2.2.3 Alternative 2 Potential Impacts

The study area for water resources under Alternative 2 includes groundwater, surface water, wetlands, floodplains, shorelines, and coastal waters in the vicinity of the existing utility bridge and the Alternative 2 project area where construction would occur. Impacts from Alternative 2 would be comparable to those described under Alternative 1, though the potential impacts under Alternative 2 could be slightly greater due to the distance between the existing bridge and the Alternative 2 site, resulting in more potential for utility trenching. As the total difference in length would be at most 2,100 feet and along pavements, additional impacts would be negligible. Alternative 2 may require removal of a tree near Decatur Avenue; tree replacement would be accomplished on a one-to-one basis for trees that are removed during construction. Therefore, implementation of Alternative 2 would not result in significant impacts on water resources.

3.2.2.4 Alternative 3 Potential Impacts

The study area for water resources under Alternative 3 includes groundwater, surface water, wetlands, floodplains, shorelines, and coastal waters in the vicinity of the existing utility bridge and the Alternative 3 project area where construction would occur. Impacts from Alternative 3 would be the same as those described under Alternative 1. Therefore, implementation of Alternative 3 would not result in significant impacts on water resources.

3.2.2.5 Potential Impacts of Underground Utility Option

The study area for the underground utility option includes water resources in the vicinity of the underground utility line (i.e., College Creek and its shoreline). Negligible impacts on water resources would be expected under this utility option. Utility boring and horizontal directional drilling would occur on the banks of the creek and below the sediment 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 creek bed, the Navy would adhere to all necessary permits and regulations. Since the area for the underground utility option would already be disturbed from bridge demolition, impacts would be further minimized. Implementation of the underground utility option, in addition to any of the alternatives, would not result in significant impacts on water resources.

3.3 Geological Resources

Geological resources include topography, geology, and soils. Within water bodies, geological resources also include bathymetry.

The Farmland Protection Policy Act minimizes federal losses of prime or unique farmlands. The project area considered in this EA is primarily aquatic and surrounded by urban development. None of the sites would be considered available for use as farmland. Therefore, prime farmland is not considered further in this EA.

3.3.1 Affected Environment

3.3.1.1 Topography

Topography is typically described with respect to the elevation, slope, and surface features found within a given area. NSA Annapolis is within the Western Shore Lowlands of the Atlantic Coastal Plain Physiographic Province. The topography of USNA is relatively flat, ranging from sea level to 80 feet above mean sea level, with most of the installation around 20 to 40 feet above mean sea level. The project areas along College Creek are between 0 and 15 feet above mean sea level (NAVFAC Washington, 2011).

3.3.1.2 Geology

The geology of an area can include bedrock materials, mineral deposits, and fossil remains. The Atlantic Coastal Plain is underlain by unconsolidated sediments containing gravels, sands, and clays of the Triassic to Quaternary Periods, 100 million years old or younger. Geologic formations occurring in the area include the Aquia Greensand and Matawan Formation, which overlie the Magothy Formation

(Navy, 2012). No major geographical structural features or active fault lines are in the Annapolis area; therefore, geologic hazards are not discussed further in this EA.

3.3.1.3 Soils

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 construction activities and types of land use. Table 3-6 summarizes the soils mapped in the project area.

Table 3-6 Soil Descriptions in the Project Area

Soil Name	*Percent Slope*	*Brief Description of Dominant Soil*	*Location Within Project Area*	*Percent of Project Area*
Annapolis-Urban land complex	0 to 5%	Annapolis soils: · fine sandy loam texture · strongly acidic · well drained · low shrink-swell potential · nonhydric	Shoreline of Upper and Lower Yards, existing bridge, and all alternatives	78%
Annapolis-Urban land complex	5 to 15%	(see previous)	Shoreline of Lower Yard, existing bridge, and Alternative 1	19%
Donlonton-Urban land complex	0 to 5%	Donlonton soils: · fine sandy loam and sandy clay loam textures · strongly acidic · moderately well to somewhat poorly drained · low to moderate shrink-swell potential · nonhydric but with hydric components	Shoreline of Upper Yard, Alternative 2	3%

Sources: NRCS, 2017; NRCS, 2015a; NRCS, 2015b; NAVFAC Washington, 2011
Notes: Percent of project area is approximate and excludes College Creek, which is mapped as water.

3.3.1.4 Bathymetry

Bathymetry is described in terms of the topography of the sea floor or river bottoms where a project would occur. In College Creek, between the King George Street Bridge and the Decatur Avenue Bridge, depth is approximately 1 to 2 feet along the Upper Yard shoreline; 9 to 12 feet in the center of the channel; and 1 to 7feet along the Lower Yard shoreline, as the channel deepens near the Decatur Avenue Bridge (GPS Nautical Charts, 2019; Christopher Consultants, 2020).

3.3.2 Environmental Consequences

Geological resources are analyzed in terms of drainage, erosion, and land subsidence. 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. Standards and controls would minimize soil impacts and prevent or control pollutant releases into stormwater.

3.3.2.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and there would be no change in baseline geological resources. Therefore, no significant impacts on geological 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-term, minor, adverse effects from soil erosion and sedimentation. Minor, localized changes in topography from bridge construction and demolition. No significant impacts.
- Alternative 2: Similar to Alternative 1 but slightly greater due to more trenching. No significant impacts.
- Alternative 3: Similar to Alternative 1. No significant impacts.
- Option: Short-term, minor potential for drilling fluid or other fluid to leak into soils. No significant impact, when combined with any of the action alternatives.

3.3.2.2 Alternative 1 Potential Impacts

The study area for geological resources under Alternative 1 includes the existing utility bridge and the Alternative 1 project area where construction would occur.

The on-land area of disturbance, including construction of the new bridge followed by demolition of the existing bridge, would disturb an estimated 5,000 square feet. MDE requires preparation of an erosion- and sediment-control plan for activities that disturb more than 5,000 square feet (MDE, 2015). Even if the total area of disturbance was slightly less, given this project's location on the College Creek shoreline, the Navy would use BMPs to limit soil runoff from the construction site into College Creek and downstream water bodies.

Most of the project shoreline is Annapolis-Urban land complex, 0 to 5 percent slopes; Annapolis soils have a medium to very high index for surface runoff (NRCS, 2015a). The existing bridge terminus on the Lower Yard as well as a portion of the Alternative 1 construction area are underlain by Annapolis-Urban land complex, 5 to 15 percent slope. Due to the greater slope, this portion of the project area is more prone to erosion. BMPs would ultimately be selected during design and construction that are best suited for site-specific soil and topography. Alternative 1 could also result in minor changes in the localized topography on-land following completion of construction and demolition, limited to the areas where the new bridge would be constructed, and where the former bridge was situated. Any changes in topography would be consistent with the existing slopes between the shoreline and the creek and would not result in significant changes in drainage.

In-water construction of bridge piles and supports, as well as demolition of the existing bridge, would disturb creek sediments while these activities are occurring. College Creek along the Alternative 1 site is approximately 582 feet across and 11 feet at its deepest (Christopher Consultants, 2020). In-water construction would use BMPs such as turbidity or silt curtains to minimize sediment transport from the active construction site. Sediments would resettle to the creek bed following completion of in-water activities.

With the use of BMPs, on-land and in-water potential for soil and sediment transport would be short term and minor. Negligible long-term effects would be expected from localized changes in topography. Therefore, implementation of Alternative 1 would not result in significant impacts on geological resources.

3.3.2.3 Alternative 2 Potential Impacts

The study area for geological resources under Alternative 2 includes the existing utility bridge and the Alternative 2 project area where construction would occur. Alternative 2 would disturb an estimated 5,000 square feet during on-land construction and demolition activities, primarily affecting Annapolis-Urban land complex and Donlonton-Urban land complex, both 0 to 5 percent slope, with a small area having Annapolis-Urban land complex, 5 to 15 percent slope, at the existing bridge. In-water, College Creek is approximately 320 to 500 feet across and 12.4 feet at its deepest (Christopher Consultants, 2020). On-land and in-water impacts on geological resources under Alternative 2 would be similar to those described under Alternative 1. However, on-land utility trenching has slightly more potential for soil disturbance under Alternative 2 (approximately 2,100 feet of additional trenching, accounting for both sides of College Creek). Conversely, the new bridge length over water would be less than Alternative 1, so Alternative 2 could have slightly less in-water sedimentation. The use of site-specific BMPs would limit the potential for soil erosion and sediment transport. Long-term, localized changes in topography would be minor. Therefore, implementation of Alternative 2 would not result in significant impacts on geological resources.

3.3.2.4 Alternative 3 Potential Impacts

The study area for geological resources under Alternative 3 includes the existing utility bridge and the Alternative 3 project area where construction would occur. Alternative 3 would disturb an estimated 5,000 square feet during on-land construction and demolition activities, primarily affecting Annapolis-Urban land complex (0 to 5 percent slope), as this is the mapped soil beneath the project area on the Upper and Lower Yard, with a small area having 5 to 15 percent slope at the existing bridge. In-water, College Creek is approximately 610 feet across and 11 feet at its deepest (Christopher Consultants, 2020). On-land and in-water impacts on geological resources under Alternative 3 would be similar to those described under Alternative 1. The use of site-specific BMPs would limit the potential for soil erosion and sediment transport. Long-term, localized changes in topography would be minor. Therefore, implementation of Alternative 3 would not result in significant impacts on geological resources.

3.3.2.5 Potential Impacts of Underground Utility Option

The study area for the underground utility option includes the directional boring near the existing utility bridge, to include the subsurface soils through which the bore would pass. Annapolis soils, which are in the boring vicinity, are typically very deep with a moderately high saturated hydraulic conductivity in the subsoil. The typical pedon is strongly to extremely acidic throughout its profile (NRCS, 2015a). A geotechnical report would be prepared prior to initiating construction activities to ensure that site-specific soil and geologic features are appropriately considered during design. At this time, the required depth of the boring has not been determined. Along the bore path, the depth of College Creek is approximately 11 feet deep, therefore, the depth would be deeper than that to ensure avoidance of sensitive aquatic environments.

Short-term risks include the potential for exposure to and leaks of drilling fluid into the soil. High hydraulic conductivity in the deeper Annapolis soil horizons suggests potential for contamination to move within the soil or groundwater in the event of a leak. Construction contractors are responsible for ensuring that the transport, use, storage, and disposal of fluids complies with all applicable federal and state regulations, and that good housekeeping measures are employed so that equipment is in appropriate working order. Adherence to policies, procedures, and regulations would minimize the potential impacts from exposure and accidental releases during construction.

In the long term, the highly acidic Annapolis soils could accelerate corrosion of steel or concrete utility casings or conduits. However, compared with the Proposed Action of attaching utilities to the exterior of the utility bridge, the possibility for underground corrosion is probably not greater than potential surface corrosion and weathering. The selection of appropriate underground casings and conduits for the soil properties would minimize possible long-term damages.

For these reasons, implementation of the underground utility option, in addition to any of the alternatives, would not result in significant impacts on geological resources.

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 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 Affected Environment

Cultural resources listed in the NRHP or eligible for listing in the NRHP are “historic properties” as defined by the National Historic Preservation Act (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. Historic properties include archaeological and architectural resources.

The Navy has conducted inventories of cultural resources at the USNA to identify historic properties that are listed or potentially eligible for listing in the NRHP (NAVFAC Washington, 2018b).

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 determined that the APE is defined as a 400-foot radius around all the alternative project boundaries to include views from which the proposed construction would be visible with an extended APE boundary to the north that includes views to and from Halligan Hall on the Upper Yard. This APE includes a portion of both the Upper and Lower Yards, and a portion of the Colonial Annapolis Historic District. See location map of the Colonial Annapolis Historic District in Figure 3-2 and APE boundaries in Figure 3-3.

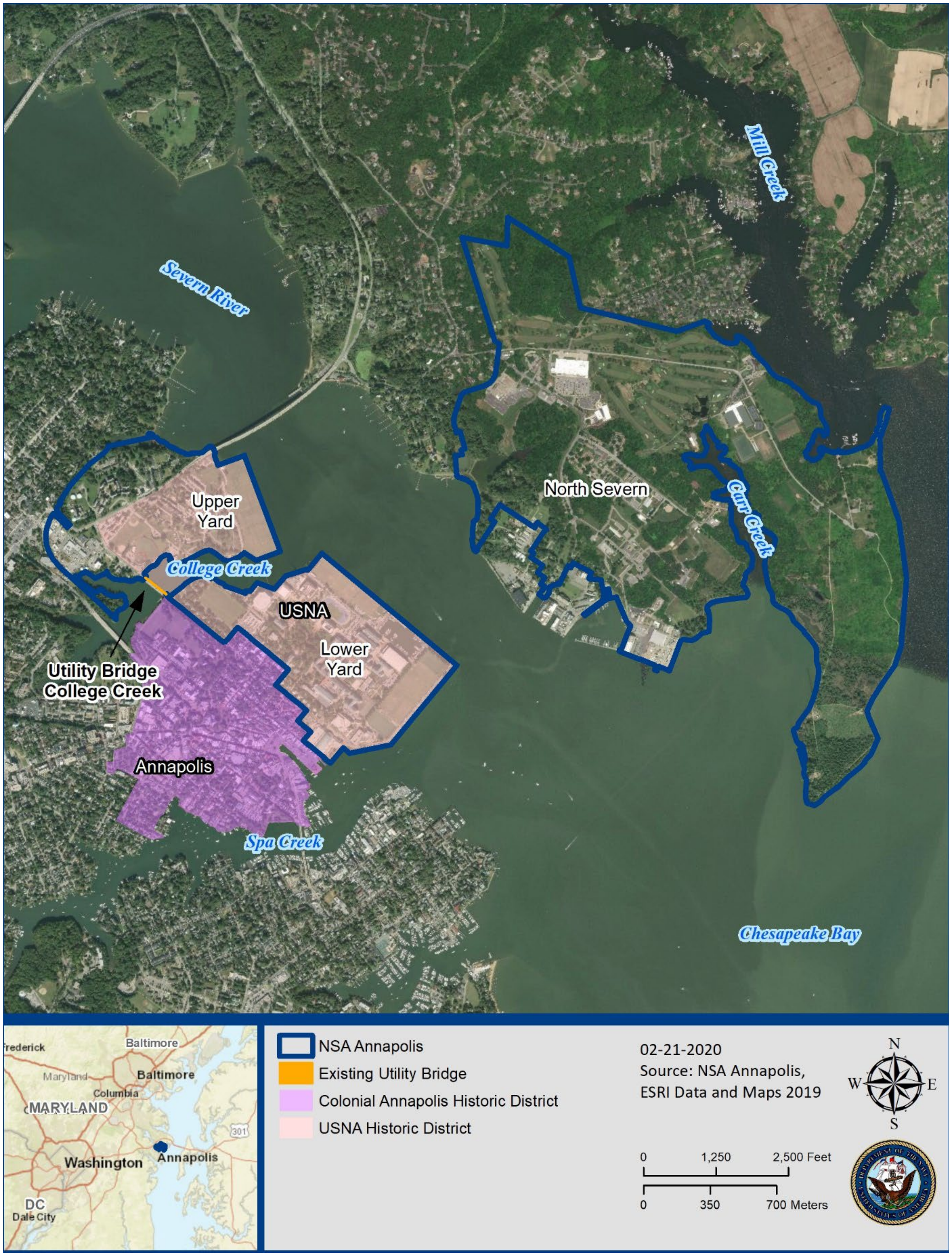


Figure 3-2 Location of Undertaking, the USNA Historic District, and the Colonial Annapolis Historic District

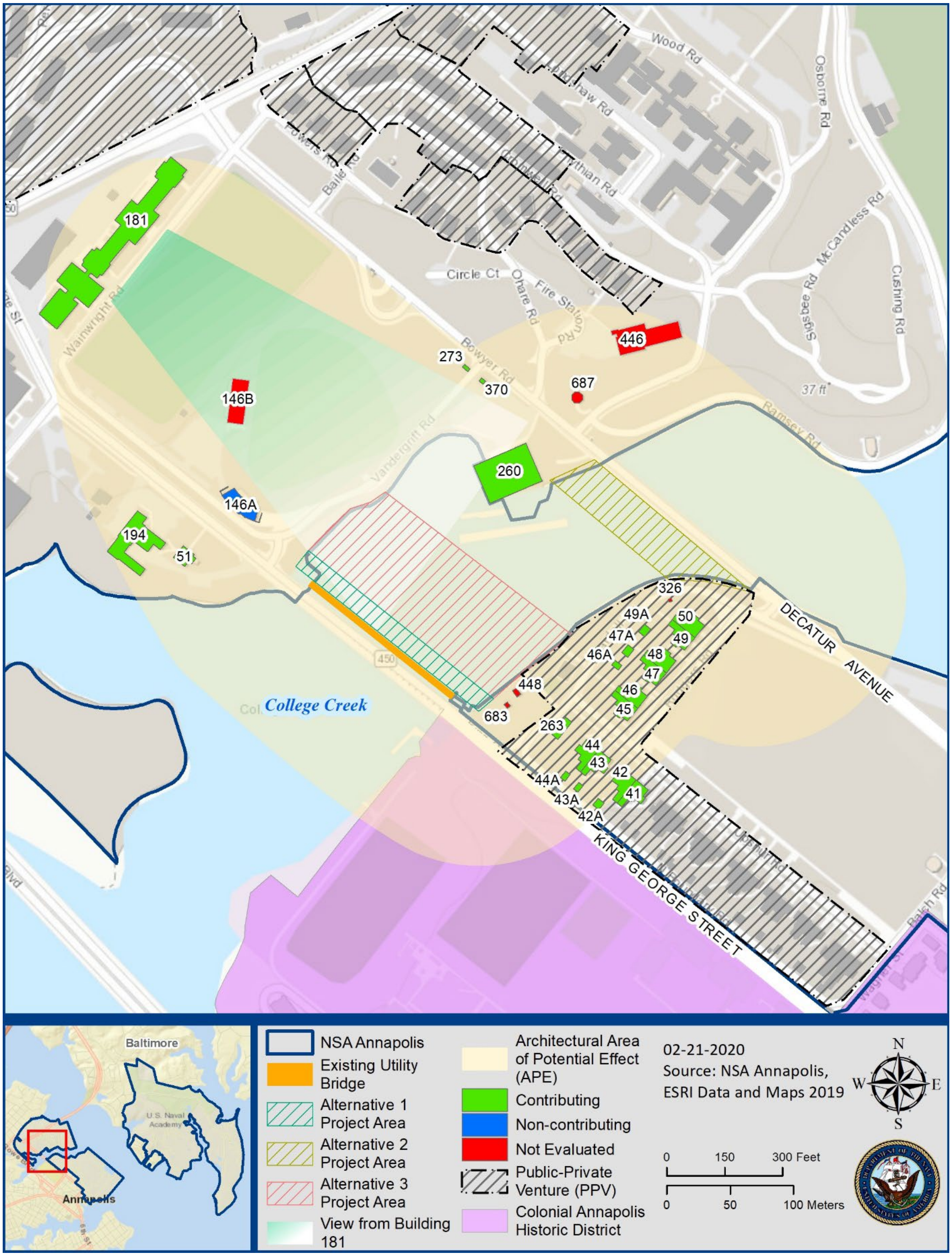


Figure 3-3 Location of Historic Properties Within or Adjacent to the Area of Potential Effect

3.4.1.1 Archaeological Resources

Forty-three archaeological surveys have been conducted at NSA Annapolis including both the Upper and Lower Yards and North Severn Complex. A total of 46 archaeological sites have been identified, counting prehistoric sites and historic domestic and military sites; most of these have not been evaluated. Five sites have been determined NRHP-eligible, and one is listed in the NRHP. None of these sites would be affected by ground disturbance from the undertaking. Four sites are located within approximately a quarter-mile of the three alternatives. Of these four sites, three have been determined not eligible and one has not been evaluated. These would also not be affected by ground disturbance from the Proposed Action (Table 3-7).

Table 3-7 National Register of Historic Places-eligible Archaeological Sites at Naval Support Activity Annapolis and Archaeological Sites Near the Proposed Undertaking

Site Number	*NRHP Status*	*Location*	*Within 0.25 mile of Proposed Undertaking*
18AN550	Listed	North Severn Complex	—
18AP46	Not Evaluated	Upper Yard	Yes
18AP78	Not Eligible	Lower Yard	Yes
18AP79	Not Eligible	Upper Yard	Yes
18AP81	Eligible	Lower Yard	—
18AP82	Eligible	Lower Yard	—
18AP83	Eligible	Lower Yard	—
18AP86	Not Eligible	Upper Yard	Yes
18AN944	Eligible	North Severn Complex	—
18AN1127	Eligible	North Severn Complex	—

Source: NAVFAC Washington, 2018b
Key: NRHP = National Register of Historic Places

3.4.1.2 Architectural Resources

The USNA was designated a National Historic Landmark (NHL) in 1961 and a National Register Historic District in 1966. Both district designations share the same boundary and encompass most of the USNA property. The district includes 139 buildings, structures, and sites that define the USNA character and significance. A variety of landscape features contribute to the district's historical significance, including historic views and vistas, small- and large-scale features, vegetation, and land use (Kuhn & Groesbeck, 2013). Several NRHP-contributing buildings and one NRHP-eligible view are located within the APE (Table 3-8).

A portion of public-private venture housing, managed by the Mid-Atlantic Military Family Communities, LLC, is sited within the APE. These resources are located along Upshur and Rodgers Roads in the Lower Yard of the USNA. Each of these public-private venture-managed resources are NRHP-contributing to the NHL District. This housing is managed under a Programmatic Agreement between the Navy, MHT, and the Advisory Council on Historic Preservation.

Adjacent to the USNA to the southwest is the Colonial Annapolis Historic District, designated an NHL in 1965 and a National Register Historic District in 1966. It covers approximately 230 acres. The only aboveground resource associated with the Colonial Annapolis Historic District that is within view of the proposed project is the Beneficial-Hodson Boathouse located at St. John's College. This resource is sited immediately adjacent to King George Street and faces College Creek.

Table 3-8 Historic Properties within the Area of Potential Effect of the Proposed Undertaking

Facility Number	*Facility Name*	*NRHP Status*	*Location*	*Built Date*	*MHT ID Number*	*PPV-Managed*
41–42	Public Quarters	Contributing	Lower Yard	1897	AA-359	Yes
42a	Detached Garage	Contributing	Lower Yard	1924	AA-359	Yes
43–44	Public Quarters	Contributing	Lower Yard	1899	AA-359	Yes
43a	Detached Garage	Contributing	Lower Yard	1924	AA-359	Yes
44a	Detached Garage	Contributing	Lower Yard	1924	AA-359	Yes
45–46	Public Quarters	Contributing	Lower Yard	1899	AA-359	Yes
46a	Detached Garage	Contributing	Lower Yard	1924	AA-359	Yes
47–48	Public Quarters	Contributing	Lower Yard	1899	AA-359	Yes
47a	Detached Garage	Contributing	Lower Yard	1924	AA-359	Yes
49–50	Public Quarters	Contributing	Lower Yard	1899	AA-359	Yes
49a	Detached Garage	Contributing	Lower Yard	1924	AA-359	Yes
51[*]	Public Quarters	Contributing	Upper Yard	1904	AA-359; AA-2201	—
146A	W. H. G. Fitzgerald Clubhouse	Non-contributing	Upper Yard	1995	AA-359	—
146B	Locker house	Not Evaluated	Upper Yard	N/A	—	—
181	Halligan Hall	Contributing	Upper Yard	1903	AA-2202	—
194[*]	Public Works Maintenance Storage	Contributing	Upper Yard	1904	AA-359; AA-2201	—
260	Hubbard Hall	Contributing	Upper Yard	1930	AA-359; AA-2201	—
263	Grounds Equipment Shed	Contributing	Lower Yard	1928	AA-359; AA-2201	—
273	Lower Field Substation	Contributing	Upper Yard	1932	AA-359	—
326	Sewage Pumping Station	Not Evaluated	Lower Yard	1944	—	—
370	Pump Station #2	Contributing	Upper Yard	1957	AA-359	—
446	Fire Station #1	Not Evaluated	Upper Yard	1997	—	—
448	Well	Not Evaluated	Lower Yard	1962	—	—
683	Pump House for Well #16	Not Evaluated	Lower Yard	1991	—	—
687	Class of 1941 Observatory	Not Evaluated	Upper Yard	1991	—	—
n/a	View to and from Halligan Hall	Contributing (significant landscape feature)	Upper and Lower Yard	1920s–present	—	—
n/a	Beneficial-Hodson Boathouse, St. John's College	Contributing: Colonial Annapolis Historic District	St. John's College	1934	AA-2046; AA-2208	—

Source: NAVFAC Washington, 2018b

Note: [*] Buildings 51 and 194 have been demolished under a separate and unrelated action.

Key: ID = identification; MHT = Maryland Historical Trust; NRHP = National Register of Historic Places; and PPV = Public-Private Venture.

3.4.1.3 Traditional Cultural Properties

No traditional cultural properties are known to be located within the Upper and Lower Yards of USNA.

3.4.2 Environmental Consequences

Analysis of potential impacts on cultural resources considers both direct and indirect impacts. Direct impacts can be the result of physically altering, damaging, or destroying all or part of a resource. Indirect impacts include 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.

Cultural Resources Potential Impacts:

- No Action: Possible direct adverse effects from worst-case scenario depending on the extent of a rupture. Possible indirect adverse effects from the worst-case scenario due to the vibrations from a rupture. No significant impacts.
- Alternative 1: Minor-to-moderate, adverse effects on unknown archaeological deposits due to ground disturbance of the new bridge; a Phase I survey would be completed. No adverse effects on viewsheds in the APE. No adverse effects on the Colonial Annapolis Historic District. No significant impacts.
- Alternative 2: Minor-to-moderate, adverse effects on unknown archaeological deposits due to ground disturbance of the new bridge; a Phase I survey would be completed. No adverse effects on viewsheds in the APE. No adverse effects on the Colonial Annapolis Historic District. No significant impacts.
- Alternative 3: Minor-to-moderate, adverse effects on unknown archaeological deposits due to ground disturbance of the new bridge; a Phase I survey would be completed. No adverse effects on viewsheds in the APE. No adverse effects on the Colonial Annapolis Historic District. No significant impacts.
- Option: The Navy would follow SOP on unanticipated discoveries. No significant impacts.

3.4.2.1 No Action Alternative

Under the No Action Alternative, the utility bridge would continue to deteriorate, and various utilities provided to the USNA, such as heat and hot water, would be negatively affected. In the worst-case scenario of the No Action Alternative, the bridge would fail and cause a utility line rupture, which could cause possible adverse effects on nearby cultural resources. The extent of such a rupture is unknown, but there could be possible direct effects on nearby historic properties. In addition, a rupture could cause indirect adverse effects due to the vibrations caused by such an event. The vibrations could potentially damage foundations, windows, framing, plaster, chimneys, and aesthetic features of nearby historic buildings, the majority of which are contributing to the NHL district. These adverse effects would not affect the NRHP status of these affected cultural resources and their ability to convey their historic significance to the historic district. Therefore, the No Action Alternative would not result in significant impacts on cultural resources.

3.4.2.2 Alternative 1 Potential Impacts

The APE for cultural resources under Alternative 1 is the same for all three alternatives: a 400-foot buffer around the alternative project boundaries with an extended boundary to the north that includes views to and from Halligan Hall (Building 181) on the Upper Yard. This includes all cultural resources that may have the project area within its viewshed.

The construction of the new utility bridge adjacent to the current bridge could have minor-to-moderate, adverse effects on unknown archaeological resources along the shoreline and in College Creek where there would be ground disturbance. The northwest shoreline is previously disturbed from the construction of the baseball stadium, Vandergrift Road, Hubbard Hall boathouse and associated parking, installation of underground utilities, and hardened seawalls lining College Creek. Therefore, intact archaeological resources are unlikely to be present on the northwest shoreline of College Creek. A Phase 1 survey of the southeast shoreline would be conducted prior to any ground disturbance.

There would be no direct adverse effects on architectural resources from the construction of a new utility bridge and the demolition of the current bridge under Alternative 1.

On USNA, the construction of the new utility bridge would introduce a new element within the viewshed to and from Halligan Hall, as well as the NRHP-eligible resources in the APE: USNA Buildings 41–51, 194, 260, 263, 273, and 370, as shown in Figure 3-4. It must be noted that Buildings 51 and 194 have been demolished under a separate, unrelated action. The bridge would be along the edge of the district line and along an existing roadway and would not obstruct the view from Halligan Hall across College Creek to the Lower Yard. Furthermore, this location is within the same approximate location of the current utility bridge, which was in place when the viewshed was determined contributing. Therefore, Alternative 1 would have no adverse effect on the USNA.

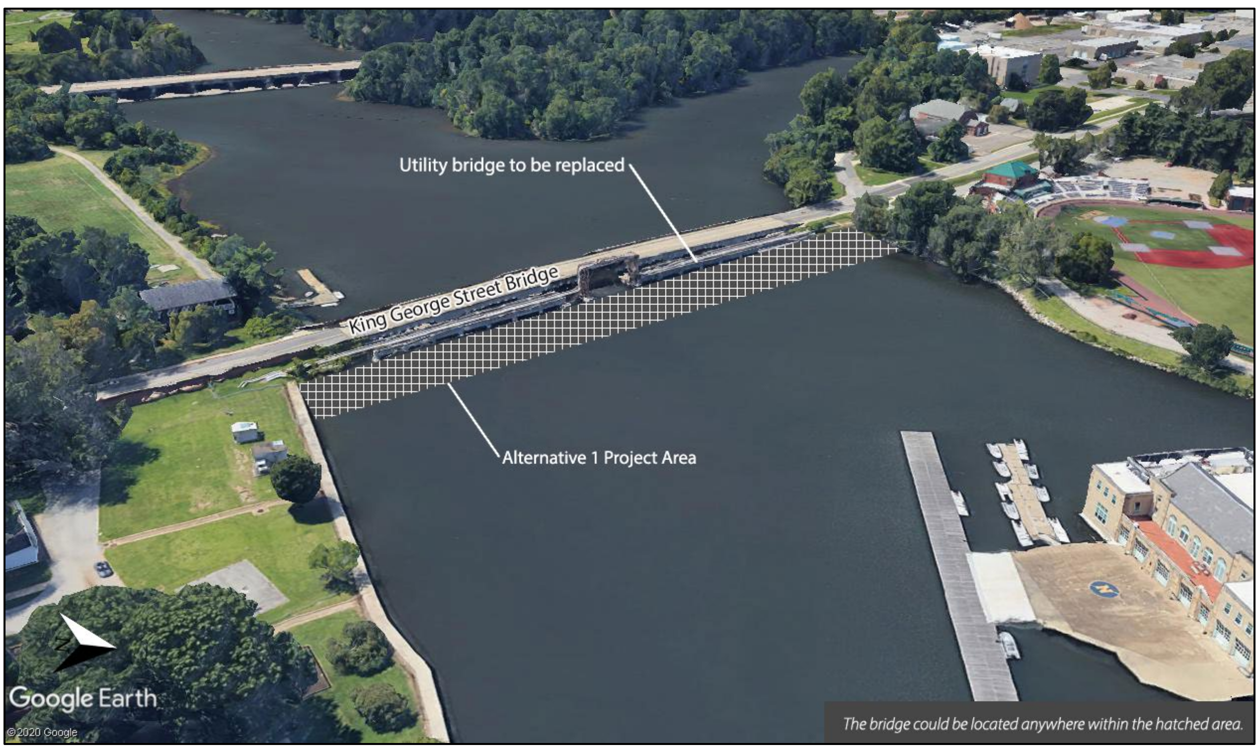


Figure 3-4 Viewshed around Alternative 1 Location

The new utility bridge under Alternative 1 would be only minimally visible from the Colonial Annapolis Historic District, specifically from the St. Johns College Beneficial-Hodson Boathouse, which is sited immediately adjacent to King George Street and faces College Creek. Visibility would be limited to the northern corner of the Historic District and would be partially obstructed by the King George Street Bridge. No significant viewsheds within the Colonial Annapolis Historic District would be affected; therefore, Alternative 1 would have no adverse effect on the Historic District.

The Navy consulted with MHT on Alternative 1 as the preferred location for the proposed utility bridge. The Navy considered a precast concrete bridge to be the most appropriate design at this location. Here, the profile of a precast concrete bridge would be lower than the highest elevation of the existing utility bridge and similar in height as the top elevation of the barrier wall of the King George Street vehicle bridge. The Alternative 1 location and lower profile of a precast concrete bridge would minimize its visibility from the Colonial Annapolis Historic District and the contributing view from Halligan Hall across College Creek towards the USNA Lower Yard. In a letter dated February 18, 2022 (see Appendix B), MHT concurred that the Alternative 1 location with a precast concrete bridge would have no adverse effect on historic properties.

However, MHT noted that the project area may contain terrestrial and submerged aquatic resources that are yet unidentified. Therefore, once detailed design plans are available, MHT requested the following:

- When available, the Navy will provide copies of the detailed design plans for the Alternative 1 location with the precast concrete bridge that illustrate final design location, elements, and materials and show the proposed limits of disturbance and staging area for construction. These would document the proposed appearance of the bridge on the landscape and identify whether the extent of anticipated underwater disturbance for the bottom impacts extends beyond the area that has already been disturbed for the construction of the current bridge. If the APE extends beyond the area previously disturbed, MHT indicated that a Phase I underwater survey would likely be requested to identify whether submerged resources are present.
- When available, the Navy will provide a copy of the draft report for the Phase I terrestrial archaeological survey of the project impact area on the southeast shoreline of College Creek.

MHT also requested copies of comments from other consulting parties on the Navy's preferred location and design. See correspondences in Appendix B.

The Navy will continue Section 106 consultation through the design and construction phases to mitigate any potential adverse effects associated with the presence of unknown archaeological resources. An archaeological survey is planned along the shoreline to identify historic properties within the APE. Once the design is completed, an underwater archaeological APE will be prepared and consultation with the SHPO to determine if an underwater archaeological survey is needed. If any terrestrial or submerged historic property would be adversely affected, the Navy will pursue a Memorandum of Agreement regarding adverse effects. Therefore, implementation of Alternative 1 would not result in significant impacts on cultural resources.

3.4.2.3 Alternative 2 Potential Impacts

The APE for cultural resources under Alternative 2 is the same as Alternative 1 and includes a 400-foot buffer around the alternative project boundaries with an extended boundary to the north that includes views to and from Halligan Hall (Building 181) on the Upper Yard. There could be adverse effects on unknown archaeological resources similar to Alternative 1; a Phase 1 survey of the southeast shoreline would be conducted prior to any ground disturbance.

On USNA, the construction of the new utility bridge would introduce a new element within the viewshed to and from Halligan Hall (see Figure 3-5). The new bridge would also introduce a new visual element to and from Hubbard Hall (Building 260), and to and from Quarters 41–50. This alternative may alter the visual connection between the Upper and Lower Yards, which is historically significant; however, the closer proximity to the Decatur Avenue Bridge minimizes its potential visual impact on surrounding viewsheds. Furthermore, this would not obstruct the view from Halligan Hall across College Creek to the Lower Yard. Therefore, Alternative 2 would have no adverse effect on the USNA.

There could be minor-to-moderate, adverse effects on unknown archaeological deposits due to ground disturbance of the new bridge. No adverse effects on viewsheds in the APE or the Colonial Annapolis Historic District would occur. This alternative is not within the viewshed of Colonial Annapolis Historic District, and, therefore, would have no adverse effects on these cultural resources. Therefore, implementation of Alternative 2 would not result in significant impacts on cultural resources. However, if selected, Alternative 2 would require consultation with MHT pursuant to Section 106.

Figure 3-5 Viewshed around Alternative 2 Location

3.4.2.4 Alternative 3 Potential Impacts

The APE for cultural resources under Alternative 3 is the same as Alternative 1 and includes a 400-foot buffer around the alternative project boundaries with an extended APE boundary to the north that includes views to and from Halligan Hall on the Upper Yard. There could be adverse effects on unknown archaeological resources similar to Alternative 1; a Phase 1 survey of the southeast shoreline would be conducted prior to any ground disturbance.

On USNA, the construction of the new utility bridge would introduce a new element within the viewshed to and from Halligan Hall, as well as to and from Hubbard Hall (Building 260) and to and from Quarters 41–50 (see Figure 3-6). The utility bridge within this alternative would be independent of other built resources and associated features that could minimize its impact, as in Alternative 1. The utility bridge would be constructed on “open” water in an open viewshed. There could be minor, adverse effects on the viewshed associated with USNA Building 51 due to the distance and obstructing vegetation, until such time as Building 51 is demolished under a separate and unrelated action. However, the new bridge would not obstruct the view from Halligan Hall across College Creek to the Lower Yard. Therefore, Alternative 3 would have no adverse effect on the USNA.

This alternative may also be visible, although minimally, from the Colonial Annapolis Historic District. Visual obstruction by the King Street Bridge reduces the effects of a new bridge in this location to the Colonial Annapolis Historic District. Therefore, this alternative would have no adverse effect on the Colonial Annapolis Historic District.

Therefore, implementation of Alternative 3 would not result in significant impacts on cultural resources. However, if selected, Alternative 3 would require consultation with MHT pursuant to Section 106.

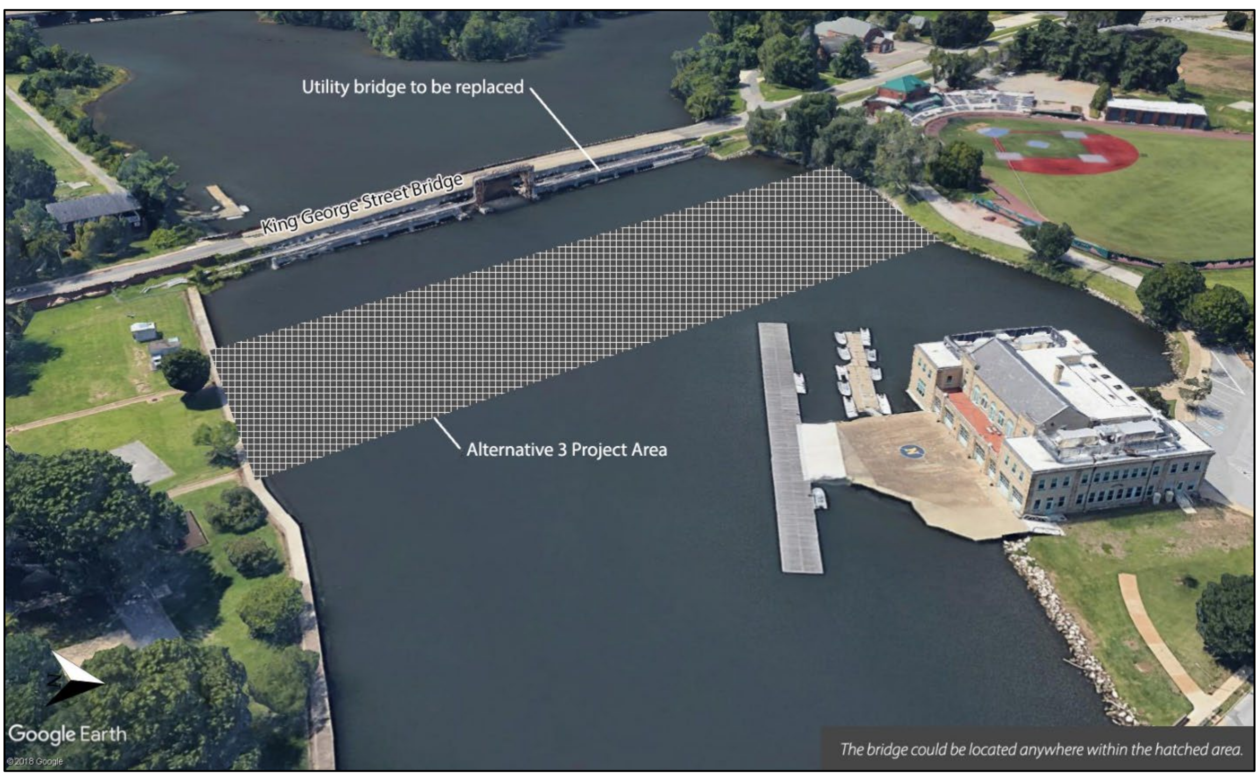


Figure 3-6 Viewshed around Alternative 3 Location

3.4.2.5 Potential Impacts of Underground Utility Option

The APE for the underground utility option is the same as Alternative 1 and includes a 400-foot buffer around the alternative project boundaries with an extended APE boundary to the north to include views to and from Halligan Hall on the Upper Yard. The underground utility option would bore all the utilities underground except for one utility line, which would remain aboveground and attached to the proposed utility bridge structure. The utilities would be bored underneath College Creek using a technique such as horizontal directional drilling. 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. Similar to Alternative 1, there could be minor-to-moderate, adverse effects on unknown archaeological deposits due to ground disturbance of the underground utilities. In the event on an unanticipated discovery, the Navy would follow specific procedures detailed in Standard Operating Procedure (SOP) 4 of the Integrated Cultural Resources Management Plan. Therefore, implementation of the underground utility option, in addition to any of the alternatives, would not result in significant impacts on cultural resources.

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 three major categories: (1) terrestrial vegetation, (2) terrestrial wildlife, and (3) marine species.

3.5.1 Affected Environment

No federal rare, threatened, or endangered species are known to occur at the Lower and Upper Yards, but several protected species have the potential to occur. Northern long-eared bat (*Myotis septentrionalis*), a federally threatened species, has not been documented on NSA Annapolis (NAVFAC Washington, 2017), but it is considered by USFWS to be potentially present within the project area (USFWS, 2021a). Monarch butterfly (*Danaus plexippus*), a candidate species for listing under the Endangered Species Act, is also considered by USFWS to be potentially present in the project area (USFWS, 2021a). The bald eagle (*Haliaeetus leucocephalus*), which is delisted but still protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, is present in the vicinity. The closest bald eagle nest is documented south of the Chesapeake Bay Bridge, approximately two miles east of NSA Annapolis (NAVFAC Washington, 2011). MDNR, Wildlife and Heritage Service, noted there are no records for federal- or state-listed rare, threatened, or endangered species within the project area (Appendix B, dated August 4, 2020).

In addition, some protected fish and marine mammals have potential to be present in the waters near NSA Annapolis. Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*), both listed as endangered under the Endangered Species Act, are present in the Chesapeake Bay and some of its tributary rivers but are unlikely to be present in College Creek or the Severn River. Several federally protected marine mammal and sea turtle species also have the potential to occur in the Chesapeake Bay; bottlenose dolphin (*Tursiops truncatus*) has been observed in the Severn River near NSA Annapolis, but other marine mammals and sea turtles have not. These species are discussed further in Section 3.5.2.3. Protected species, including state-listed species, are discussed in each respective section below.

3.5.1.1 Terrestrial Vegetation

Terrestrial vegetation includes plants in upland and freshwater aquatic (e.g., wetlands, freshwater streams, and rivers) environments.

NSA Annapolis contains diverse vegetation communities including forested areas, grasslands, improved (developed) land, and agricultural fields. The Upper and Lower Yards of the USNA are predominantly landscaped areas and improved lands apart from a small four-acre forested peninsula reaching into College Creek, approximately 450 feet upstream from the utility bridge. This four-acre peninsula is the last tract of mature natural forest within Annapolis (NAVFAC Washington, 2011).

No forests or woodlands exist along the College Creek banks where the utility bridge and alternative project boundaries are located; the land in these locations consists of maintained lawn with some landscaped and urban trees and shrubs along the existing seawall.

No federally listed threatened, endangered, or candidate plant species occur on NSA Annapolis. Terrestrial surveys were conducted at USNA and Greenbury Point (part of North Severn) in 1996, but aquatic surveys of the adjacent creeks and rivers were not conducted. The 1996 survey identified Lancaster's sedge (*Cyperus lancastriensis*), which is considered "Status Uncertain" by MDNR Wildlife and Heritage Service. Subsequent surveys also identified grass-leaved arrowhead (*Sagittaria graminea*), also listed as "Status Uncertain," and broad-fruited bur-reed (*Sparganium eurycarpum*), classified as S3, rare-to-uncommon in the state. Carolina milkvine (*Matelea carolinensis*) is considered state endangered and classified as S2S3, rare-to-vulnerable in the state (MDNR, 2019); this species has been observed in several locations in North Severn but does not exist along the College Creek shoreline.

3.5.1.2 Terrestrial Wildlife

Terrestrial wildlife includes all animal species (i.e., insects and other invertebrates, freshwater fish, amphibians, reptiles, birds, and mammals) focusing on the species and habitat features of greatest importance or interest. Fish resources at and near NSA Annapolis are found in the brackish/saltwater fisheries of the Severn River, College Creek, Spa Creek, Carr Creek, and Mill Creek. Since these water bodies are not freshwater, fish are described in Section 3.5.2.3, Marine Species.

NSA Annapolis provides food, cover, and nesting opportunities for a variety of wildlife species, many of which use NSA Annapolis for all or part of their life cycle requirements. Generally, the wildlife species (mammals, birds, reptiles, amphibians, and insects) known to occur at NSA Annapolis are consistent with native fauna communities throughout the mid-Atlantic coastal region. Although detailed fauna surveys have not been completed, the habitat diversity at NSA Annapolis provides valuable breeding, foraging, and stopover habitat for many species in the increasingly urbanized Annapolis area. NSA Annapolis is also home to a variety of nuisance wildlife and feral pets. White-tailed deer (*Odocoileus virginianus*), resident Canada goose (*Branta canadensis*), raccoon (*Procyon lotor*), and feral cats (*Felis catus*) are the most prominent nuisance species of concern.

Amphibians and Reptiles

An amphibian and reptile survey was conducted in 1997 and 1998 at Greenbury Point on North Severn and the four-acre woods peninsula on the Upper Yard along College Creek. Eight species of frogs and toads were observed over the two-year period, including the American toad (*Bufo americanus*), gray treefrog (*Hyla versicolor*), spring peeper (*Pseudacris crucifer*), bullfrog (*Rana catesbeiana*), green frog (*Rana clamitans*), pickerel frog (*Rana palustris*), wood frog (*Rana sylvatica*), and southern leopard frog (*Rana utricularia*). Five species of turtles, five species of snakes, and one salamander species were also observed. The turtles found include the common snapping turtle (*Chelydra serpentina*), northern diamondback terrapin (*Malaclemys terrapin*), eastern mud turtle (*Kinosternon subrubrum*), eastern painted turtle (*Chrysemys picta*), and eastern box turtle (*Terrapene carolina*). Snake species include the eastern worm snake (*Carphophis amoenus*), northern black racer (*Coluber constrictor*), black rat snake (*Elaphe obsoleta*), northern water snake (*Nerodia sipedon*), and eastern garter snake (*Thamnophis sirtalis*). The redback salamander (*Plethodon cinereus*) was also observed (NAVFAC Washington, 2016).

Mammals

General observations of mammals at NSA Annapolis include white-tailed deer, groundhog (*Marmota monax*), eastern cottontail (*Sylvilagus floridanus*), raccoon, gray squirrel (*Sciurus carolinensis*), gray fox (*Urocyon cinereoargenteus*), and red fox (*Vulpes vulpes*). Small mammals that have been observed at NSA Annapolis include short-tailed shrew (*Blarina brevicauda*), eastern mole (*Scalopus aquaticus*), meadow vole (*Microtus pennsylvanicus*), and house mouse (*Mus musculus*) (NAVFAC Washington, 2011). An acoustic survey for bats was conducted in May 2016, documenting the following bat species at NSA Annapolis: the big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), silver-haired bat (*Lasionycteris noctivagans*), evening bat (*Nycticeius humeralis*), and hoary bat (*Lasiurus cinereus*) (NAVFAC Washington, 2017). An acoustic bat survey conducted in June 2019 also documented little brown bat (*Myotis lucifugus*) at NSA Annapolis (NAVFAC Washington, 2020). A list of federally protected species potentially present within the project area was obtained from the USFWS through their Information for Planning and Consultation (IPaC) tool, and the northern long-eared bat (*Myotis septentrionalis*), a federally threatened species, was listed as potentially occurring (USFWS, 2021a). The northern long-eared bat was not observed during acoustic and mist-net bat surveys that were conducted at NSA Annapolis in 2016 and 2019 (NAVFAC Washington, 2017; 2020).

Birds

Over 150 bird species have been documented at NSA Annapolis and the adjacent water bodies, including songbirds, shorebirds, wading birds, waterfowl, and raptors. Common bird species in the region frequently use the installation’s open areas, forested areas, and urban settings. The marshes and shoreline of NSA Annapolis provide habitat for several shorebirds and wading birds including several gull species, the great blue heron (*Ardea herodias*), snowy egret (*Egretta thula*), and green heron (*Butorides virescens*), as well as numerous red-winged blackbirds (*Agelaius phoeniceus*). Osprey (*Pandion haliaetus*), bald eagle, forest interior dwelling birds, and waterfowl are common in the region.

The ecological communities at NSA Annapolis provide important stopover habitat for migratory birds during spring and fall migration, which are protected under the Migratory Bird Treaty Act. Maryland is an important stopover for breeding and overwintering in the Atlantic Flyway, a major migratory flight route in North America, especially for waterfowl in winter and wading birds in summer (NAVFAC Washington, 2011). College Creek is considered a historic waterfowl concentration area by the Maryland Department of Natural Resources Wildlife and Heritage Service (see letter dated August 4, 2020, in Appendix B).

Several state-listed endangered bird species—mourning warbler (*Geothlypis philadelphia*), royal tern (*Thalasseus maximus*), and short-eared owl (*Asio flammeus*)—and one state-listed threatened species—least tern (*Sterna antillarum*)—have been observed at or near North Severn.

Invertebrates

Many butterfly species are known to occur at Greenbury Point on North Severn. The most commonly occurring butterflies include the orange sulphur (*Colias eurytheme*), clouded sulphur (*Colias philodice*), common buckeye (*Junonia coenia*), cabbage white (*Pieris rapae*), and monarch. Monarch butterfly is a candidate species for listing under the Endangered Species Act (USFWS, 2021a).

3.5.1.3 Marine Species

Marine Vegetation

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

Submerged aquatic vegetation (SAV) beds are considered Special Aquatic Sites under Section 404 of the Clean Water Act (40 CFR Part 230, Section 404 (b)(1)) and are an important resource in the Chesapeake Bay. SAV provide protection and nursery habitat for a broad range of aquatic organisms and contribute to the oxygenation of the water.

Ongoing mapping of SAV by organizations such as the Chesapeake Bay Foundation and local watershed groups such as Friends of College Creek have mapped SAV in several rivers and creeks along NSA Annapolis. Mapping efforts in College Creek indicates SAV occurs in the area but is limited to the upper portions of the creek. No SAV has been found in the portions of the creek to the east of King George Street Bridge, and the shoreline of bulkhead and riprap along this section does not provide suitable SAV habitat (Friends of College Creek, 2007). One species of SAV, claspingleaf pondweed (*Potamogeton perfoliatus*), which is classified as S3 by MDNR Wildlife and Heritage Service, has been mapped in the upper portion of College Creek (NAVFAC Washington, 2011). According to the Virginia Institute of Marine Science, which conducts regional SAV monitoring and restoration in Chesapeake Bay the watershed, SAV beds have not been observed here since 2011 (Virginia Institute of Marine Science, 2020).

The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) conducted an SAV survey in the project area on June 16, 2022 (see email in Appendix B dated June 30, 2022). Floating patches of horned pondweed (*Zannichellia palustris*) were observed in the project area of College Creek, but no rooted SAV was documented.

Marine Mammals and Sea Turtles

NMFS maintains jurisdiction over whales, dolphins, porpoises, seals, and sea lions. USFWS maintains jurisdiction for certain other marine mammal species, including walruses, polar bears, dugongs, sea otters, and manatees. USFWS and NMFS share federal jurisdiction for sea turtles with the USFWS having lead responsibility on the nesting beaches and NMFS on the marine environment.

Ten marine mammal species and five sea turtle species have been recorded in the Chesapeake Bay and may occur, if rarely, in the vicinity of NSA Annapolis. Table 3-9 lists the species that have known occurrence within the Chesapeake Bay and provides details regarding the likelihood of these species occurring near NSA Annapolis.

Table 3-9 Marine Mammals and Sea Turtles With Potential to Occur Near NSA Annapolis

Common Name	***Scientific Name***	***ESA Status***	***Stranding, Bycatch, or Sightings Near NSA Annapolis***
North Atlantic right whale	*Eubalaena glacialis*	FE	No
Humpback whale – West Indies DPS	*Megaptera novaeangliae*	Not listed	No
Fin whale	*Balaenoptera physalus*	FE	No
West Indian manatee	*Trichechus manatus*	FT	No
Bottlenose dolphin	*Tursiops truncatus*	Not listed	Observed at the mouth of the Severn River near NSA Annapolis in 2016 and in 2018 (Jedra, 2016; Dance, 2018)
Common dolphin	*Delphinus delphis*	Not listed	No
Harbor porpoise	*Phocoena phocoena*	Not listed	No
Harbor seal	*Phoca vitulina*	Not listed	No
Grey seal	*Halichoerus grypus*	Not listed	No
Harp seal	*Pagophilus groenlandicus*	Not listed	No
Leatherback sea turtle	*Dermochelys coriacea*	FE	Have stranded as far north as Kent Island in the Chesapeake Bay, approximately 7 miles east of NSA Annapolis (Litwiler, 2001)
Loggerhead sea turtle	*Caretta caretta*	FT	Have stranded as far north as Hart Miller Island in the Chesapeake Bay approximately 20 miles north of NSA Annapolis (Litwiler, 2001)
Atlantic green sea turtle	*Chelonia mydas*	FT	No
Atlantic hawksbill sea turtle	*Eretmochelys imbricata*	FE	No
Kemp's ridley sea turtle	*Lepidochelys kempii*	FE	Have stranded as far north as Kent Island in the Chesapeake Bay, approximately 7 miles east of NSA Annapolis (Litwiler, 2001)

Source: NAVFAC Washington, 2011
Key: DPS = distinct population segment; ESA = Endangered Species Act; FE = federally endangered; FT = federally threatened; NSA = Naval Support Activity.

Areas of the Chesapeake Bay are designated as "primary occurrence" for sea turtles in the areas and habitats where species are expected to be primarily found; areas of "secondary occurrence" are areas and habitat where species may be found, especially during anomalous environmental conditions like a hurricane; and areas of "rare occurrence" are where the species is not expected to be found with any regularity. The vicinity of NSA Annapolis is designated as an area of primary occurrence for Kemp's ridley (endangered) and green (threatened) sea turtles from May to October; an area of secondary occurrence for the loggerhead (threatened) from May to June and September to October; and an area of rare occurrence for leatherback (endangered) from May to October. During the months of July and August, the mouth of the Severn River is designated as an area of primary occurrence and the tributaries as areas of secondary occurrence for the loggerhead turtle. Hawksbill turtles are considered extralimital in the Chesapeake Bay. No stranding, bycatch, or sightings have been documented for NSA Annapolis for any of these sea turtles (NAVFAC Washington, 2011).

Fish

MDNR conducted fish surveys in the Severn River from 1989 through 1994. Fish that occur in the Severn River are influenced by salinity, with freshwater fish dominating the fresher tidal headwater areas of the tributaries, and more salt-tolerant marine fish in the major tidal waters. Of the 40 species captured during the surveys, most were estuarine residents; however, 12 species were marine migrants and 7 were primarily freshwater species. The most commonly observed fish include the inland silverside (*Menidia beryllina*), Atlantic menhaden (*Brevoortia tyrannus*), striped killifish (*Fundulus majalis*), striped bass (*Morone saxatilis*), mummichog (*Fundulus heteroclitus*), Atlantic silverside (*Menidia menidia*), bay anchovy (*Anchoa mitchilli*), Atlantic croaker (*Micropogonias undulatus*), white perch (*Morone americana*), and spot (*Leiostomus xanthurus*). Shellfish within the zones of higher salinity within the Severn River include blue crab (*Callinectes sapidus*), oyster, and clam. Pursuant to the Endangered Species Act, federally protected species present in the Chesapeake Bay and some of its tributaries, but unlikely to occur in College Creek, are the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*).

The 2007 College Creek Watershed Assessment surveyed for macrofaunal species via beach seine and observed 20 species of fish. The most commonly observed fish along bulkhead shorelines include Atlantic menhaden, pumpkinseed (*Lepomis gibbosus*), Atlantic silverside, mummichog, white perch, striped killifish, bluefish (*Pomatomus saltatrix*), and Atlantic needlefish (*Strongylura marina*) (Friends of College Creek, 2007). Refer to Appendix D for detailed information on fish species, including anadromous species.

Essential Fish Habitat

Fish are vital components of the marine ecosystem. They have great ecological and economic aspects. To protect this resource, NMFS works with the regional fishery management councils to identify the essential habitat for every life stage of each federally managed species using the best available scientific information. EFH designations emphasize the importance of habitat protection to healthy fisheries and serve to protect and conserve the habitat of marine, estuarine, and anadromous finfish; mollusks; and crustaceans. EFH is defined as necessary habitat that is required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. 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 described for approximately 1,000 managed species to date.

EFH has been designated for 11 fish species in College Creek. In accordance with the Magnuson-Stevens Fisheries Conservation and Management Act, consultation with NMFS 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 3-10 in College Creek. For context within the EFH descriptions below the table, the salinity of the Severn River averages between approximately 6 and 12 parts per thousand (ppt) throughout the year, with lower salinity occurring in the spring and the higher salinity occurring in the fall (Severn Riverkeeper, 2012). Salinity within College Creek ranges from approximately 6 to 11 ppt (Friends of College Creek, 2007). Eight of the species with designated EFH are either unlikely to inhabit, or are incapable of persisting within, College Creek: scup (*Stenotomus chrysops*), black sea bass (*Centropristis striata*), Atlantic butterfish (*Peprilus triacanthus*), little skate (*Leucoraja erinacea*), Atlantic herring (*Clupea harengus*), red hake (*Urophycis chuss*), winter skate (*Leucoraja ocellata*), and clearnose skate (*Raja eglanteria*) (NAVFAC, 2021). Three of the species with designated EFH may be found in College Creek: bluefish (*Pomatomus saltatrix*), summer flounder (*Paralichthys dentatus*), and windowpane flounder (*Scophthalmus aquosus*) (NAVFAC, 2021). All 11 species for which EFH has been mapped are summarized in the following text and described in detail in Appendix D, but only the three species that may be found in College Creek are carried forward for further analysis in Section 3.5.2.

Table 3-10 Essential Fish Habitat and Life Stages Mapped Near Proposed Action

Common Name	*Scientific Name*	*Eggs*	*Larvae*	*Juveniles*	*Adults*
Bluefish*	*Pomatomus saltatrix*	—	—	Yes	Yes
Scup	*Stenotomus chrysops*	—	—	Yes	Yes
Summer flounder*	*Paralichthys dentatus*	—	Yes	Yes	Yes
Black sea bass	*Centropristis striata*	—	—	Yes	Yes
Atlantic butterfish	*Peprilus triacanthus*	Yes	Yes	—	Yes
Little skate	*Leucoraja erinacea*	—	—	—	Yes
Atlantic herring	*Clupea harengus*	—	—	Yes	Yes
Red hake	*Urophycis chuss*	Yes	Yes	Yes	Yes
Windowpane flounder*	*Scophthalmus aquosus*	—	—	Yes	Yes
Winter skate	*Leucoraja ocellata*	—	—	—	Yes
Clearnose skate	*Raja eglanteria*	—	—	Yes	Yes

Sources: NMFS, 2019; NAVFAC 2021
Note: * These species potentially occur in College Creek. See also Appendix D.

An increased level of conservation is afforded to areas of EFH that are further designated as Habitat Areas of Particular Concern (HAPC). This special designation can be assigned due to an important ecological function the habitat may afford to a species, if a habitat is particularly sensitive to degradation caused by humans, current and future development activities that could stress the habitat, and if the habitat is rare (50 CFR 600.815(a)(8)). HAPC for summer flounder is designated for areas where juvenile or adult EFH has been identified and occurrence of all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes overlap. Juveniles use estuarine marsh creeks, seagrass beds, mud flats, and open bay areas for habitat in water temperatures greater than 37.4 degrees Fahrenheit and salinities ranging from 10 to 30 ppt (Mid-Atlantic Fishery Management Council, 1998). These conditions were identified for College Creek; however, as described in the Marine Vegetation subsection above, rooted SAV beds have not been observed in the project area (Virginia Institute of Marine Science, 2020; email from Jonathan Watson dated June 30, 2022). Additionally, the area of College Creek east of King George Street Bridge, where the Proposed Action would occur, had only one documented occurrence of horned pondweed (Friends of College Creek, 2007). Therefore, designated HAPC is not anticipated to exist in College Creek.

The Navy prepared an EFH Assessment, which is included as Appendix D of this EA (NAVFAC, 2021). Refer to Appendix D for more detailed information on EFH and forage fish species, which are managed as potential prey within EFH, within the study area.

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 (0.5–25 ppt) and seawater (>25 ppt) salinity zones (NOAA, 1998a). Bluefish has been collected in low densities in College Creek; its abundance is expected to be low, but transient individuals may be found. This species may be present and, therefore, affected by the Proposed Action; it is evaluated further in the EA (NAVFAC, 2021).

Scup (*Stenotomus chrysops*): Scup is a migratory, schooling, bottom-dwelling species found along the Atlantic coast. Inshore EFH for juvenile and adult scup includes the estuaries within mixing- and seawater-salinity zones. Scup is generally found during the summer and spring in estuaries and bays with various sand, mud, mussel, and eelgrass bed-type substrates in water temperatures greater than 45 degrees Fahrenheit and salinities greater than 15 ppt (NOAA, 1998b). While scup is abundant in the

Chesapeake Bay, its northern range is the York River, which is 120 miles south of NSA Annapolis. This species is not likely to be found in the project area and is not evaluated further in the EA (NAVFAC, 2021).

Summer Flounder (*Paralicthys dentatus*): EFH for juvenile and adult summer flounder encompasses bottom waters, including tidal guts. Juveniles may use estuarine habitats such as SAV beds and open bay areas as nursery areas, and adults generally inhabit shallow estuarine waters during warmer months. Inshore EFH for summer flounder larvae is within the mixing (0.5–25 ppt) and seawater (>25 ppt) salinity zones. In general, summer flounder larvae are most abundant nearshore (12–50 miles from shore) at depths between 30 and 230 feet. Within the southern part of the Mid-Atlantic Bight, summer flounder larvae are most frequently found from November to May (NOAA, 1998c). Summer flounder larvae, juveniles, and adults may be present in College Creek, though its abundance is expected to be low because salinity levels are not consistently within its preferred range. This species may be present and, therefore, affected by the Proposed Action; it is evaluated further in the EA (NAVFAC, 2021).

Black Sea Bass (*Centropristis striata*): EFH for juvenile and adult black sea bass includes estuaries within mixing- and seawater-salinity zones with temperatures warmer than 43 degrees Fahrenheit. Juveniles are found during summer and spring in estuaries with salinities greater than 18 ppt, and typically found in association with rough bottom, shellfish, and eelgrass beds, and man-made structures in sandy, shelly areas. Wintering adult black sea bass are typically found offshore (NOAA, 1998d). While black sea bass is common in the Chesapeake Bay from spring to late autumn, its northern range extends to Solomons Island, which is 50 miles south of NSA Annapolis. This species is not likely to be found in the project area and is not evaluated further in the EA (NAVFAC, 2021).

Atlantic Butterfish (*Peprilus triacanthus*): EFH for Atlantic butterfish eggs, larvae, and adults include pelagic habitats in inshore esuaries and embayments fom Massachusetts to North Carolina, including the Chesapeake Bay. EFH for eggs is generally found over bottom depths of 1,500 meters or less where average temperatures in the upper 200 meters of the water column are 43 to 70 degrees Fahrenheit. Larvae EFH is within similar temperature ranges, and generally found over bottom depths between 41 and 350 meters. Adult EFH is generally found over bottom depths between 10 and 250 meters and where salinities are above 5 ppt (NOAA, 2011). College Creek does not provide the preferred salinity for eggs and does not consistently provide the preferred salinity for larvae. Adults are most common in the mixing zone of the lower Chesapeake Bay from March through November and only occassionally found in the upper Chesapeake Bay. This species is not likely to inhabit College Creek. Therefore, this species would not be affected by the Proposed Action, and it is not evaluated in further detail in the EA (NAVFAC, 2021).

Little Skate (*Leucoraja erinacea*): EFH for adult little skate includes intertidal and sub-tidal benthic habitat, extending to a maximum depth of approximately 330 feet, and including high-salinity zones in the Chesapeake Bay. EFH occurs primarily on sand and gravel substrates but also occasionally mud (New England Fishery Management Council, 2017). The Proposed Action is entirely within the mixing-salinity zone of College Creek, which has a lower salinity than typical adult little skate habitat. Therefore, this species would not be affected, and it is not discussed further in the EA (NAVFAC, 2021).

Atlantic Herring (*Clupea harengus*): Atlantic herring is a pelagic schooling species found at various depths depending on life stage, season, and geographic location. EFH for juveniles include intertidal and sub-tidal pelagic habitats; young juveniles can tolerate low salinities, but older juveniles avoid brackish water. EFH for adult Atlantic herring includes the seawater-salinity zone of the Chesapeake Bay (New

England Fishery Management Council, 2017). The Proposed Action would occur entirely within the mixing-salinity zone of College Creek, which has a lower salinity than typical juvenile and adult Atlantic herring habitat. Therefore, this species would not be affected, and it is not discussed further in the EA (NAVFAC, 2021).

Red Hake (*Urophycis chuss*): 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, which is approximately 45 miles south of the Severn River. Red hake eggs and larvae are found in pelagic habitats but are unlikely to be found within Chesapeake Bay estuaries and embayments. Adult red hake EFH includes the seawater-salinity zone of the Chesapeake Bay (New England Fishery Management Council, 2017). The Proposed Action is entirely within the mixing-salinity zone of College Creek, which has a lower salinity than typical juvenile and adult red hake habitat. Therefore, this species is not likely to be affected and is not discussed further in the EA (NAVFAC, 2021).

Windowpane Flounder (*Scopthalmus aquosus*): EFH for juvenile and adult windowpane flounder includes bottom habitats with a substrate of mud and fine-grained sand, water temperatures below 77 degrees Fahrenheit, and salinities between 5.5 and 36 ppt (mixing- and high-salinity zones) within the Chesapeake Bay (New England Fishery Management Council, 2017). Windowpane flounder is a year-round resident of the Chesapeake Bay and could inhabit College Creek. However, its abundance would likely be low and restricted because it is only occasionally found in the upper Chesapeake Bay. This species may be present and, therefore, affected by the Proposed Action; it is evaluated further in the EA (NAVFAC, 2021).

Winter Skate (*Leucoraja ocellata*): EFH for adult winter skate includes sub-tidal benthic habitats in coastal waters from the shoreline to a maximum depth of approximately 260 feet, including the high-salinity zones of the Chesapeake Bay. EFH occurs on sand and gravel substrates, but this species is also found on mud (New England Fishery Management Council, 2017). The Proposed Action is entirely within the mixing-salinity zone of College Creek, which has a lower salinity than typical adult winter skate habitat. Therefore, this species would not be affected, and it is not discussed further in the EA (NAVFAC, 2021).

Clearnose Skate (*Raja eglanteria*): EFH for adult clearnose skate includes sub-tidal benthic habitats in coastal waters from the shoreline to approximately 130 feet, including the high-salinity zones of the Chesapeake Bay. EFH occurs primarily on mud and sand but also gravelly and rocky bottom (New England Fishery Management Council, 2017). The Proposed Action is entirely within the mixing-salinity zone of College Creek, which has a lower salinity than typical juvenile and adult clearnose skate habitat. Therefore, this species would not be affected, and it is not discussed further in the EA (NAVFAC, 2021).

Other Protected Fish Species

Shortnose and Atlantic sturgeon are the only two sturgeon species on the Atlantic Coast; both are protected under the Endangered Species Act.

The Atlantic sturgeon Chesapeake Bay Distinct Population Segment is federal- and state-listed as endangered. The Chesapeake Bay Distinct Population Segment includes five critical habitat units for the species: Potomac River, Rappahannock River, York River system (including Pamunkey and Mattaponi Rivers), James River, and Nanticoke River/Marshyhope Creek (Federal Register, 2017). Atlantic sturgeon is an anadromous fish that spends most of its life in saltwater and migrates into freshwater to spawn.

There is a small spawning population in Virginia's James River and York River, approximately 140 miles and 120 miles south of NSA Annapolis, respectively. Spawning is not known to occur in Maryland waters (MDNR, n.d.). The species has not been found in the Severn River and is unlikely to inhabit College Creek near the Proposed Action. EFH is not designated for Atlantic sturgeon in College Creek or Severn River.

Shortnose sturgeon, federal- and state-listed as endangered, is found in the Chesapeake Bay. This anadromous fish spends most of its life in brackish or saltwater and migrates into freshwater to spawn from February through April. This species prefers large, low-salinity river systems, and, near the Chesapeake Bay, is primarily found in the Potomac and Susquehanna Rivers (approximately 110 miles south and 45 miles north of NSA Annapolis, respectively); it has not been found in the Severn River or its tributaries (NMFS, n.d.). As such, shortnose sturgeon is unlikely to be located in College Creek near the Proposed Action.

3.5.2 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.

3.5.2.1 No Action Alternative

Under the No Action Alternative, the proposed utility bridge replacement would not occur. The conditions of the current utility bridge would continue to decline. According to the 2019 inspection report, the bridge is in poor condition overall, and numerous deficiencies require correction within 12 months (NAVFAC EXWC, 2019). Direct, short-term, moderate impacts on aquatic resources within College Creek could occur if the bridge failed and severed utility lines. Under a worst-case scenario, a sudden discharge of materials into College Creek could kill aquatic wildlife and vegetation within the creek. Locally decreased dissolved oxygen levels in could also affect the water quality and aquatic habitat within College Creek. The depletion of dissolved oxygen would temporarily likely create a "dead zone" within College Creek from hypoxia until the creek recovers. Given the proximity of the utility bridge to the confluence with the Severn River, indirect impacts within the Severn River could also occur. These impacts from a worst-case scenario bridge failure would result in moderate impacts on the biological resources within College Creek, but impacts would be short term. Therefore, no significant impacts on biological resources would occur under the No Action Alternative.

3.5.2.2 Alternative 1 Potential Impacts

The study area for biological resources under Alternative 1 includes the lower portion of College Creek, and the aquatic habitat near the existing utility bridge and the Alternative 1 project area where construction would occur.

Biological Resource Potential Impacts:

- No Action: Potential short-term, moderate impacts from a worst-case scenario of a rupture that results in discharges into College Creek. No significant impacts.
- Alternative 1: Short-term, minor impacts from construction activity on marine species. The Navy will implement conservation measures during construction to minimize adverse effects on essential fish habitat. No significant impacts.
- Alternative 2: Similar to Alternative 1. No significant impacts.
- Alternative 3: Similar to Alternative 1. No significant impacts.
- Option: Short-term, minor impacts on bottom-dwelling species from vibrations during directional drilling. No significant impacts.

Construction activity associated with the Alternative 1 utility bridge construction and demolition would result in short-term, minor impacts on biological resources. Impacts would result from installation of bridge piles (including underwater noise resulting from pile driving) and demolition of the existing utility bridge, which would have minor impacts on wildlife from noise, potential increased sedimentation and turbidity within the water column, and alteration of aquatic habitats. These would be short-term, negligible-to-minor impacts on biological resources on, near, and downstream of the project site. The proposed utility bridge would not result in any permanent loss of vegetation or habitat or other long-term, adverse impacts. Implementation of Alternative 1 would not result in significant impacts on biological resources, as discussed in the following.

Terrestrial Vegetation

As previously described in Section 3.5.1.1, no forests or woodlands exist within the Alternative 1 project footprint; the land that would be disturbed under Alternative 1 is maintained lawn with some landscaped and urban trees and shrubs along the existing seawall. Potential short-term, minor impacts on the vegetation within the project area could occur during the construction period from the use of heavy construction equipment to connect the utilities and construct the utility bridge. Temporary construction areas, if needed, could also result in temporary impacts on vegetation. Trees, shrubs, and grasses may be damaged, removed, or trampled during the construction phase. The Navy would implement erosion- and sediment-control BMPs (as described in Sections 3.2.2 and 3.3.2) and prescribed by applicable permits, minimizing short-term impacts from ground disturbance on terrestrial vegetation. If any trees must be removed, they would be replaced at a one-to-one ratio to retain tree canopy.

Terrestrial Wildlife

Short-term, negligible impacts on terrestrial wildlife species could occur from noise and disturbance associated with construction of the utility bridge. Increases in noise levels from construction would be minor and temporary, likely resulting in wildlife avoidance of the area while noise is occurring. Many of the terrestrial species that occur in the project area are highly mobile and would be temporarily displaced during construction activity but would likely return when construction is complete.

Many species of migratory birds are found at NSA Annapolis. College Creek is considered a historic waterfowl concentration area by the MDNR Wildlife and Heritage Service. Construction and demolition of the utility bridge under Alternative 1 could have short-term, minor impacts on migratory birds and waterfowl from noise, minor habitat alterations, and general disturbance. MDNR sent a letter to the Navy (Appendix B, dated August 4, 2020) and provided comments through the Clearinghouse coordination (Appendix B, dated July 24, 2020). MDNR recommended that no work potentially affecting waterfowl take place between November 15 and March 1 in any year to protect overwintering waterfowl. No migratory bird nesting is known to occur in the project area, and birds would be expected to relocate to areas not undergoing active construction and demolition. Takes of migratory birds are not expected under Alternative 1.

Marine Species

Short-term effects on aquatic resources and habitats would be expected during construction activities. Ground-disturbing activities along the College Creek shorelines can lead to increased sedimentation and turbidity, which affects aquatic life by reducing light. Construction would directly affect College Creek as construction occurs, and indirectly affect downstream water bodies like the Severn River. These impacts would be minimized through BMPs to protect against soil erosion and sedimentation into receiving water bodies. Shellfish, if present within the immediate area where the bridge pilings are installed, could be affected by increased sedimentation from pile installation. Fish in the immediate construction area would be affected by those activities, increased noise, and a temporary decrease in water quality due to sedimentation. These impacts would be minor, and fish could avoid the area until construction is complete.

As previously discussed, SAV is not present in College Creek in the Alternative 1 project area. SAV has been observed in the upper portions of College Creek, but these SAV communities would not likely be affected during construction under Alternative 1 since construction would be limited to the lower portions of the creek.

BMPs would be incorporated in accordance with project permits and regulations to avoid and minimize impacts on shellfish and fish during in-water construction. BMPs would limit sediment disturbance during construction and minimize the effects of turbidity within the immediate area of construction. After construction activity is complete, sedimentation and turbidity levels would return to pre-construction levels. Any potential impacts on marine species would be short term and minor.

Noise from construction activity, particularly from pile driving to place the bridge piles and pile demolition, would affect marine species. Underwater sound pressure caused by in-water pile driving could distress, injure, or kill fish in College Creek. Noise impacts are described in more detail in Section 3.6.2.2, but pile-driving activities have the potential to impact fish species. Juvenile and adult fish near the project area are highly mobile and would be able to avoid the area immediately surrounding construction and increased noise. Cushion blocks, soft starts, and maximizing the use of vibratory hammers in lieu of impact hammers will be implemented to minimize underwater noise generated during pile installation.

Threatened, Endangered, and Special-Status Species

No threatened or endangered species are known to occur within the study area of Alternative 1. The USFWS IPaC report generated for this project indicates that northern long-eared bat (threatened) and monarch butterfly (candidate) are potentially present (NAVFAC Washington, 2017; USFWS, 2021a). In addition, protected sea turtle and marine mammal species have the potential to be present within the study area.

Northern Long-Eared Bat: Multiple bat surveys have been conducted on NSA Annapolis, though no presence of this species has been documented via acoustic or mist-net surveys (USFWS, 2021a; NAVFAC Washington, 2017; NAVFAC Washington, 2020). Because Alternative 1 would not result in substantial tree clearing (i.e., not equal to or greater than 15 acres), potential habitat for the species would not be affected. This allows NSA Annapolis to reply upon the finding of the programmatic biological opinion for the 4(d) rule to fulfill its project-specific section 7 responsibilities (USFWS, 2021b). Following this measure, along with completing the determination key for this species in the USFWS IPaC process, included in Appendix B, allows the installation to avoid completing a formal section 7 consultation. Alternative 1 would have no effect on this species.

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. The College Creek shorelines that would be altered under Alternative 1 consists of manicured lawn with some landscaped trees and bushes. There is no quality habitat for monarch butterflies that would be affected by Alternative 1, and monarchs are unlikely to use the habitat at the project site during their annual migration. Alternative 1 would have no effect on monarch butterfly.

Marine Mammals and Sea Turtles: Marine mammals and sea turtles are unlikely to be within College Creek. As such, no effects on Endangered Species Act-listed species are anticipated under Alternative 1. In addition, takes of marine mammals pursuant to the Marine Mammal Protection Act are not reasonably foreseeable.

Atlantic Sturgeon and Shortnose Sturgeon: As discussed in Section 3.5.1.3, neither Atlantic sturgeon nor shortnose sturgeon are known to occur in College Creek or the Severn River or likely to be present. As such, no effect on these protected species would be expected under Alternative 1.

Threatened, Endangered, and Special-Status Species Conclusion: There would be no effect on terrestrial or marine threatened and endangered species, and no consultation between the Navy and USFWS or NMFS pursuant to section 7 of the Endangered Species Act would be required. Coordination with MDNR Wildlife and Heritage Service occurred through the Maryland Clearinghouse, which is included in Appendix B.

Essential Fish Habitat

EFH is found at the Alternative 1 site in College Creek for 11 species of fish. During the construction and demolition for Alternative 1, potential stressors that may affect these species and their habitat would include habitat alteration or loss that can result in direct or indirect mortality, increased underwater noise, and a possible decrease in water quality from turbidity. Effects of Alternative 1 on EFH would be confined to the area immediately surrounding the existing and proposed bridge. Maximum total permanent in-water impact is estimated to be 62 square feet. The existing utility bridge has 230 square feet of in-water structures that would be removed during demolition. Upon removal, this area of the creek would return to its natural substrate and benthic fauna over time. Therefore, after the new bridge has been erected and demolition activities have occurred, there would be a permanent net gain of benthic habitat totaling approximately 168 square feet. No SAV is present. Impacts on EFH are summarized in the following text. In-water construction would likely occur in stages and would not affect the flow of College Creek at any time. As explained in Section 3.5.1.3, scup, black sea bass, Atlantic butterfish, little skate, Atlantic herring, red hake, winter skate, and clearnose skate are unlikely to occur within College Creek and are not analyzed further in the EA. See also the EFH Assessment in Appendix D for more detailed information on EFH species and prey species.

Bluefish: Juvenile and adult bluefish EFH could be affected during construction activity. Short-term impacts on EFH could occur from disturbances in the water column causing suspended sediments. In addition, underwater noise resulting from bridge demolition and pile driving from new bridge construction would affect EFH temporarily. Existing bridge removal would result in a net gain of permanent benthic habitat for juvenile and adult bluefish. No changes in water depth, tidal flow, or salinity of College Creek would be expected. There would be no long-term impacts on bluefish EFH.

Summer Flounder: EFH exists for larval, juvenile, and adult summer flounder, a bottom-dwelling species. Short-term impacts on EFH could occur from disturbances in the water column causing suspended sediments. In addition, underwater noise resulting from bridge demolition and pile driving from new bridge construction would affect EFH temporarily. Existing bridge removal would result in a net gain of permanent benthic habitat for larvae, juvenile, and adult summer flounder. No changes in water depth, tidal flow, substrates, water temperature, or salinity of College Creek would be expected. There would be no long-term impacts on summer flounder EFH.

Windowpane Flounder: Windowpane flounder is a bottom-dwelling species and could be affected during construction activity. EFH exists at Alternative 1 for juvenile and adult windowpane flounder.

Short-term impacts on EFH could occur from disturbances in the water column causing suspended sediments. In addition, underwater noise resulting from bridge demolition and pile driving from new bridge construction would affect EFH temporarily. Existing bridge removal would result in a net gain of permanent benthic habitat for juvenile and adult windowpane flounder. No changes in water depth, tidal flow, substrates, water temperature, or salinity of College Creek would be expected. There would be no long-term impacts on windowpane flounder EFH.

Since no SAV is present, designated HAPC is not anticipated to exist in College Creek or anticipated to be affected by Alternative 1. See also the EFH Assessment in Appendix D for more detailed information on HAPC.

Alternative 1 may adversely affect EFH in the short term due to a reduction in water quality from habitat alteration or loss, increased underwater noise, a decrease in water quality from turbidity, and indirect impacts on prey species during construction. There would be no anticipated long-term, adverse effects on EFH. The Navy determined that adverse effects on EFH would not be substantial. Consultation with NMFS pursuant to the Magnuson-Stevens Fishery Conservation and Management Act identified the following measures to minimize potential adverse effects on EFH:

- During construction activities, cushion blocks, soft starts, and maximizing the use of vibratory hammers in lieu of impact hammers will be implemented to minimize underwater noise generated during pile installation.
- When demolishing the support structures of the existing utility bridge, the piers will be removed to a depth of two feet below the mudline (i.e., benthic substrate) to allow for naturalization of the mudline following removal.

Therefore, implementation of Alternative 1 would not result in significant impacts on EFH.

3.5.2.3 Alternative 2 Potential Impacts

The study area for biological resources under Alternative 2 includes the lower portion of College Creek, and the aquatic habitat near the existing utility bridge and the Alternative 2 project area where construction would occur.

Impacts under Alternative 2 would be the same as those described under Alternative 1. The impacts would occur along a different portion of College Creek, but terrestrial and marine vegetation and wildlife would be expected to be the same under Alternative 2, and potential impacts would remain consistent to those described in Section 3.5.2.2. Therefore, implementation of Alternative 2 would not result in significant impacts on biological resources.

3.5.2.4 Alternative 3 Potential Impacts

The study area for biological resources under Alternative 3 includes the lower portion of College Creek, and the aquatic habitat near the existing utility bridge and the Alternative 1 project area where construction would occur.

Impacts under Alternative 3 would be the same as those described under Alternative 1. The impacts would occur along a different portion of College Creek, but terrestrial and marine vegetation and wildlife would be expected to be the same under Alternative 3, and potential impacts would remain consistent to those described in Section 3.5.2.2. Therefore, implementation of Alternative 3 would not result in significant impacts on biological resources.

3.5.2.5 Potential Impacts of Underground Utility Option

The study area for the underground utility option includes the aquatic habitat near the proposed underground utility line. Short-term, minor impacts on biological resources would be expected from this utility option. Utility boring and horizontal directional drilling would occur on the banks of the creek, creating negligible impacts on terrestrial species and habitat given that this area is landscaped and not high-quality habitat. Drilling would occur below the sediment bed in College Creek. Bottom-dwelling aquatic species would experience vibrations from the drilling activity, causing disruptions and prompting them to leave the area. These impacts would be short term and minor. No long-term impacts on species or their habitats would be expected. Implementation of the underground utility option, in addition to any of the alternatives, would not result in significant impacts on biological resources.

3.6 Noise

This discussion of noise includes the types or sources of noise and the associated sensitive receptors in the human environment.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water, and are sensed by the human ear. Sound is all around us. The perception and evaluation of sound involves three basic physical characteristics:

- Intensity–the acoustic energy, which is expressed in terms of sound pressure, in decibels
- Frequency–the number of cycles per second the air vibrates, in Hertz
- Duration–the length of time the sound can be detected

Noise is defined as unwanted or annoying sound that interferes with or disrupts normal human activities. Although continuous and extended exposure to high noise levels (e.g., through occupational exposure) can cause hearing loss, the principal human response to noise is annoyance. The response of different individuals to similar noise events is diverse and is influenced by the type of noise; perceived importance of the noise; its appropriateness in the setting, time of day, and type of activity during which the noise occurs; and sensitivity of the individual.

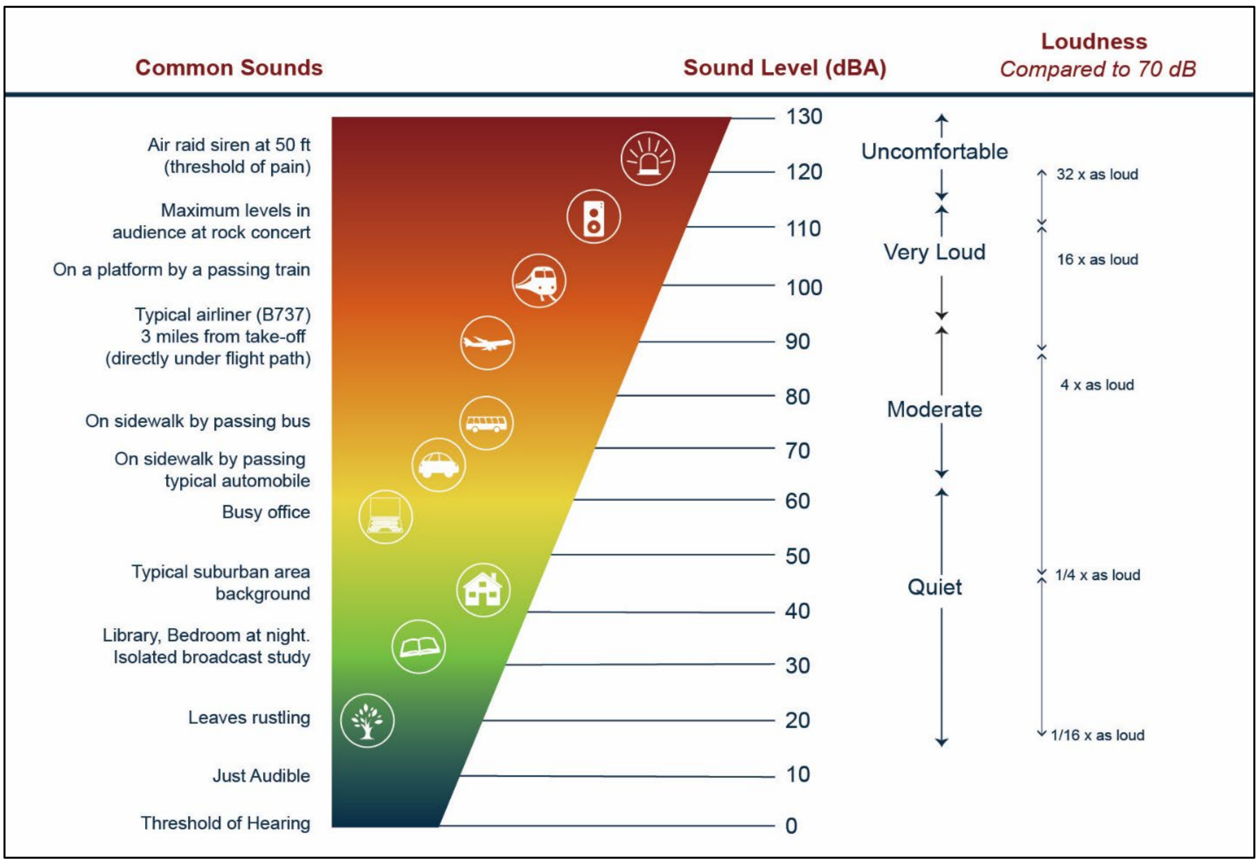
Basics of Sound and A-Weighted Sound Level

The loudest sounds that can be detected comfortably by the human ear have intensities that are a trillion times higher than those of sounds that can barely be detected. This vast range means that using a linear scale to represent sound intensity is not feasible. The decibel is a logarithmic unit used to represent the intensity of a sound, also referred to as the sound level. All sounds have a spectral content, which means their magnitude or level changes with frequency, where frequency is measured in cycles per second or Hertz. To mimic the human ear's non-linear sensitivity and perception of different frequencies of sound, the spectral content is weighted. For example, environmental noise measurements are usually on an "A-weighted" scale that filters out very low and very high frequencies to replicate human sensitivity. It is common to add the "A" to the measurement unit to identify that the measurement has been made with this filtering process (i.e., dBA). In this document, the decibel unit refers to A-weighted sound levels for human receptors. Table 3-11 provides a comparison of how the human ear perceives changes in loudness on the logarithmic scale.

Figure 3-7 provides a chart of A-weighted sound levels from typical noise sources. Some noise sources (e.g., air conditioner, vacuum cleaner) are continuous sounds that maintain a constant sound level for some period (Cowan, 1994). Other sources (e.g., automobile, heavy truck) are the maximum sound produced during an event like a vehicle passing by. Other sounds (e.g., urban daytime, urban nighttime) are averages taken over extended periods of time. A variety of noise metrics have been developed to describe noise over different time periods, as discussed in the following text.

Table 3-11 Subjective Responses to Changes in A-Weighted Decibels

Change	*Change in Perceived Loudness*
3 decibels	Barely perceptible
5 decibels	Quite noticeable
10 decibels	Dramatic—twice or half as loud
20 decibels	Striking—fourfold change



Source: Adapted from Cowan, 1994

Figure 3-7 A-Weighted Sound Levels from Typical Sources

Noise Metrics

A metric is a system for measuring or quantifying a characteristic of a subject. Since noise is a complex physical phenomenon, different noise metrics help to quantify the noise environment.

Maximum Sound Level

The highest A-weighted sound level measured during a single event where the sound level changes value with time (e.g., an aircraft overflight) is called the maximum A-weighted sound level or Lmax. During an aircraft overflight, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance. Lmax defines the maximum sound level occurring for a fraction of a second. For aircraft noise, the "fraction of a second" over which the maximum level is defined is generally one-eighth second (American National Standards Institute, 1988).

For additional information on noise, see Appendix A.

3.6.1 Affected Environment

3.6.1.1 Airborne Noise

Many components may generate noise and warrant analysis as contributors to the total noise impact. Existing noise levels at and near the alternative project boundaries along the Upper and Lower Yards can be characterized as moderately dense urban, which would be typical of nearby land uses and activities and with the overall level of development in the area. The primary source of noise is vehicular traffic. Noise levels are low to moderate.

The federal government supports conditions free from noise that threaten human health and welfare and the environment. Response to noise varies, depending on the type and characteristics of the noise, distance between the noise source and whoever hears it (the receptor), receptor sensitivity, and time of day. A noise-sensitive receptor is defined as a land use where people involved in indoor or outdoor activities may be subject to stress or considerable interference from noise. Such locations or facilities often include residential dwellings, hospitals, nursing homes, educational facilities, and libraries. Sensitive receptors may also include noise-sensitive cultural practices, some domestic animals, or certain wildlife species.

3.6.1.2 Underwater Noise

Noise from underwater sources cannot be directly compared to airborne noise. A reference pressure of 20 micropascal is used in air compared to 1 micropascal in water. While airborne noise dissipates by 6 decibels (dB) per doubling of distance, underwater noise only dissipates by approximately 4.5 dB per doubling of distance. This is because underwater sound is bound by the water surface and the seafloor, creating a channel, which prevents sound from dissipating (Anchor QEA and Greenbusch, 2015).

Exposure to low levels of underwater sound for a relatively long period of time, or exposure to higher levels of sound for shorter periods of time, may result in auditory tissue damage or temporary hearing loss on fish (CalTrans, 2015). Sound generated by pile driving, which is one of the loudest noises from construction and is used to drive piles into the underwater substrate, has the potential to affect fish in several ways. The range of effects can include alteration of behavior to physical injury or mortality, depending on the intensity and characteristics of the sound, the distance and location of the fish in the water column relative to the sound source, the size and mass of the fish, and the fish's anatomical characteristics.

3.6.2 Environmental Consequences

Analysis of potential noise impacts includes estimating likely noise levels from the Proposed Action and determining potential effects on sensitive receptor sites.

Noise Potential Impacts:

- No Action: Short-term, moderate impacts from a worst-case scenario of a rupture. No significant impacts.
- Alternative 1: Short-term, minor impacts on airborne and underwater receptors from construction. No significant impacts.
- Alternative 2: Similar to Alternative 1. No significant impacts.
- Alternative 3: Similar to Alternative 1. No significant impacts.
- Option: Short-term, minor impacts from vibration. No significant impacts.

3.6.2.1 No Action Alternative

Routine maintenance under the No Action Alternative would not result in noise impacts beyond what the adjacent populations are accustomed to, including underwater species. Under the worst-case scenario, a loud rupture caused by the failure of the existing utility bridge would cause moderate, adverse impacts; however, these impacts would be short term. In the long term, if King George Street Bridge is not accessible, vehicles would have to use another route. Given that Bladen Street/Rowe Boulevard is approximately 1,100 feet southwest of the King George Street Bridge, it is likely that this road would be used as a detour. Populations would not likely experience long-term impacts from noise given that they are already accustomed to the noise from traffic. Therefore, no significant impacts on the noise environment would occur under the No Action Alternative.

3.6.2.2 Alternative 1 Potential Impacts

The study area for noise under Alternative 1 includes the project area and populations adjacent to the utility bridge that could be affected by noise.

There are no forests or woodlands within or immediately adjacent to the Alternative 1 project area. The land that would be disturbed is maintained lawn with some landscaped and urban trees and shrubs along the existing seawall. There would not be any long-term noise impacts from the implementation of Alternative 1, only short-term impacts from construction. Terrestrial species and birds that occur in the project area are highly mobile and would be temporarily displaced during construction activity but would likely return when construction is complete. No migratory bird nesting is known to occur in the project area, and birds would be expected to relocate to areas not undergoing active construction and demolition. Therefore, short-term, negligible impacts would occur from noise impacts on terrestrial species and birds.

Short-term impacts from Alternative 1 would include noise from construction and demolition activities. Noise from these activities would consist of peak sound levels and would be intermittent, as equipment and activities would not occur at one continuous level. Overall, peak noise levels diminish with distance from the active project site. Table 3-12 shows typical noise levels at 50 feet from the source of heavy equipment that could be used during proposed construction and demolition activities.

Table 3-12 Construction Equipment Noise Emission Levels

Equipment	*Typical Noise Level (dBA) 50 feet from Source*
Air compressor	81
Backhoe	80
Ballast equalizer	82
Ballast tamper	83
Compactor	82
Concrete mixer	85
Concrete pump	82
Concrete vibrator	76
Crane, derrick	88
Crane, mobile	83
Dozer	85
Generator	81
Grader	85
Impact wrench	85
Jack hammer	88
Loader	85
Paver	89
Pile-driver (impact)	101
Pile-driver (sonic)	96
Pneumatic tool	85
Pump	76
Rail saw	90
Rock drill	98
Roller	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82
Spike driver	77
Tie cutter	84
Tie handler	80
Tie inserter	85
Truck	88

Source: Federal Transit Administration, 2006
Key: dBA = A-weighted decibels.
Note: Table based on a U.S. Environmental Protection Agency Report, which measured data from railroad construction equipment taken during the Northeast Corridor Improvement Project, and other measured data.

Noise-sensitive receptors closest to the proposed construction site under Alternative 1 include residences on Beardall Road and the French Soldiers Monument, which are south of College Creek. As shown in Table 3-12, peak noise (Lmax) from construction equipment can range from 74 dBA to 101 dBA at 50 feet (which includes noise from pile driving). Given those levels, noise at 100 feet would range from 68 dBA to 95 dBA at the French Soldiers Monument (see Appendix E, Noise Calculations). The closest residences on Beardall Road are about 150 feet from the project area and would be exposed to levels from 64 dBA to 91 dBA from construction equipment. However, these noise levels would be short term and intermittent.

Short-term impacts would result from dump trucks hauling materials to and from the construction area. As shown in Table 3-12, construction trucks typically produce noise levels of approximately 88 dBA at 50 feet from the road. Consequently, short-term, minor impacts would occur to populations adjacent to the roadways for the duration of the construction period.

Under Alternative 1, pile driving and minor excavation for new pile caps would likely occur. The timing and duration of pile-driving activities and the life stage of fish exposed to noise are important factors in determining effects on the various species of fish that could be present during pile-driving activities. Pile-driving activities would be intermittent and temporary and would not occur for the entire duration of the project. Fish would generally avoid the area immediately surrounding construction during those activities. Marine mammals are unlikely to be within College Creek. If present, the closest marine mammals would be in Severn River, which is more than 2,000 feet from the project site, so marine mammals would be able to avoid the confluence of Severn River and College Creek if necessary. Consequently, impacts on fish and marine mammals from noise would not be significant.

As previously described in Section 3.5.2.3, EFH is within the project area. Short-term impacts on EFH could occur from underwater noise up to 460 feet from the pile cap foundation area as a result of demolition and pile-driving activities (see Appendix D). As discussed in Section 3.5.2.2, the Navy consulted with NMFS pursuant to Magnuson-Stevens Fishery Conservation and Management Act. During construction activities, cushion blocks, soft starts, and maximizing the use of vibratory hammers in lieu of impact hammers will be implemented to minimize underwater noise generated during pile installation. The noise environment would return to current levels following completion of construction; therefore, no long-term effects on EFH from noise are expected.

Once the new bridge has been constructed and the existing bridge demolished, short-term noise impacts would cease, and the ambient noise environment would return to the existing levels for both airborne and underground environments. No long-term impacts would occur. Therefore, implementation of Alternative 1 would not result in significant impacts on the noise environment.

3.6.2.3 Alternative 2 Potential Impacts

The project area for Alternative 2 is the Decatur Avenue Bridge, which is similar to the project area for Alternative 1. Short-term impacts from Alternative 2 would include noise from construction and demolition activities. Noise impacts on terrestrial species, birds, and underwater biological receptors would be the same as described under Alternative 1. Noise from these activities would consist of peak sound levels and would be intermittent, as equipment and activities would not occur at one continuous level.

Noise-sensitive receptors closest to the proposed construction site under Alternative 2 include residences on Beardall Road and the French Soldiers Monument, which are south of College Creek. The French Soldiers Monument is about 400 feet from the Alternative 2 project area and would be exposed to noise levels of approximately 56 dBA to 83 dBA. The closest residences on Beardall Road are about 65 feet from the project area and would be exposed to levels from 72 dBA to 99 dBA from construction equipment. However, these noise levels would be short term and intermittent.

Once the new bridge has been constructed and the existing bridge demolished, short-term noise impacts would cease, and the ambient noise environment would return to the existing levels for both airborne and underwater environments. No long-term impacts would occur. Therefore, implementation of Alternative 2 would not result in significant impacts on the noise environment.

3.6.2.4 Alternative 3 Potential Impacts

The project area for Alternative 3 spans between the project areas for Alternatives 1 and 2. Therefore, noise levels from construction activities would be similar to those discussed under Alternatives 1 and 2 for human and biological receptors. Noise from construction and demolition would be intermittent, as equipment and activities would not occur at one continuous level, and temporary.

Once the new bridge has been constructed and the existing bridge demolished, short-term noise impacts would cease, and the ambient noise environment would return to the existing levels for both airborne and underwater environments. No long-term impacts would occur. Therefore, implementation of Alternative 3 would not result in significant impacts on the noise environment.

3.6.2.5 Potential Impacts of Underground Utility Option

If this option is implemented, directional drilling would be used to install the utilities underground. Noise from directional drilling would not be louder than noise from pile driving. However, the construction period would be longer, and there would be more vibration as compared to installing aboveground utilities, which would cause disruptions and prompt aquatic species to leave the area. These impacts would be short term and minor. No long-term impacts on species or their habitats would be expected. Implementation of the underground utility option, in addition to any of the alternatives, would not result in significant impacts on the noise environment.

3.7 Infrastructure

This section discusses infrastructure such as utilities (including drinking water production, storage, and distribution; wastewater collection treatment and disposal; stormwater management; energy production, transmission, and distribution; and communications) and facilities.

3.7.1 Affected Environment

The following discussions provide a description of the existing conditions for utilities and facilities. Unless otherwise cited, all information in this section derives from the Installation Development Plan (NAVFAC Washington, 2018a).

3.7.1.1 Utilities

Table 3-13 summarizes the status of utility systems on the Upper and Lower Yards at NSA Annapolis.

Table 3-13 Utilities on the Upper and Lower Yards at Naval Support Activity Annapolis

Utility System	*Provider(s)*	*Presence at Sites*	*Base Concerns?*
Potable Water	· Provided by three on-base wells, one of which is operational at any given time. · Water treatment plant is on the Upper Yard.	Yes: raw waterlines, potable waterlines, and a well and pumphouse are in the vicinity of the utility bridge and surrounding areas.	None noted regarding capacity; current treatment capacity is adequate for current and anticipated demand. Aging water piping results in occasionally discolored water.
Wastewater	· Treatment provided by City of Annapolis. · Navy owns and maintains on-base wastewater lines.	No: sanitary sewer lines are not within the site alternatives.	None noted for USNA.
Stormwater	· NSA Annapolis owns and maintains stormwater infrastructure. · There are no storm sewers.	Yes: while no stormwater conveyance lines cross the utility bridge, outfalls discharge into College Creek at several locations within the alternative sites along the east and west banks.	Stormwater management at NSA Annapolis is a challenge due to the installation's low elevation, significant areas of 100-year floodplain, made land areas, and aging system; conveyance lines on the Lower Yard are inadequate.
Electricity	· Purchased under DLA contract. · Distributed by BGE. · NSA Annapolis owns and maintains the on-base distribution including a substation supporting USNA.	Yes: electric lines are in the vicinity of the utility bridge and surrounding areas.	None noted regarding capacity; system has redundant feeders and automatic transfer capabilities in the event of a service interruption, including some facilities with oil-fired and natural gas back-up generators.
Heating, Hot Water, and Steam	· NSA Annapolis owns and operates the heating, hot water, and steam system. · Central heating plant generates high temperature hot water, which is converted into steam for heat in facilities.	Yes: high temperature hot water lines are in the vicinity of the utility bridge and surrounding areas.	Capacity exceeds current and anticipated demand; however, two of three generators are nearing the end of their useful service, and the utility bridge has structural issues.
Natural Gas	· Purchased under DLA contract for central heating plant and Lower Yard; and then distributed by BGE. · BGE provides service to remainder of installation.	No: natural gas lines are not in the immediate vicinity of the utility bridge or any of the site alternatives.	System is noted as being in good condition, and volume and pressure are able to meet current and anticipated needs.
Communications	· The Navy provides communication and IT infrastructure to buildings across NSA Annapolis. · Some facilities use private IT providers.	Yes: communications lines are in the vicinity of the utility bridge and surrounding areas.	None noted for USNA.

Source: NAVFAC Washington, 2018a

Key: BGE = Baltimore Gas and Electric; DLA = Defense Logistics Agency; IT = information technology; NSA = Naval Support Activity; USNA = U.S. Naval Academy

Note: Utilities at North Severn are not included in this table as they would not be affected by the Proposed Action.

3.7.1.2 Facilities

Facilities within the affected environment are limited to those within and adjacent to the site alternatives. The utility bridge that is the subject of this EA is in a severely deteriorated state. Originally constructed in 1931 as a train trestle bridge, this structure was retrofitted in 1986 to carry five utility lines across College Creek between the Upper and Lower Yards. Bridge safety inspections noted that 37 of the bridge piles (26 percent) are in poor to critical or failing condition. Portions of the concrete abutments, pier pile caps, and fascia panel components are also damaged or deteriorated. Two pipeline support beams are twisted and out of plumb. Superstructure and bearing hardware exhibit moderate-to-severe corrosion. This utility bridge provides needed utility services to the Lower Yard (NAVFAC EXWC, 2019).

The bank of College Creek along the Upper Yard is armored with riprap and assessed as being in fair condition, while the bank along the Lower Yard is bulkhead and assessed as being in satisfactory condition (NAVFAC, 2017). The Decatur Avenue Bridge is adjacent to the Alternative 2 site. This bridge is serviceable but will likely need major repairs or replacement in the next 5 to 10 years. Hubbard Hall (Building 260) is situated between the Alternative 2 and Alternative 3 sites on the Upper Yard. A concrete wharf (Facility 261) and associated floating docks provide general purpose and small craft berthing adjacent to Hubbard Hall. Hubbard Hall is assessed as being in overall poor condition and slated for future renovations and floodproofing (NAVFAC Washington, 2018a).

Infrastructure Potential Impacts:

- No Action: Likely impacts include partial or total bridge failure affecting the distribution of utility service. Under a worst-case scenario of catastrophic bridge failure, impacts would be major, but utility service would be restored in the long term. Infrastructure deterioration is a driving need for the Proposed Action.
- Alternative 1: Short-term, minor impacts on utility service during interconnections. Long-term, beneficial effects from safer, more reliable bridge to carry utilities. No significant impacts.
- Alternative 2: Similar to Alternative 1. No significant impacts.
- Alternative 3: Similar to Alternative 1. No significant impacts.
- Option: Additional short-term, minor impacts on utility service during interconnections. Long-term increased reliability and protection from lines being underground. No significant impacts.

3.7.2 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.

3.7.2.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur. Routine maintenance would continue to occur, including activities such as spot painting, securing hardware that has loosened, or replacing severely deteriorated timbers. This level of maintenance would not address the deterioration of the bridge substructure. According to the 2019 inspection report, the bridge is in poor condition overall, and numerous deficiencies require correction within 12 months. The No Action Alternative has the potential to interrupt utility service in the event of a partial or catastrophic bridge failure. Impacts would likely not be significant on the Upper and Lower Yards because functions would be disconnected temporarily, with possibly major interruptions while lines are being repaired and service restored. Infrastructure deterioration is a driving need for the Proposed Action.

3.7.2.2 Alternative 1 Potential Impacts

The study area associated with Alternative 1 includes the utility systems and facilities within the existing utility bridge and Alternative 1 project area, with consideration for how the project could affect installation utility service.

Implementation of Alternative 1 would not result in significant impacts on infrastructure, as discussed in the following sections for utilities and facilities.

Utilities

Alternative 1 includes in-kind replacement of all existing five utility lines crossing College Creek and would not change the existing capacity or demand of these utilities. Short-term disruptions would be expected during connection and disconnection of utilities, but these would be minor and coordinated to minimize operational impacts. Construction of the new bridge would occur prior to demolition of the existing bridge, minimizing possible service disruptions.

Several stormwater outfalls are located along the east and west banks of College Creek. Depending on the location of the bridge in the Alternative 1 project area, bridge design would account for existing stormwater infrastructure and revise outfall locations, as needed. Other than the five utility lines on the existing bridge and the stormwater outfalls, no other utilities would require relocation.

Relative to the No Action Alternative, Alternative 1 would improve long-term reliability of all utilities crossing College Creek by reducing the risk of bridge failure. No long-term changes in capacity or demand would occur from Alternative 1.

Facilities

Alternative 1 includes the construction of a new utility bridge and subsequent demolition of the existing, aging utility bridge. The new bridge would provide a safer and more reliable structure to convey utility lines between the Upper and Lower Yards. Construction and demolition activities would affect the riprap and bulkhead shoreline structures where the bridge connects on-land; bridge design would account for shoreline facilities to integrate them into the design and/or repair them as necessary to protect the shoreline. No effects on Hubbard Hall or the Decatur Avenue Bridge would occur.

3.7.2.3 Alternative 2 Potential Impacts

The study area associated with Alternative 2 includes the utility systems and facilities within the existing utility bridge and Alternative 2 project area, with consideration for how the project could affect installation utility service. Short-term disruptions would be expected during connection and disconnection of utilities, but these would be minor and coordinated to minimize operational impacts. Construction of the new bridge would occur prior to demolition of the existing bridge, minimizing possible service disruptions. Stormwater outfalls are also present in the Alternative 2 area that could require relocation. Construction would not affect nearby Hubbard Hall or the Decatur Avenue Bridge.

Riprap and bulkhead shoreline facilities in the immediate vicinity of the on-land bridge ends would be repaired as necessary. No long-term changes in capacity or demand would occur.

Impacts on infrastructure under Alternative 2 would be essentially the same as those described under Alternative 1. Relative to the No Action Alternative, Alternative 2 would improve long-term reliability of all utilities crossing College Creek by reducing the risk of bridge failure. Implementation of Alternative 2 would not result in significant impacts on infrastructure.

3.7.2.4 Alternative 3 Potential Impacts

The study area associated with Alternative 3 includes the utility systems and facilities within the vicinity of the existing utility bridge and Alternative 3 project area, with consideration for how the project could affect installation utility service. Short-term disruptions would be expected during connection and disconnection of utilities, but these would be minor and coordinated to minimize operational impacts. Construction of the new bridge would occur prior to demolition of the existing bridge, minimizing possible service disruptions. Stormwater outfalls are also present in the Alternative 3 area that could require relocation. Construction would not affect Hubbard Hall or the Decatur Avenue Bridge. Riprap and bulkhead shoreline facilities in the immediate vicinity of the on-land bridge ends would be repaired as necessary. No long-term changes in capacity or demand would occur.

Impacts on infrastructure under Alternative 3 would be essentially the same as those described under Alternative 1. Relative to the No Action Alternative, Alternative 3 would improve long-term reliability of all utilities crossing College Creek by reducing the risk of bridge failure. Implementation of Alternative 3 would not result in significant impacts on infrastructure.

3.7.2.5 Potential Impacts of Underground Utility Option

The study area for the underground utility option includes the location of the directional boring near the existing utility bridge, with consideration for how the project could affect installation utility service.

Under this option, all utility lines except one would be bored under College Creek. One utility line would still be installed on the proposed utility bridge as it cannot be located underground. A geotechnical report would be prepared prior to initiating any construction activities to ensure that site-specific conditions are appropriately considered during design and materials selection.

Short-term, minor disruptions in service for interconnection could occur from boring four utility lines underground, similar to installing them on the bridge as discussed under Alternative 1. Underground utilities would experience long-term increased reliability and safety, compared with aboveground options. However, construction costs of boring utilities would be greater, and future access to utilities for repairs or replacements would also be more expensive, difficult, and possibly time-consuming than aboveground options.

For these reasons, implementation of the underground utility option, in addition to any of the alternatives, would not result in significant impacts on infrastructure.

3.8 Public Health and Safety

This discussion of public health and safety includes consideration for any activities, occurrences, or operations that have the potential to affect the safety, well-being, or health of members of the public. A safe environment is one in which there is no, or optimally reduced, potential for death, serious bodily injury or illness, or property damage. The primary goal is to identify and prevent potential accidents or impacts on the general public. Public health and safety within this EA pertain to community emergency services, construction activities, operations, and environmental health and safety risks to children.

3.8.1 Affected Environment

Community emergency services are organizations that ensure public safety and health by addressing different emergencies. Police, fire, and rescue service, and emergency medical service are the primary emergency service functions. NSA Annapolis has its own police department and fire department, as well as a mutual aid agreement with Annapolis and Anne Arundel County.

Operational safety refers to the actual use of facilities, or training or testing activities and potential risks to inhabitants or users of adjacent or nearby land and water parcels. Safety measures are often implemented through designated safety zones, warning areas, or other types of designations. No operational explosive safety quantity distance arcs are within the project sites, though small arms ammunition is transported along the Decatur Avenue Bridge, adjacent to the Alternative 2 site. There are no areas with unexploded ordnance or electromagnetic concerns (NAVFAC Washington, 2018a).

3.8.2 Environmental Consequences

The safety and environmental health analysis contained in the respective sections addresses issues related to the health and well-being of military personnel and civilians living on or in the vicinity of USNA.

Public Health and Safety Potential Impacts:

- No Action: The potential for a bridge failure is a public health and safety threat. Addressing infrastructure deterioration that threatens property damage or public safety is a driving need for the Proposed Action.
- Alternative 1: Short-term, minor adverse safety risks during construction and demolition. Long-term beneficial effects from improved bridge safety. No significant impacts.
- Alternative 2: Similar to Alternative 1. No significant impacts.
- Alternative 3: Similar to Alternative 1. No significant impacts.
- Option: Additional short-term, minor adverse safety risks during boring activities. Long-term beneficial effects from better-protected underground utilities. No significant impacts.

3.8.2.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur. Bridge safety inspections noted that 37 of the bridge piles (26 percent) are in poor-to-critical or failed condition. Portions of the concrete abutments, pier pile caps, and fascia panel components are also damaged or deteriorated. Two pipeline support beams are twisted and out of plumb. Superstructure and bearing hardware exhibit moderate-to-severe corrosion (NAVFAC EXWC, 2019).

Routine maintenance would continue to occur, including activities such as spot painting, securing hardware that has loosened, or replacing severely deteriorated timbers. This level of maintenance would not address the main safety concerns with the degraded bridge substructure. A 2019 bridge inspection report determined the bridge is in poor condition overall, and numerous deficiencies require correction within 12 months (NAVFAC EXWC, 2019).

The current utility bridge does not have any structural means to facilitate inspections or repairs. Inspections or repairs must be conducted via boat, which introduce short-term safety risks while these activities are occurring. Bridge inspection reports have noted this safety deficit, which would persist under the No Action Alternative.

As previously described, as a worst-case scenario, continued deterioration could result in the bridge suddenly failing, severing five utility lines. Instantaneous ruptures of pressurized lines could be capable of damaging nearby infrastructure. This is an unacceptable safety risk, putting the general public traversing the King George Street Bridge at risk, as well as military and civilian personnel on USNA. A more probable scenario would be partial bridge failure that damages or imminently threatens to damage one or more of the five utility lines. In that case, emergency shut off protocols would be enacted to prevent further damage or catastrophic failure, though this course would result in a loss of utility service on the Lower Yard, until these services could be safely restored.

In the unlikely event of a catastrophic bridge failure, there could be major risks that threaten a safe environment. In the more likely scenario of a partial bridge failure, the No Action Alternative would result in moderate safety risks, which would not result in significant impacts. Addressing infrastructure deterioration that threatens property damage or public safety is a driving need for the Proposed Action.

3.8.2.2 Alternative 1 Potential Impacts

The study area for public health and safety under Alternative 1 includes the existing utility bridge and the Alternative 1 project area where construction would occur; safety concerns include all of USNA.

Public health and safety during bridge construction and demolition activities is generally associated with the safety of personnel within or adjacent to construction zones. 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. The construction site would be clearly marked to discourage members of the public from illegally accessing the on-land construction area, which would occur within installation boundaries.

Replacing the bridge would provide an operationally safe structure for utility crossings. The new bridge would be further away from the publicly accessible King George Street Bridge, which would improve security by placing utility infrastructure further within the USNA boundary. Furthermore, the new bridge would include infrastructure so that personnel can safely access the new bridge to conduct future inspections, repairs, and maintenance. Other safety measures would be included in the design to ensure the bridge meets applicable security requirements. Collectively, these are all long-term safety improvements.

Implementation of Alternative 1 would not result in changes in operations. No changes in police, fire, rescue, and emergency medical service would occur. No other operational safety considerations are present at the Alternative 1 project area.

Implementation of Alternative 1 would not result in significant impacts on public health and safety.

3.8.2.3 Alternative 2 Potential Impacts

The study area for public health and safety under Alternative 2 includes the existing utility bridge and the Alternative 2 project area where construction would occur; safety concerns include all of USNA. Alternative 2 would increase short-term safety risks associated with construction and demolition activities. Construction sites would be clearly marked to discourage unauthorized access, and 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. Long-term safety would be improved by providing an operationally safe structure for utility crossings that has access infrastructure for safe inspections, repairs, and maintenance. These impacts are essentially the same as those described under Alternative 1. The Alternative 2 site is adjacent to the explosives transportation route along Decatur Avenue. As all small arms would be handled and transported in accordance with existing plans and protocols, their presence would have no effect on the safety of the construction or operations of the proposed utility bridge. Therefore, implementation of Alternative 2 would not result in significant impacts on public health and safety.

3.8.2.4 Alternative 3 Potential Impacts

The study area for public health and safety under Alternative 3 includes the existing utility bridge and the Alternative 3 project area where construction would occur; safety concerns include all of USNA. Alternative 3 would increase short-term safety risks associated with construction and demolition activities. Construction sites would be clearly marked to discourage unauthorized access, and 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. Long-term safety would be improved by providing an operationally safe structure for utility crossings that has access infrastructure for safe inspections, repairs, and maintenance. These impacts are essentially the same as those described under Alternative 1. Therefore, implementation of Alternative 3 would not result in significant impacts on public health and safety.

3.8.2.5 Potential Impacts of Underground Utility Option

The study area for the underground utility option includes the location of the directional boring near the existing utility bridge; safety concerns extend to include all of USNA. Boring utilities underground would increase short-term safety risks as a result of operating drilling equipment. Similar to general construction activities for the bridge, contractors would be responsible for employing best practices and procedures for safe boring. Locations of existing underground utilities would be clearly identified and marked prior to boring to minimize unintended underground strikes. These kinds of construction-related safety risks would be short term and managed via following standard practices. Locating utilities underground could improve long-term safety by protecting those lines and conduits from accidental or intentional damage. Implementation of the underground utility option, in addition to any of the alternatives, would not result in significant impacts on public health and safety.

3.9 Hazardous Materials and Wastes

This section discusses hazardous materials, hazardous waste, and toxic substances management at USNA, with a focus on the presence of these materials near the project area.

Two installation restoration program sites and two munitions response sites are on North Severn, and a closed solid waste management unit adjacent to Shady Lake is on the northern side of the Upper Yard, all of which are well removed from the project area (NAVFAC Washington, 2018a). Therefore, contaminated sites are not discussed further in this EA.

3.9.1 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.

3.9.1.1 Hazardous Materials

NSA Annapolis has a Spill Prevention, Control, and Countermeasure Plan for USNA that details the equipment, workforce, procedures, and steps to prevent, control, and provide adequate countermeasures of an oily discharge (NSA Annapolis, 2019). The installation also has a pollution prevention program aimed at reducing use and controlling, managing, and reusing hazardous materials. Hazardous materials are managed in a central location on-site according to the Navy's Consolidated Hazardous Material Reutilization and Inventory Management Program (CHRIMP).

The various departments, divisions, and tenants of the installation use different types of hazardous materials (Navy, 2009). Hazardous materials used on the installation include paints, aerosols, oils, cleaning solutions, and fluorescent bulbs. Building 619 serves as the central hazardous materials storage and distribution facility for USNA (NSA Annapolis, 2019). The largest bulk oil storage tanks (i.e., between 325,000 and 350,000 gallons of fuel) have appropriate secondary containment sized for the volume of the container. Smaller oil storage containers are either double walled, have secondary containment, or are stored in locations where the facility structure provides adequate containment. USNA has only aboveground storage tanks, though some piping is below-grade. A 50-gallon generator tank is along the eastern bank of College Creek near the Alternative 2 area (NSA Annapolis, 2019).

3.9.1.2 Hazardous Waste

NSA Annapolis is a large-quantity generator of hazardous waste (NSA Annapolis, 2017). Hazardous waste typically produced at the installation includes spent solvents, used oils, organic substances, waste paint, laboratory chemicals, dirt contaminated with oil and other organic liquids, batteries, and battery fluids. The CHRIMP in Building 619 also provides hazardous waste storage in addition to hazardous materials storage on the Upper Yard. On the Lower Yard, several facilities store hazardous waste where it is generated until the maximum amount of waste is reached—55 pounds of hazardous waste or 1 quart of acutely hazardous waste—and then waste containers must be transferred to a less-than-90 day storage area to await final transport and disposal (NSA Annapolis, 2017).

3.9.1.3 Special Hazards

Special hazards are those substances that might pose a threat to human health, including asbestos-containing materials (ACM), lead-based paint (LBP), and PCBs. 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. As the bridge was originally constructed in 1931 and underwent a major retrofit in 1986, ACM, LBP, and PCBs are likely to be present.

3.9.2 Environmental Consequences

The hazardous materials and wastes analysis for this EA addresses issues related to the use and management of hazardous materials and wastes and the presence of special hazards in near the project area at NSA Annapolis.

3.9.2.1 No Action Alternative

Under the No Action Alternative, the Proposed Action would not occur, and there would be no change associated with use or management of hazardous materials and wastes. The Navy would continue to maintain the existing utility bridge, though the bridge is in poor condition overall with numerous deficiencies. Routine maintenance activities would have negligible impacts on hazardous materials and wastes due to the very small quantities that could be used or generated for these repairs. Under a worst-case scenario of a bridge failure, bridge components containing special hazards such as lead and asbestos could be released into College Creek or into the air and surrounding area in the form of dust and debris. Sources of special hazards on the utility bridge include primarily paints, caulks, and coatings; asbestos and lead have varying solubilities in water, depending on temperature, pH, and other factors. Clean-up following such an event could necessitate soil and sediment testing and removal. Therefore, no significant impacts on hazardous materials and wastes would occur under the No Action Alternative.

Hazardous Material and Waste Potential Impacts:

- No Action: Potential short-term, moderate adverse impacts from a worst-case scenario of a bridge failure or rupture resulting in special hazards such as lead and asbestos being released into the water, air, or surrounding area in the form of dust and debris. No significant impacts.
- Alternative 1: Short-term increase in use of hazardous materials and generation of hazardous wastes. Demolished bridge components may contain special hazards; wastes would be characterized and disposed of appropriately. No significant impacts.
- Alternative 2: Similar to Alternative 1. No significant impacts.
- Alternative 3: Similar to Alternative 1. No significant impacts.
- Option: Additional short-term, minor use of hazardous materials and generation of hazardous wastes. No significant impact, when combined with any of the action alternatives.

3.9.2.2 Alternative 1 Potential Impacts

The study area for hazardous materials and wastes under Alternative 1 includes the existing utility bridge and the Alternative 1 project area where construction would occur; management of hazardous materials and wastes includes all of USNA.

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 would include various components that could be hazardous waste or special hazards. The original bridge structure was constructed in 1931 as a railroad trestle, and then converted to a utility bridge. 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. If any hazardous waste is discovered during the work, the PWD-A-EV HW program manager would sign all manifests for waste leaving NSA Annapolis.

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

3.9.2.3 Alternative 2 Potential Impacts

The study area for hazardous materials and wastes under Alternative 2 includes the existing utility bridge and the Alternative 2 project area where construction would occur; management of hazardous materials and wastes includes all of USNA. Alternative 2 would increase short-term use of hazardous materials and generation of hazardous wastes from construction activities. The existing bridge likely contains ACM, LBP, and PCBs due the age of construction; suspect materials would require testing and, if present, appropriate disposal. These impacts are essentially the same as those described under Alternative 1. Therefore, implementation of Alternative 2 would not result in significant impacts with hazardous materials and wastes.

3.9.2.4 Alternative 3 Potential Impacts

The study area for hazardous materials and wastes under Alternative 3 includes the existing utility bridge and the Alternative 3 project area where construction would occur; management of hazardous materials and wastes includes all of USNA. Alternative 3 would increase short-term use of hazardous materials and generation of hazardous wastes from construction activities. The existing bridge likely contains ACM, LBP, and PCBs due the age of construction; suspect materials would require testing and, if present, appropriate disposal. These impacts are essentially the same as those described under Alternative 1. A generator and associated fuel storage tank are close to the project boundary on the eastern bank of College Creek; these would be avoided during construction activities. Therefore, implementation of Alternative 3 would not result in significant impacts with hazardous materials and wastes.

3.9.2.5 Potential Impacts of Underground Utility Option

The study area for the underground utility option includes the location of the directional boring near the existing utility bridge; management of hazardous materials and wastes includes all of USNA. Boring four underground utility lines could require short-term use of additional hazardous materials, such as drilling fluid, and generate some additional hazardous wastes. 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. Therefore, implementation of the underground utility option, in addition to any of the alternatives, would not result in significant impacts with hazardous materials and wastes.

3.10 Summary of Potential Impacts on Resources and Impact Avoidance and Minimization

Table 3-14 provides a tabular summary of the potential impacts on the resources associated with the No Action Alternative and the three action alternatives as well as the underground utility option.

Table 3-14 Summary of Potential Impacts on Resource Areas

Resource Area	***No Action Alternative***	***Alternative 1***	***Alternative 2***	***Alternative 3***	***Underground Utility Option***
Air Quality	Negligible air emissions from ongoing, routine maintenance. Temporary, minor, adverse, localized impacts from airborne dust and debris under a worst-case scenario of bridge failure. No significant impacts.	Similar to but slightly less than Alternative 2. No significant impacts.	Short-term, minor emissions during construction. No significant impacts.	Similar to but slightly less than Alternative 2. No significant impacts.	Short-term, minor emissions from operating boring equipment. No significant impacts, when combined with any of the action alternatives.
Water Resources	Short-term, moderate, adverse impacts from a rupture that results in discharges into College Creek. No significant impacts.	Short-term, minor adverse impacts from construction within College Creek. No long-term impacts. No significant impacts.	Similar to Alternative 1 but slightly greater due to more trenching. No significant impacts.	Similar to Alternative 1. No significant impacts.	Negligible impacts since utilities would be below creek sediment bed. No significant impacts, when combined with any of the action alternatives.
Geological Resources	No change in baseline condition. No significant impacts.	Short-term, minor, adverse effects from soil erosion and sedimentation. Minor, localized changes in topography from bridge construction and demolition. No significant impacts.	Similar to Alternative 1 but slightly greater due to more trenching. No significant impacts.	Similar to Alternative 1. No significant impacts.	Short-term, minor potential for drilling fluid or other fluid to leak into soils. No significant impacts, when combined with any of the action alternatives.

Resource Area	***No Action Alternative***	***Alternative 1***	***Alternative 2***	***Alternative 3***	***Underground Utility Option***
Cultural Resources	Possible direct adverse effects from a worst-case scenario depending on the extent of a rupture. Possible indirect, adverse effects from the worst-case scenario due to the vibrations from a rupture. No significant impacts.	Minor-to-moderate, adverse effects on unknown archaeological deposits due to ground disturbance of the new bridge; a Phase I survey will be completed. No adverse effects on viewsheds in the APE. No adverse effects on the Colonial Annapolis Historic District. No significant impacts.	Minor-to-moderate, adverse effects on unknown archaeological deposits due to ground disturbance of the new bridge; a Phase I survey would be completed. No adverse effects on viewsheds in the APE. No adverse effects on the Colonial Annapolis Historic District. No significant impacts.	Minor-to-moderate, adverse effects on unknown archaeological deposits due to ground disturbance of the new bridge; a Phase I survey would be completed. No adverse effects on viewsheds in the APE. No adverse effects on the Colonial Annapolis Historic District. No significant impacts.	The Navy would follow the Standard Operating Procedure on unanticipated discoveries. No significant impacts, when combined with any of the action alternatives.
Biological Resources	Potential short-term, moderate adverse impacts from a worst-case scenario of a rupture that results in discharges into College Creek. No significant impacts.	Short-term, minor, adverse impacts from construction activity on marine species. The Navy will implement conservation measures during construction to minimize adverse effects on essential fish habitat. No significant impacts.	Similar to Alternative 1. No significant impacts.	Similar to Alternative 1. No significant impacts.	Short-term, minor impacts on bottom-dwelling species from vibrations during directional drilling. No significant impacts, when combined with any of the action alternatives.
Noise	Short-term, moderate impacts from a worst-case scenario of a rupture. No long-term impacts. No significant impacts.	Short-term, minor impacts on airborne and underwater receptors from construction. No long-term impacts. No significant impacts.	Similar to Alternative 1. No significant impacts.	Similar to Alternative 1. No significant impacts.	Short-term, minor impacts from construction; minor impacts from vibration. No long-term impacts. No significant impacts when combined with any of the action alternatives.

Resource Area	***No Action Alternative***	***Alternative 1***	***Alternative 2***	***Alternative 3***	***Underground Utility Option***
Infrastructure	Likely impacts include partial or total bridge failure affecting the distribution of utility service. Under a worst-case scenario of catastrophic bridge failure, impacts would be major, but utility service would be restored in the long term. Infrastructure deterioration is a driving need for the Proposed Action.	Short-term, minor impacts on utility service during interconnections. Long-term, beneficial effects from a safer, more reliable bridge to carry utilities. No significant impacts.	Similar to Alternative 1. No significant impacts.	Similar to Alternative 1. No significant impacts.	Short-term, minor impacts on utility service during interconnections. Long-term increased reliability and protection from lines being underground. No significant impacts, when combined with any of the action alternatives.
Public Health and Safety	The potential for a bridge failure is a public health and safety threat. Addressing infrastructure deterioration that threatens property damage or public safety is a driving need for the Proposed Action.	Short-term, minor adverse safety risks during construction and demolition. Long-term beneficial effects from improved bridge safety. No significant impacts.	Similar to Alternative 1. No significant impacts.	Similar to Alternative 1. No significant impacts.	Short-term, minor adverse safety risks during boring activities. Long-term beneficial effects from better-protected underground utilities. No significant impacts, when combined with any of the action alternatives.
Hazardous Materials and Wastes	Potential short-term, moderate adverse impacts from a worst-case scenario of a bridge failure or rupture resulting in special hazards such as lead and asbestos being released into the water, air, or surrounding area in the form of dust and debris. No significant impacts.	Short-term increase in use of hazardous materials and generation of hazardous wastes. Demolished bridge components may contain special hazards; wastes would be characterized and disposed of appropriately. No significant impacts.	Similar to Alternative 1. No significant impacts.	Similar to Alternative 1. No significant impacts.	Additional short-term, minor use of hazardous materials and generation of hazardous wastes. No significant impacts, when combined with any of the action alternatives.

Key: APE = Area of Potential Effect; NRHP = National Register of Historic Places.

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 NEPA and Navy regulations. A cumulative impact is defined 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 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 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 EA, the study area delimits the geographic extent of the cumulative impacts analysis. In general, the study area includes 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 interrelated 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 notices of intent for Environmental Impact Statements and EAs, management plans, land use plans, and other planning related studies.

4.3 Past, Present, and Reasonably Foreseeable Actions

This section focuses 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 impact analysis are listed in Table 4-1, shown on Figures 4-1 through 4-3, and briefly described in the following subsections.

Table 4-1 Cumulative Action Evaluation

Action	***Level of NEPA Analysis Completed***
Past Actions	
Navy Exchange, Commissary, Health Clinic	Environmental Assessment
Halligan Hall Energy Repairs	Categorical Exclusion
Perry Center Seawall Repair	Categorical Exclusion
Wastewater Treatment Plant Upgrades	Environmental Assessment
Center for Cyber Security Studies	Environmental Assessment
Chapel Roof Repairs	Categorical Exclusion
Mail Center and CHRIMP Relocation	Environmental Assessment
Beach Hall Conference Center Addition	Categorical Exclusion
Present and Reasonably Foreseeable Future Actions	
Porter Road Stormwater Management Repairs	Categorical Exclusion
Chapel and Leahy Hall Steam Distribution Repairs	Categorical Exclusion
Sampson Hall Roof and Exterior Repairs	Categorical Exclusion
U.S. Naval Academy Alumni Association and Foundation Headquarters	Environmental Assessment
Perry Center Riprap Repair	Categorical Exclusion
Seawall Repair and Restoration	Environmental Assessment
Decatur Avenue Bridge Repair/Replacement	To be determined

Sources: NAVFAC Washington, 2015a; NAVFAC Washington, 2018a; NAVFAC Washington, 2018c
Key: CHRIMP = Consolidated Hazardous Material Reutilization Inventory Management Program; NEPA = National Environmental Policy Act.

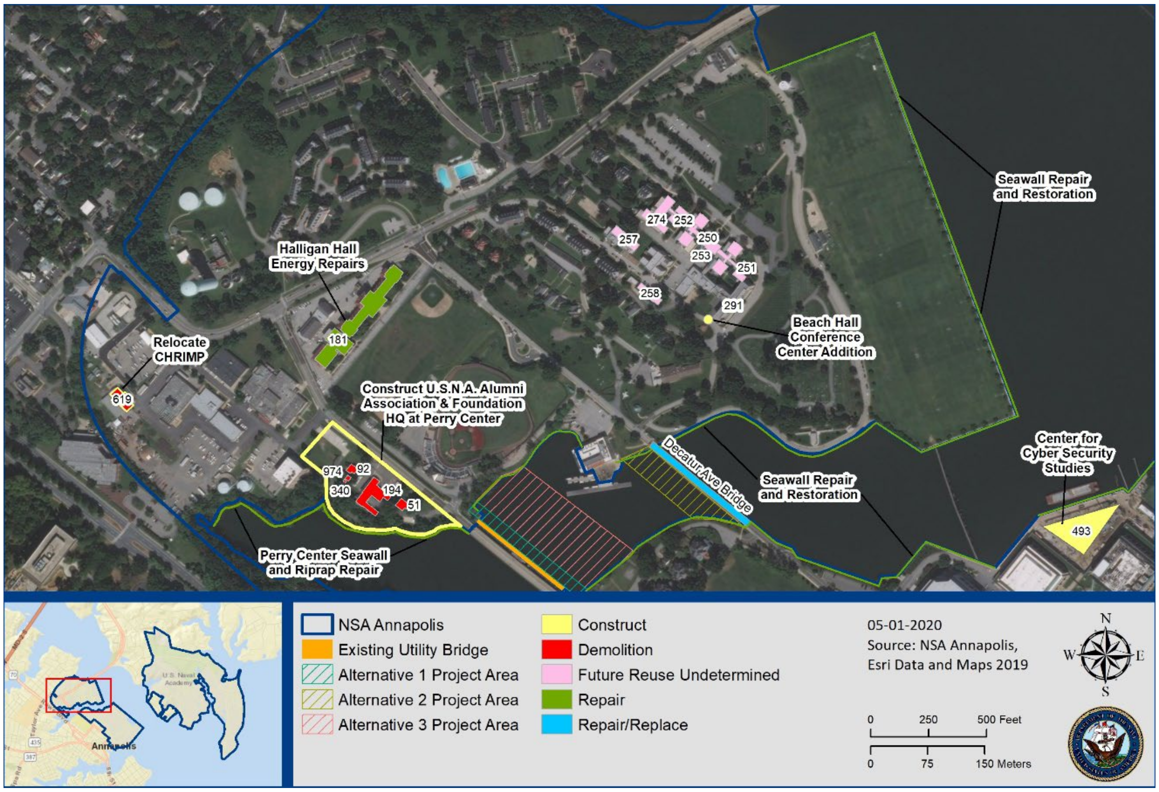


Figure 4-1 Cumulative Projects on the Upper Yard

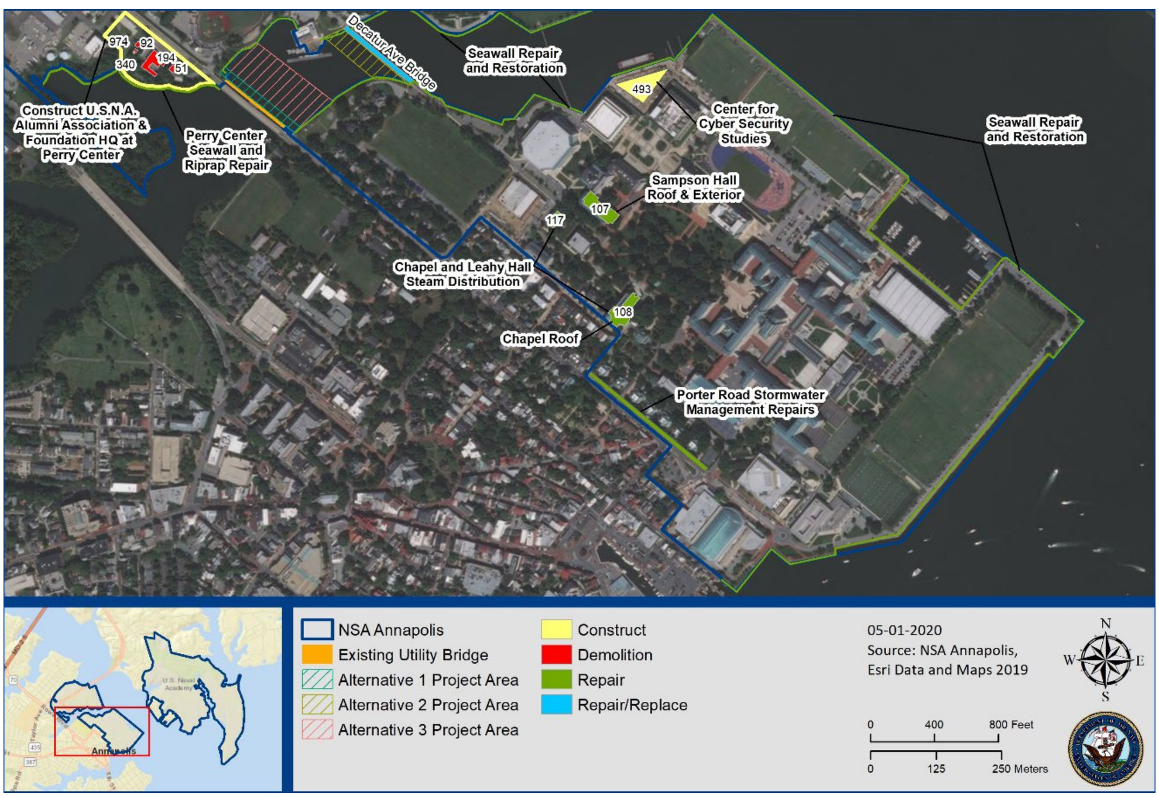


Figure 4-2 Cumulative Projects on the Lower Yard

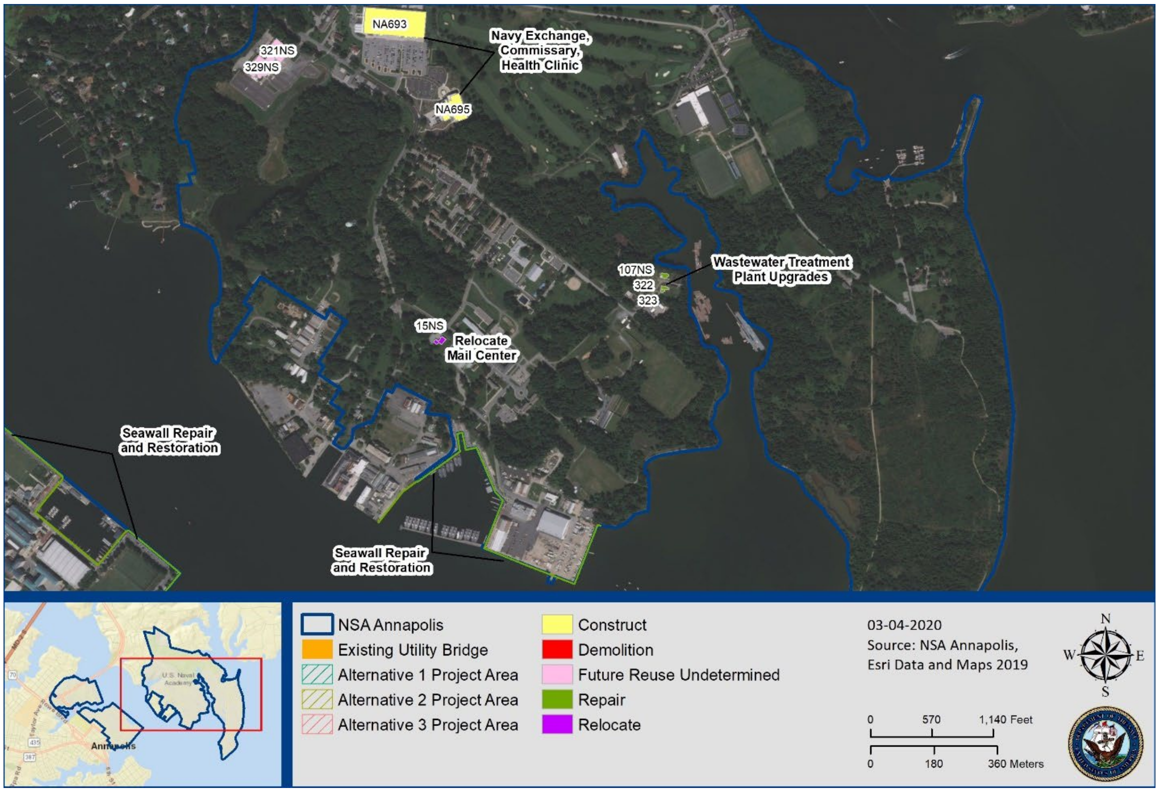


Figure 4-3 Cumulative Projects on North Severn

4.3.1 Past Actions

Navy Exchange, Commissary, Health Clinic. The Navy prepared an EA to assess the potential environmental impacts of constructing and operating a new Navy Exchange, Commissary, and Health Clinic on North Severn. The Navy Exchange and Commissary complex, located between Kinkaid and Greenbury Point Roads, includes a one-story building with an 88,000-square-foot Navy Exchange and a 51,500-square-foot Commissary. A three-story 105,500-square foot-Health Clinic is located adjacent to the northwestern boundary of the golf course. A supporting 550-space parking area was constructed between the Navy Exchange and Commissary complex and the Health Clinic. The Navy Exchange and Commissary replace the existing facilities on North Severn; the existing Navy Exchange and Commissary buildings and their associated parking would be reused (potential reuse has not yet been determined). The new Health Clinic on North Severn replaced the Naval Health Clinic on the Upper Yard. The Navy Exchange/Commissary opened in September 2014, and construction of the Health Clinic was completed in 2017 (NAVFAC Washington, 2018c).

Halligan Hall Energy Repairs. This project consisted of replacing the existing steam service and heating and air conditioning system in Halligan Hall (Building 181) with a more energy efficient ground-source heat pump, also known as a geothermal well system. Approximately 190 six-inch-diameter wells were installed at a depth of up to 400 feet below Lawrence Field for the proposed ground-source heat pump system. The project also included restoring and selectively replacing the existing windows to improve the building's thermal performance (NAVFAC Washington, 2018c).

Perry Center Seawall Repair. The Navy conducted repairs to the seawall along College Creek.

Wastewater Treatment Plant Upgrades. The Navy modernized and repaired the North Severn wastewater treatment plant to comply with regulatory requirements for denitrification (NAVFAC Washington, 2018a).

Center for Cyber Security Studies. This project consisted of the construction of an approximately 206,000-square-foot new multistory facility at the Lower Yard to house the Center for Cyber Security Studies and a supporting two-story parking garage structure. The facilities were designed and constructed for energy efficiency and sustainability including, at a minimum, a Leadership in Energy and Environmental Design Silver certification (NAVFAC Washington, 2018c).

Chapel Roof Repairs. This project consisted of roof repairs to the historic USNA Chapel (Building 108), located on the Lower Yard of NSA Annapolis.

Relocation of Mail Center and Consolidated Hazardous Material Reutilization Inventory Management Program (CHRIMP) Facilities. Two functions within the Perry Center were relocated prior to the new USNA Alumni Association and Naval Academy Foundation Headquarters construction starting. The Navy relocated the Mail Center from Building 51 (which was demolished) to Building 15NS on North Severn.

The CHRIMP was in Building 194, which was also demolished. The Navy relocated the CHRIMP to Building 619, a public works shop storage area that was no longer needed (NAVFAC Washington, 2018c).

Beach Hall Conference Center Addition. The U.S. Naval Institute, which is in Beach Hall (Building 291), constructed a conference center addition on the western side of the building. The addition included a 400-seat auditorium/conference room with an open-air area for tables and chairs on the roof (NAVFAC Washington, 2018a).

4.3.2 Present and Reasonably Foreseeable Actions

Porter Road Stormwater Management Repairs. This project consists of repairs to stormwater management along Porter Road on the Lower Yard.

Chapel and Leahy Hall Steam Distribution Repairs. This project consists of repairs to the water and steam distribution lines that provide heating at the USNA Chapel (Building 108) and Leahy Hall (Building 117) on the Lower Yard.

Sampson Hall Roof and Exterior. This project consists primarily of replacing the roof on Sampson Hall (Building 107) and other minor facility repairs.

Construct U.S. Naval Academy (USNA) Alumni Association and Foundation Headquarters at Perry Center. The USNA Alumni Association and Naval Academy Foundation will construct a new 29,000–square-foot Alumni Service Center and Headquarters facility with a 90- to 120-vehicle parking lot on NSA Annapolis property located at the Perry Center in the southwestern portion of the Upper Yard. Construction of the facility and parking lot will require excavation, grading, and tree/vegetation removal resulting in 5,928 cubic yards of excavated material, 5,585 cubic yards of fill material, and 20,650 square feet of tree/vegetation removal. Project implementation is anticipated to begin in 2020 with a 24-month construction period (NAVFAC Washington, 2018c).

Perry Center Riprap Repair. The Navy plans to conduct further repairs to the riprap along College Creek.

Seawall Repair and Restoration. NSA Annapolis plans to repair and restore approximately 19,334 linear feet of seawall on the shorelines of the Lower Yard along the Severn River, College Creek, Spa Creek, and Santee Basin; portions of the Upper Yard along the Seven River and College Creek; and portions of the

North Severn area along the Severn River and Yard Patrol Basin. The repairs and restoration would address existing structural deficiencies and potential impacts from future extreme weather events, storm surge, sea level rise, and land subsidence. Construction would occur over the next 10 to 20 years as funding becomes available. An EA has been prepared to assess a range of techniques to repair and design designated reaches, primarily hardened structures, but also log toe stabilization and living shoreline where those techniques might be feasible.

Decatur Avenue Bridge Repair/Replacement. Currently, the Decatur Avenue Bridge is in fair condition. Some repairs of this bridge could occur in the next 24 months. Furthermore, the bridge may need major repairs or replacement within the next 5 to 10 years. However, details about possible repairs or replacement are not known at this time, so this project is only considered notionally in this cumulative analysis.

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 the Metropolitan Baltimore 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 have the potential to affect air quality.

4.4.1.3 Cumulative Impact Analysis

Cumulative air quality impacts from past, present, and future actions within the study area would be less than significant. For present and future actions, 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 disturb the soil. All present and reasonably foreseeable future actions could collectively increase emissions of criteria pollutants temporarily in and around construction sites at NSA Annapolis, but variations in the timing of projects would distribute emissions temporally. Estimated construction emissions from the proposed utility bridge replacement are well below *de minimis* thresholds. Per regulation, by demonstrating that this project would be below *de minimis* thresholds as discussed in Section 3.1, the project is not considered significant individually or cumulatively within the airshed. Therefore, implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on air quality 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 includes College Creek, the downstream water resources, wetlands, and groundwater.

4.4.2.2 Relevant Past, Present, and Future Actions

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

4.4.2.3 Cumulative Impact Analysis

For past, present, and future projects at NSA Annapolis, all construction projects would be expected to increase sedimentation and turbidity, which could directly affect water resources within the study area or indirectly affect downstream water resources. The Perry Center seawall and riprap repair along College Creek would aid in reducing sedimentation into the creek. In addition, NSA Annapolis plans to repair and restore approximately 19,334 linear feet of seawall on the Lower Yard and Upper Yard along the Seven River and College Creek, which would also aid in reducing sedimentation. Individually, projects would be expected to have negligible-to-minor impacts, depending on the specific water resources (e.g., surface water, coastal zones) where the construction occurs, and varying with the size, intensity, and duration of construction activities.

Development pressures in urbanized areas have the potential for contributing to long-term, adverse, cumulative effects by increasing impervious surfaces from parking, sidewalks, and facilities, which can exacerbate stormwater and flooding issues and decrease groundwater infiltration. However, the Proposed Action would not increase the amount of impervious surface. Implementation of the Proposed Action combined with the past, present, and reasonably foreseeable future projects, would not result in significant water resource 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 NSA Annapolis and adjacent areas that could receive indirect impacts.

4.4.3.2 Relevant Past, Present, and Future Actions

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

4.4.3.3 Cumulative Impact Analysis

Most of the projects listed in Table 4-1 involve activities that result in soil disturbance. Given the NSA Annapolis' location along the shorelines of the Severn River, College Creek, and other surface water bodies, soil disturbance can increase sedimentation into those water bodies. However, erosion- and sediment-control plans are required for grading activities that disturb 5,000 square feet or more of land area or 100 cubic yards or more of earth, reducing sedimentation into water. Given the low-lying topography of the installation, the cumulative projects would not change the topography of the area. If any of the projects change the runoff characteristics and create points of concentrated flow where previously there was sheet flow, MDE may require additional water quantity management to minimize adverse impacts from the change in drainage patterns. Therefore, implementation of the Proposed

Action combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on 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 NSA Annapolis.

4.4.4.2 Relevant Past, Present, and Future Actions

All past, present, and reasonably foreseeable future actions on USNA listed in Table 4-1 have the potential to affect cultural resources, either directly if a building is within the USNA and the National Historic Landmark/Historic District boundaries, or if visible from the district.

4.4.4.3 Cumulative Impact Analysis

The Navy meets its stewardship requirements for cultural resources under Sections 106 and 110 of the NHPA. The installation has an Integrated Cultural Resources Management Plan that is a reference and a planning tool for management and preservation of cultural resources while maintaining mission readiness (NAVFAC Washington, 2018b). Any alterations of a resource eligible for the NRHP must be done to meet the Secretary of the Interior's Standards for the Treatment of Historic Properties. Consultation with the SHPO (and other appropriate parties) must be undertaken prior a project's commencement. In this way, the Navy works to identify, avoid, minimize, and/or mitigate any potential impacts on cultural resources when implementing individual projects.

The Cyber Security Studies Programmatic Agreement identified the Navy's commitment to design the facility for compatibility with its surroundings, minimizing height and massing of the top floor, and to provide designs, once available, to consulting parties for review at various phases in the design process. A Programmatic Agreement was also implemented for the shoreline repairs to stipulate the design review process as various shoreline reaches are developed and implemented. Considering the location of the utility bridge where shoreline repairs would occur at some point in the future (likely following bridge relocation), requirements identified in that Programmatic Agreement may have some cumulative considerations. The Navy would abide by any and all Programmatic Agreement commitments and consult further, as appropriate. The Navy is also consulting with the SHPO regarding this Proposed Action. Implementation of the Proposed Action, when combined with past, present, and reasonably foreseeable future projects, would not be expected to result in significant impacts 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 NSA Annapolis and the surrounding terrestrial and aquatic 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 NSA Annapolis, all 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, depending on the biological community where the construction occurs, and would vary with the size, intensity, and duration of construction activities. Given the amount of terrestrial and aquatic habitat in the vicinity of NSA Annapolis, wildlife would be able to retreat if disturbed by noise, dust, or increased human activities.

Construction activities occurring along College Creek, including the Center for Cyber Security Studies, Alumni Service Center and Headquarters facility, seawall and shoreline repair and restoration activities, and the Proposed Action, could have cumulative contributions of increased turbidity affecting aquatic organisms in College Creek and further downstream. Shoreline repairs and the utility bridge would have the greatest likelihood of cumulative contributions as these activities would occur within and along the shorelines of College Creek. Construction activities would adhere to all federal and state regulations and permits and would use sediment- and erosion-control measures and, if applicable, stormwater controls. Long-term, adverse cumulative impacts on aquatic species or EFH are not expected from construction activities.

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 Noise

4.4.6.1 Description of Geographic Study Area

The study area for assessment of cumulative impacts on the noise environment are the populations adjacent to the installation and the underwater receptors.

4.4.6.2 Relevant Past, Present, and Future Actions

All the present and foreseeable future projects listed in Table 4-1 could contribute directly or indirectly to impacts on noise.

4.4.6.3 Cumulative Impact Analysis

Cumulative noise impacts from present and future actions within the study area could occur during construction activities if they were adjacent to noise-sensitive receptors and were occurring at the same time. However, noise from construction would be intermittent and temporary. Long-term impacts from the operation of the Alumni Service Center and Headquarters facility and Center for Cyber Security Studies are not expected to be significant, and according to project schedules, construction of these facilities would not overlap with this Proposed Action (NAVFAC Washington, 2015b). The Proposed Action in this EA would not have long-term impacts; combined, these projects would not be expected to have long-term cumulative impacts on noise.

4.4.7 Infrastructure

4.4.7.1 Description of Geographic Study Area

The study area for assessment of cumulative impacts on infrastructure is NSA Annapolis.

4.4.7.2 Relevant Past, Present, and Future Actions

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

4.4.7.3 Cumulative Impact Analysis

Individual construction activities have varying infrastructure requirements. Utility systems on NSA Annapolis are generally adequate. Individual projects could have temporary impacts during utility interconnections, but these kinds of impacts would be minor and short term in nature. Larger projects, such as the Center for Cyber Security Studies and Alumni Service Center and Headquarters facility, contribute cumulatively with localized upgrades and replacements of infrastructure components, which have long-term benefits for installation-wide infrastructure. The Proposed Action would not increase demand for or change the capacity of the existing utility infrastructure. However, the replaced bridge would enhance long-term safety, security, and reliability of the utilities crossing College Creek on that bridge, which would have long-term cumulative contributions to improved utilities at NSA Annapolis. Implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on infrastructure within the study area.

4.4.8 Public Health and Safety

4.4.8.1 Description of Geographic Study Area

The study area for the assessment of cumulative impacts on public health and safety is NSA Annapolis.

4.4.8.2 Relevant Past, Present, and Future Actions

All past, present, and reasonably foreseeable future actions listed in Table 4-1 have the potential to affect public health and safety.

4.4.8.3 Cumulative Impact Analysis

All construction activities have minor safety risks while these activities are ongoing but would not cumulatively pose unacceptable safety risks. Other ongoing and future activities would not present notable long-term safety concerns. The replaced bridge would enhance long-term safety and security by correcting conditions that currently pose safety hazards. Implementation of the Proposed Action, combined with the past, present, and reasonably foreseeable future projects, would not result in significant impacts on public health and safety within the study area.

4.4.9 Hazardous Materials and Wastes

4.4.9.1 Description of Geographic Study Area

The study area for assessment of cumulative impacts on hazardous materials and wastes is NSA Annapolis.

4.4.9.2 Relevant Past, Present, and Future Actions

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

4.4.9.3 Cumulative Impact Analysis

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.

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Mary Young (Marstel-Day LLC)
B.S. Environmental Science
Years of Experience: 19
Responsible for air quality, geology, infrastructure, public health and safety, hazardous materials and wastes

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