Final

Environmental Assessment
Energy Upgrades to Steam Distribution System
(MILCON P222)

Naval Support Facility Indian Head
Indian Head, Maryland

Prepared for:

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August 2012

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COVER SHEET

Title

Final Environmental Assessment for Energy Upgrades to Steam Distribution System, Naval Support Facility Indian Head, MD, Naval Support Activity South Potomac, Naval District Washington, dated August 2012

Responsible Agency

Department of the Navy
Naval Support Activity South Potomac
6509 Sampson Road, Suite 217
Dahlgren, VA 22448-5108

Proposed Action

Upgrade the steam distribution system through construction of a natural gas transmission line from Bryans Road, natural gas-fired steam generation plants with cogeneration of electricity, and secondary nodal steam generation plants, and demolish up to 10 miles of excess steam lines and the coal-fired steam and power generation plant to reduce energy consumption, support existing and future missions of supported commands, and eliminate reliance on the Goddard Power Plant for steam and power needs at Naval Support Facility Indian Head (NSF Indian Head), located in Charles County, Maryland.

Designation

Environmental Assessment

Abstract

The overall purpose of the actions analyzed in this Environmental Assessment (EA) is to reduce energy consumption, decrease utility costs, improve the reliability of the steam distribution infrastructure, and eliminate reliance on the Goddard Power Plant for steam distribution by upgrading and decentralizing the existing steam distribution system at NSF Indian Head. The Proposed Action would address these issues by constructing a decentralized steam distribution system with cogeneration of electricity, consisting of two primary nodal steam generation plants to support critical energetics operations, along with nine secondary nodal steam generation plants to support smaller mission operations not served by the new nodal steam system. Natural gas would serve as the primary fuel source and require construction of a gas line from Bryans Road. In addition, the Proposed Action would construct a utilities and energy management (UEM) building to provide space for those functions currently located within and near the Goddard Power Plant, and demolish the Goddard Power Plant, support buildings, Steam B Plant, and up to 10 miles of excess steam lines.

The Alternative Action would construct two larger primary nodal steam generation plants with cogeneration of electricity and a UEM Building, and demolish the Goddard Power Plant, but would not construct any secondary nodal plants. As with the Proposed Action, natural gas would serve as the primary fuel source and require construction of a gas line from Bryans Road. In comparison to the Proposed Action, the Alternative Action would continue to use the existing steam line infrastructure and thus continue to experience greater steam losses and maintenance costs. A No-Action Alternative was also considered whereby neither the Proposed nor the Alternative Action would be implemented. Under the No-Action Alternative, NSF Indian Head would continue to experience significant energy loss and the supported commands would continue to incur high utility costs. The consequences of the Proposed and Alternative Actions differ in the following environmental areas: explosives safety, infrastructure and utilities, air quality, stormwater, surface waters, coastal zone management, wetlands, groundwater, fish and wildlife, architectural resources, archeological resources, geology and soils, topography, solid and hazardous waste, health and safety, and noise.

Availability

August 2012

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EXECUTIVE SUMMARY

Naval Support Facility Indian Head (NSF Indian Head) occupies approximately 3,500 acres on the eastern bank of the Potomac River in Charles County, Maryland, approximately 30 miles south of Washington, D.C. The overall purpose of the Proposed Action is to reduce energy consumption, decrease utility costs, improve the reliability of the steam distribution infrastructure, and eliminate reliance on the Goddard Power Plant for steam distribution. The action is needed because the existing steam distribution system has exceeded the expected operational life span, is costly to maintain, and is inefficient and unreliable. The Goddard Power Plant has also surpassed its expected operational lifespan and is not meeting all emissions standards.

The Proposed Action would address this purpose and need by constructing a decentralized steam distribution system consisting of two primary nodal steam generation plants with cogeneration of electricity to support critical energetics operations, along with nine secondary nodal steam generation plants to support smaller mission operations not served by the new primary nodal steam system. Natural gas would serve as the primary fuel source and require construction of a gas line from the nearest connection point in Bryans Road. In addition, the Proposed Action would construct a Utilities and Energy Management (UEM) Building to provide space for those functions currently located within and near the Goddard Power Plant, and demolish the Goddard Power Plant, support buildings, and up to 10 miles of excess steam lines.

The Navy also considered an Alternative Action to reduce energy consumption, decrease utility costs, and improve the reliability of the steam distribution infrastructure. The Alternative Action would construct two larger primary nodal steam generation plants with cogeneration of electricity, construct a UEM Building, and demolish the Goddard Power Plant, but would not install any secondary nodal plants. As with the Proposed Action, natural gas would serve as the primary fuel source and require construction of a gas line from Bryans Road.

In comparison to the Proposed Action, the Alternative Action would continue to use the full extent of existing steam line infrastructure, and thus continue to experience greater steam losses and maintenance costs. A No-Action Alternative was also considered whereby neither the Proposed Action nor the Alternative Action would be implemented. Under the No-Action Alternative, NSF Indian Head would continue to experience significant energy loss, the supported commands would continue to incur high utility costs, the Navy would not meet its goal of eliminating reliance on the Goddard Power Plant for steam and power generation, and NSF Indian Head would continue to be in violation of the new Clean Air Act rules.

The Proposed Action would result in adverse impacts to historic properties. In addition, the Proposed Action would result in minor impacts associated with increased operational air emissions of CO from natural gas-fired boilers; impacts to stormwater, surface waters, wetlands, and Maryland's coastal resources; potential exposure to surficially contaminated groundwater and contaminated soils; removal of vegetation; impacts to wildlife habitat; alterations to topography; increased health and safety hazards; and temporary increases in noise, air emissions, solid waste generation, and traffic volume due to construction and demolition activities.

The long-term benefits of the Proposed Action, in addition to reducing energy consumption, decreasing utility costs, improving the reliability of the steam distribution infrastructure, and eliminating reliance on the Goddard Power Plant, would include the following:

- Improvement to explosives safety conditions through the reduction of personnel traveling through explosives arcs due to the relocation of facilities and personnel associated with utilities and energy management outside of the restricted area;

- Minor to significant reductions in operational air emissions of CO_2, HCl, NO_x, PM, SO_2, and VOC due to a reduction in the number of buildings supported by steam and the replacement of the coal-fired Goddard Power Plant with cleaner natural gas-fired nodal plants;

- Reduction in wastewater discharge and incorporation of low impact development resulting in an improvement in quality of stormwater runoff, and subsequent improvement in surface water quality, estuarine fish and wildlife habitat, and Maryland's coastal resources;

- Reduction in groundwater usage due to the demolition of the Goddard Power Plant and associated facilities, which currently rely heavily on groundwater usage;

- Temporary improvement to employment and income in the local community during demolition and construction;

- Improvements to pervious conditions due to revegetation of demolition sites;

- Elimination of fly ash that is generated by the Goddard Power Plant; and

- Improvement to noise levels and the health and safety of workers due to fewer repairs and maintenance of lead and asbestos-contaminated facilities and steam lines needed following demolition of existing infrastructure and relocation of personnel outside of the restricted area.

The Alternative Action would result in adverse impacts to historic properties similar to those caused by the Proposed Action. Other minor impacts of the Alternative Action would also be similar to the Proposed Action, except the Alternative Action would result in less generation of contaminated solid and hazardous waste associated with demolition of steam lines and have fewer impacts on surface water bodies, wildlife habitat, and topography due to the lack of secondary nodal plants. The long-term benefits of the Alternative Action would be similar to the Proposed Action, except the Alternative Action would result in less long-term improvement to the health and safety of workers due to retaining existing steam lines, which are likely to need future repairs. Although upgraded, the steam lines would continue to experience greater steam losses than those seen under the Proposed Action, and the continued repair and maintenance of the steam lines would likely result in higher maintenance costs than the Proposed Action. As a result, the Alternative Action is considered less desirable than the Proposed Action.

This EA has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, the Council of Environmental Quality regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508 and 32 CFR Part 775), and the Department of the Navy Environmental and Natural Resources Program Manual, OPNAVINST 5090.1C, Chapter 5.

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LIST OF ACRONYMS

ACHP	Advisory Council on Historic Preservation
AQCR	Air Quality Control Region
BEMP	Bald Eagle Management Plan
BLS	Bureau of Labor Statistics
BMP	Best Management Practice
BO	Biological Opinion
CAA	Clean Air Act
CAD	Cartridge-actuated devices
CBIRF	Chemical Biological Incident Response Force
CDR	Construction, demolition, and renovation
CE	Contributing element
CEQ	Council of Environmental Quality
CFB	Circulating fluidized bed
CH_4	Methane
CHS	Controlled Hazardous Substance
CO	Carbon monoxide
CO_2	Carbon dioxide
COMAR	Code of Maryland Regulations
CRTDA	Caffee Road Thermal Decontamination Area
CWA	Clean Water Act
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
dB	Decibel
dBA	A-weighted decibel scale
DDESB	Department of Defense Explosives Safety Board
DLA	Defense Logistics Agency
DoD	Department of Defense
EA	Environmental Assessment
EAB	Emerald ash borer
EO	Executive Order
EPAct	Energy Policy Act
ESA	Endangered Species Act
ESD	Environmental site design
ESQD	Explosives safety quantity-distance
ESS	Explosives Safety Submission
ESS-DR	ESS determination request
EUL	Enhanced Use Lease
FID	Forest Interior Dweller
FY	Fiscal year
GAC	Granular activated carbon
GCR	General Conformity Rule
GHG	Greenhouse gas
gpd	Gallons per day
GWP	Global warming potential
HAER	Historic American Engineering Record
HAP	Hazardous air pollutant
HFC	Hydrofluorocarbon
HVAC	Heating, Ventilating, and Air Conditioning
IAS	Initial Assessment Study

ICRMP	Integrated Cultural Resources Management Plan
IL	Intraline
IMP	Institutional Management Plan
INRMP	Integrated Natural Resource Management Plan
IPCC	Intergovernmental Panel on Climate Change
IR	Installation Restoration
JITC	Joint Interoperability Test Command
kV	Kilovolts
LEED	Leadership in Energy and Environmental Design
LID	Low-Impact Development
LOD	Limit of disturbance
MACT	maximum achievable control technology
MDA	Maryland Department of Agriculture
MDE	Maryland Department of the Environment
MDNHP	Maryland Natural Heritage Program
MDNR	Maryland Department of Natural Resources
MEC	Munitions and explosives of concern
MHT	Maryland Historic Trust
MILCON	Military Construction Project
MOA	Memorandum of Agreement
MRP	Munitions Response Program
MT CO_2e	Metric tons CO2e
MW	megawatts
N_2O	Nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAVFACWASH	Naval Facilities Engineering Command Washington
NAVFACINST	NAVFAC's Regional Planning Instruction
NAVSEA	Naval Sea Systems Command
NAVSEALOGCEN	Naval Sea Logistics Center
NC	Nitrocellulose
NCCW	non-contact cooling water
NDW	Naval District Washington
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NG	Natural Gas
NHP	Natural Heritage Program
NHPA	National Historic Preservation Act
NMIM	National Mobile Inventory Model
NO_2	Nitrogen dioxide
NOAA Fisheries	National Marine Fisheries Service
NOSSA	Naval Ordnance Safety and Security Activity
NO_x	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NSASP	Naval Support Activity South Potomac
NSF	Naval Support Facility
NSPS	New Source Performance Standards
NSR	New Source Review
NSWC IHD	Naval Surface Warfare Center, Indian Head Division
O_3	Ozone
ODS	Ozone-depleting substances
OMB	Office of Management and Budget

OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PAD	Propellant-actuated device
Pb	Lead
PCBs	polychlorinated biphenyls
Pepco	Potomac Electric and Power Company
PES	Potential explosion site
PFC	Perfluorocarbon
PM	Particulate matter
PM_{10}	Coarse particulate matter
$PM_{2.5}$	Fine particulate matter
PPE	Personal Protective Equipment
PTC	Permit to Construct
PTR	Public traffic route
PZ1	First protection zone
RCRA	Resource Conservation and Recovery Act
RDT&E	Research, Development, Testing, and Evaluation
the National Register	National Register of Historic Places
REPS	Raptor Electrocution Prevention Study
RICE	Reciprocating Internal Combustion Engines
RO	Reverse osmosis
RT&E	rare, threatened, and endangered
SAV	Submerged aquatic vegetation
SDWA	Safe Drinking Water Act
SEC	Sediment and Erosion Control
SF	Square feet
SF_4	Sulfur hexafluoride
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMECO	Southern Maryland Electric Cooperative
SO_2	Sulfur dioxide
SO_x	Sulfur oxide
SOP	Standard Operating Procedure
SWPPP	Storm Water Pollution Prevention Plan
T-BACT	the best available control technology for toxics
TAPs	Toxic air pollutants
TCE	trichloroethylene
TIA	Total Impervious Area
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
TSS	Total suspended solids
U.S.	United States
U.S.C.	U.S. Code
UEM	Utilities and energy management
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UXO	Unexploded ordnance
VOC	Volatile organic compound
Washington Gas	Washington Gas Light Company

1. INTRODUCTION AND PROPOSED ACTION

This Environmental Assessment (EA) has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, the Council of Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500–1508 and 32 CFR Part 775), and the Department of the Navy Environmental and Natural Resources Program Manual, OPNAVINST 5090.1C, Chapter 5.

Naval Support Facility Indian Head (NSF Indian Head) is a Naval Support Activity South Potomac (NSASP) facility within Naval District Washington. NSF Indian Head occupies approximately 3,500 acres on the eastern bank of the Potomac River in Charles County, Maryland, approximately 30 miles south of Washington, D.C. (Figure 1-1).

Figure 1-1. Location of NSF Indian Head in the Washington D.C. Metropolitan Area

1.1 History of Activities

The United States (U.S.) Navy established the Naval Proving Ground at Cornwallis Neck (a portion of which was known as Indian Head) in 1890. The Proving Ground tested guns, armor, shells, and mounts for the growing Fleet. In 1900, the Navy expanded its activities at Cornwallis Neck by establishing a factory for manufacturing smokeless powder. During this time, the Navy further expanded its activities at Cornwallis Neck to include standardization of shells and powder, as well as chemical research. When the U.S. entered World War I in 1917, the powder factory was the major producer of smokeless powder for the Navy. The Naval Proving Ground was renamed the Naval Powder Factory in 1923, following the closure of proving ground activities at Cornwallis Neck. During the 1940s, the Navy expanded the mission of the Naval Powder Factory to include an extrusion plant (for pressing powder into rocket grain), a Research and Development Department, and several pilot-scale production plants. During World War II, an explosives investigation laboratory was established to examine captured enemy ordnance. Since the 1950s, the Naval Powder Factory (renamed the Naval Propellant Plant in 1958 and the Naval Ordnance Station in 1966) has produced a wide range of energetic materials such as nitroglycerin, missile fuel for the long-range Polaris missile, Otto Fuel II for high-speed torpedoes, plastic explosive C-3, and propellants for emergency ejection mechanisms.

Since the 1950s, as military conflicts evolved from Cold War scenarios to counter insurgency missions, the Navy has transformed its mission, weapons systems, and training to face these evolving military conflicts. Over the past several decades, many commands have been relocated to Cornwallis Neck, including the Naval Ordnance Safety and Security Activity (NOSSA), Naval Sea Logistics Center (NAVSEALOGCEN) Detachment Indian Head, personnel from the Naval Ordnance Laboratory in White Oak, Maryland, the Joint Interoperability Test Command (JITC), and the U.S. Marine Corps Chemical Biological Incident Response Force (CBIRF).

In 1992, the Naval Ordnance Station became the Naval Surface Warfare Center, Indian Head Division (NSWC IHD). The installation was renamed NSA South Potomac, NSF Indian Head following a Navy reorganization in 2003. Consequently, NSWC IHD, NOSSA, NAVSEALOGCEN, JITC, and CBIRF are now mission-oriented supported commands at NSF Indian Head.

NSWC IHD, the largest supported command of NSF Indian Head, employs approximately 1,371 personnel (4 military, 1,273 civilian and 94 on-site contractors) and operates approximately 920 facilities on Cornwallis Neck and Stump Neck (NSASP, 2010c; NAVFAC, 2009). The mission of NSWC IHD is to provide quality and responsive technical engineering, manufacturing, and material support to the Fleet and other operating forces. NSWC IHD is unique among its counterparts (both military and commercial) because its mission focuses on the entire lifecycle of weapons systems, from laboratory-scale research and scale-up to full-scale manufacture, quality assurance, and demilitarization.

NSWC IHD operates multiple plants and facilities that perform these functions. Among these are the Pilot Plant and Cast Plant. The Pilot Plant performs pilot-scale manufacturing of energetic materials, as an intermediate step between bench-scale research and development operations and full-scale production. The Cast Plant performs full-scale production of energetic materials, producing batches in 150-gallon and 420-gallon quantities. Both of these plants rely on steam heat for curing operations of sensitive energetic materials. Other sources of heat, such as electric resistance heat, pose a higher risk of fire, potentially leading to explosion or detonation of energetic materials.

1.2 Purpose and Need for Action

The purpose of the actions analyzed in this EA is to reduce energy consumption, decrease utility costs, improve the reliability of the steam distribution infrastructure, and eliminate reliance on the Goddard Power Plant for steam distribution by upgrading and decentralizing the existing steam distribution system. As noted in Section 1.1 above, steam is necessary for certain operations at NSF Indian Head because it is the safest means of providing heat for curing and drying of energetic materials.

The action is needed because Goddard Power Plant has surpassed its expected operational life span, is unreliable, and requires frequent repair and maintenance. When steam supply interruptions at Goddard disrupt Cast and Pilot Plant energetic processes, entire batches of material are lost, resulting in production losses ranging from $50,000 to $370,000 for a single steam outage. The total estimated cost related to steam outages from December 2007 to February 2008 exceeded $1.3 million (Krouse, 2009). Additionally, Goddard Power Plant is not meeting existing state emissions standards and will require extensive upgrades to become compliant with current and projected state and federal standards.

The steam distribution system (Figure 1-2) at NSF Indian Head has also exceeded its operational life span. Over half of the steam energy exported from the Goddard Power Plant is lost through thermal transfer to air, steam leaks, and unreturned condensate. Supported commands at NSF Indian Head pay for utilities using program budgets. Ongoing steam distribution system maintenance and annual capitalized maintenance costs are estimated at $2 million for 2010 (Jenkins, 2011). Because of these high utility expenses, supported commands have had increasing difficulty dedicating financial resources to mission-related operations.

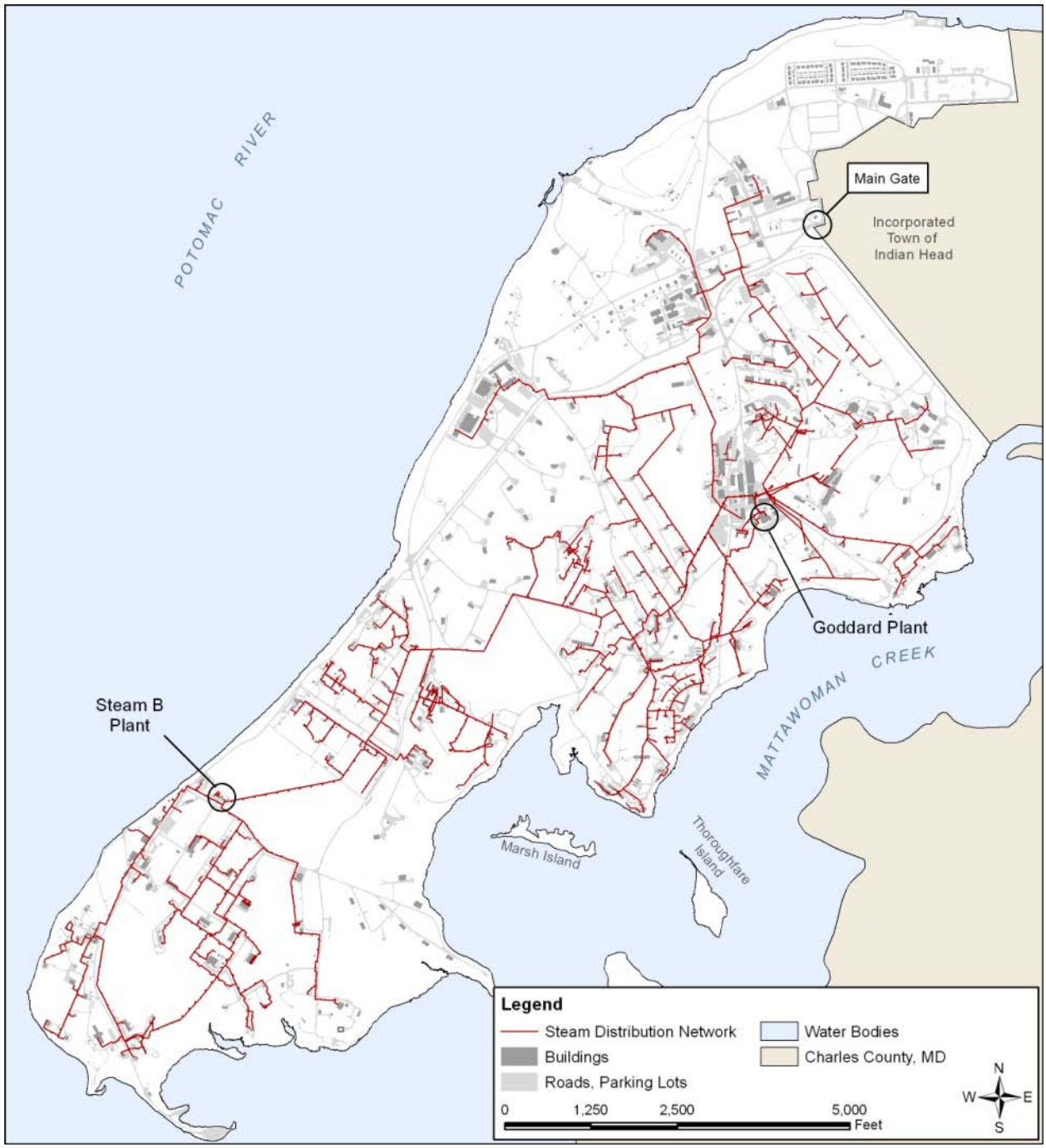

Figure 1-2. Current Steam Line Distribution System at NSF Indian Head

1.3 The Proposed Action

As further detailed below, the Proposed Action would address this purpose and need by constructing a decentralized steam distribution system consisting of two primary nodal steam generation plants with cogeneration of electricity to support critical energetic operations, along with nine secondary nodal steam generation plants to support smaller mission operations not served by the new primary nodal steam system. Natural gas would serve as the primary fuel source and require construction of a gas line from the nearest connection point in Bryans Road. In

addition, the Proposed Action would construct a Utilities and Energy Management (UEM) Building to provide space for those functions currently located within and near the Goddard Power Plant and demolish the Goddard Power Plant, support buildings, and up to 10 miles of excess steam lines.

The Proposed Action would require the installation of new utilities, including electric, telephone/fiber, sanitary sewer, stormwater, river water, and potable water lines in various locations throughout the installation to support the new nodal plants and UEM Building.

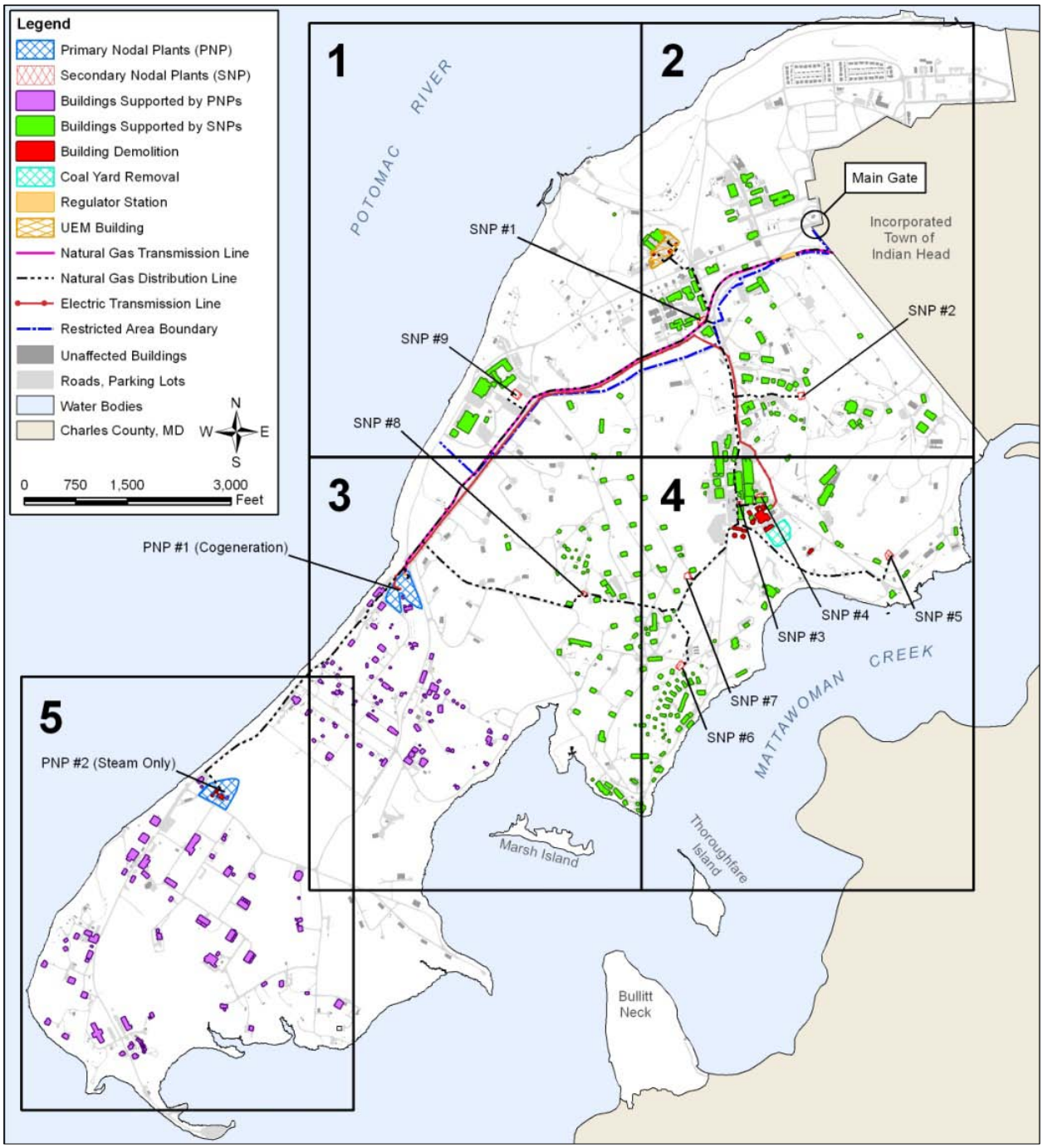

Figure 1-3. Locations of Project Elements – Proposed Action

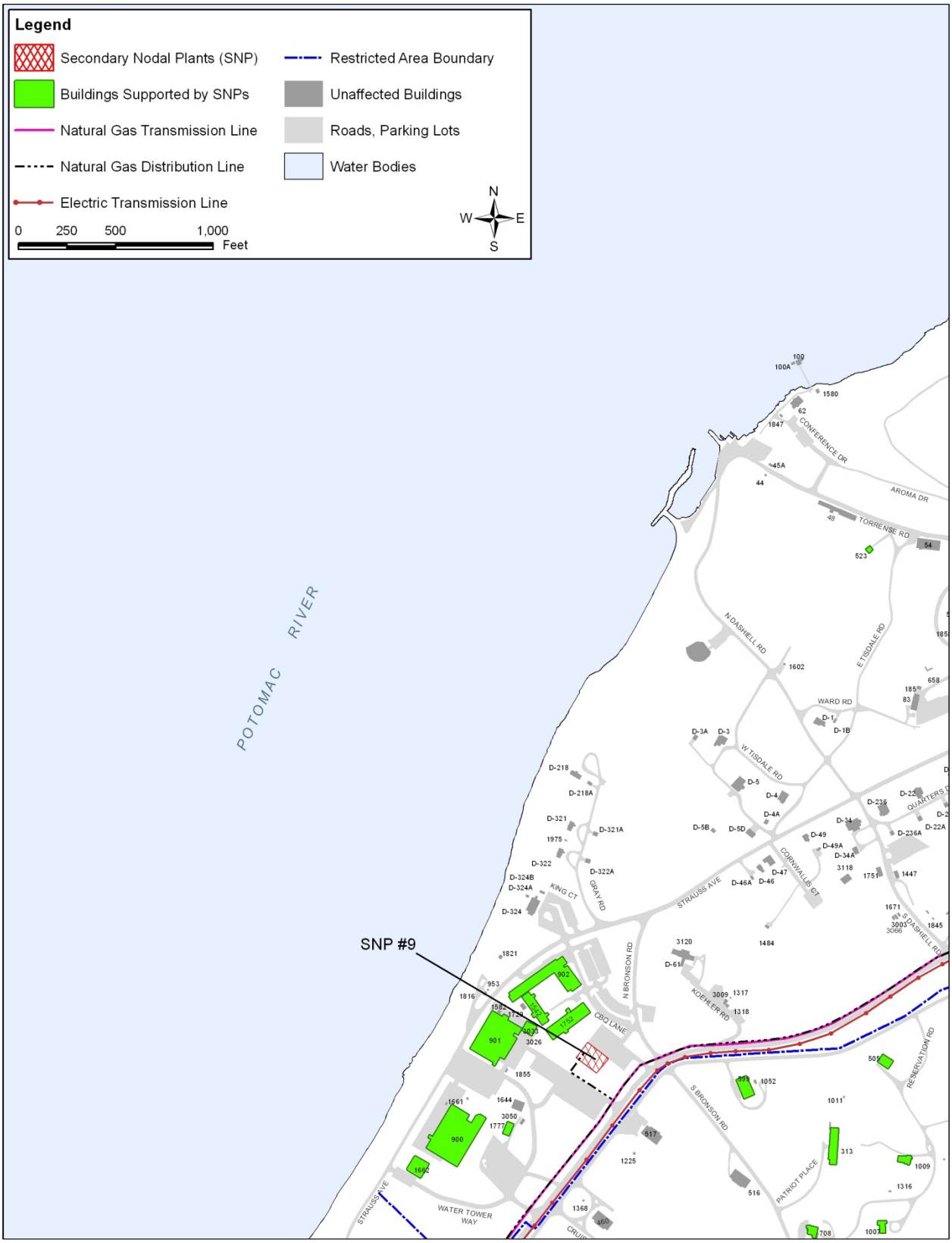

Figure 1-4. Zoom Area 1 – Proposed Action

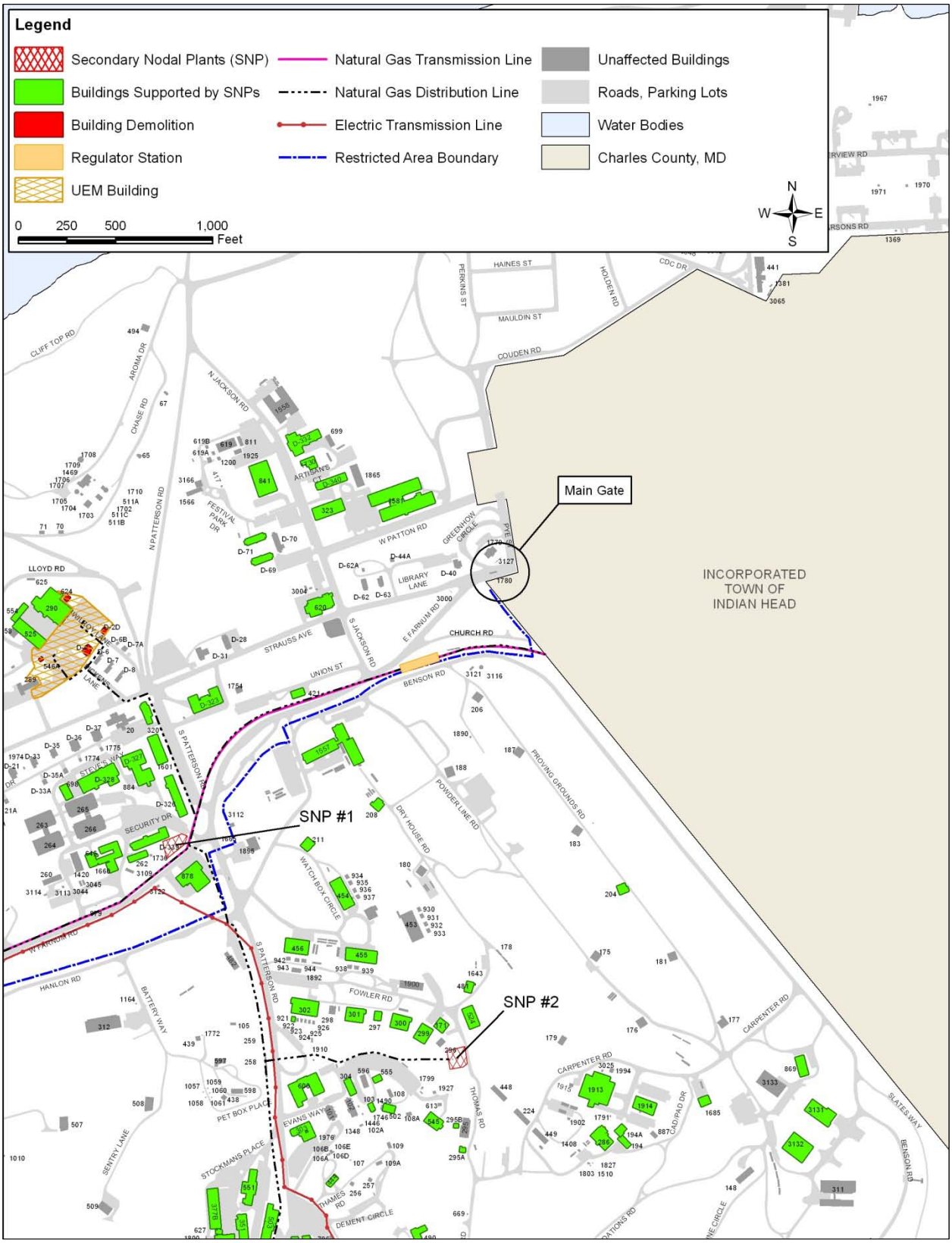

Figure 1-5. Zoom Area 2 – Proposed Action

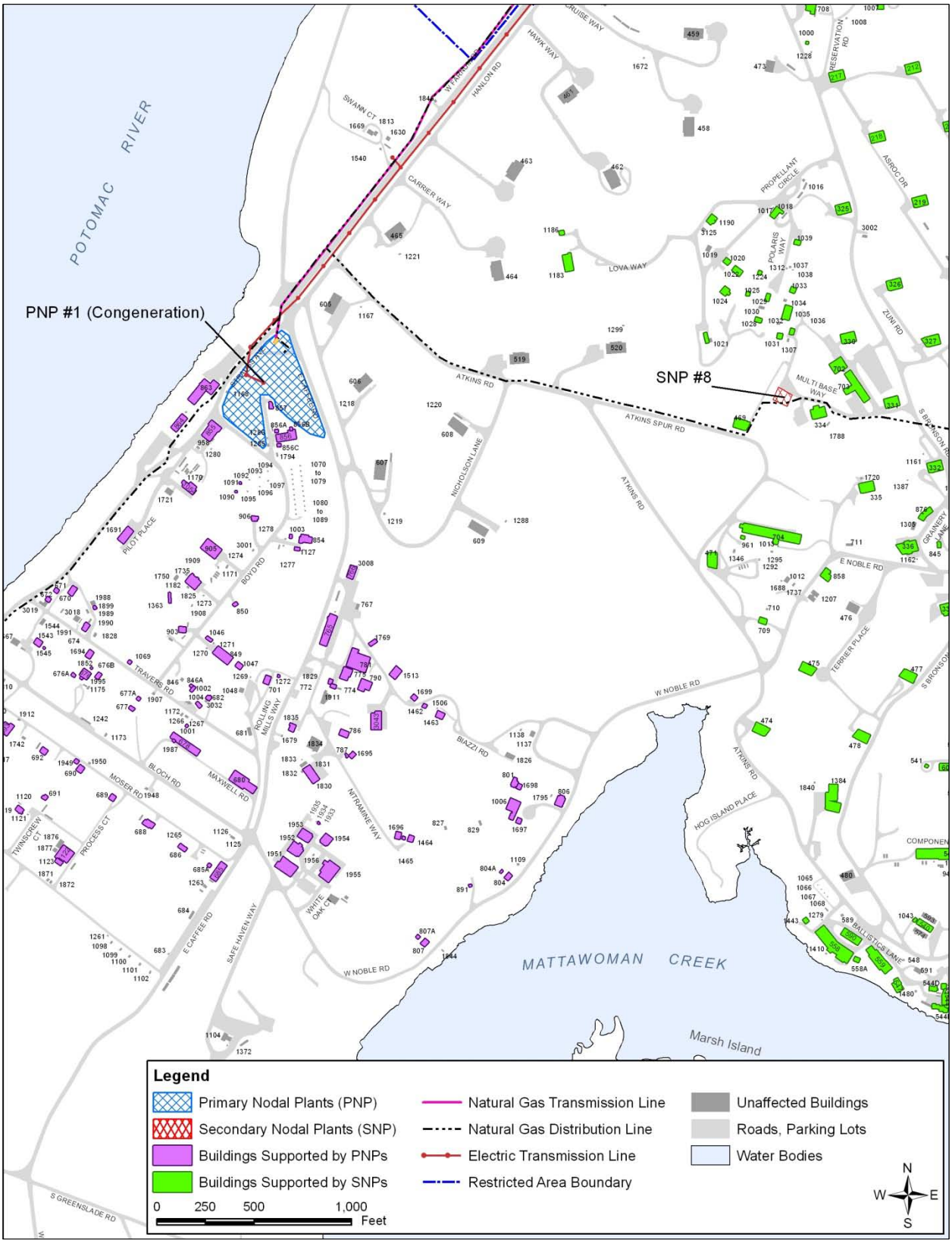

Figure 1-6. Zoom Area 3 – Proposed Action

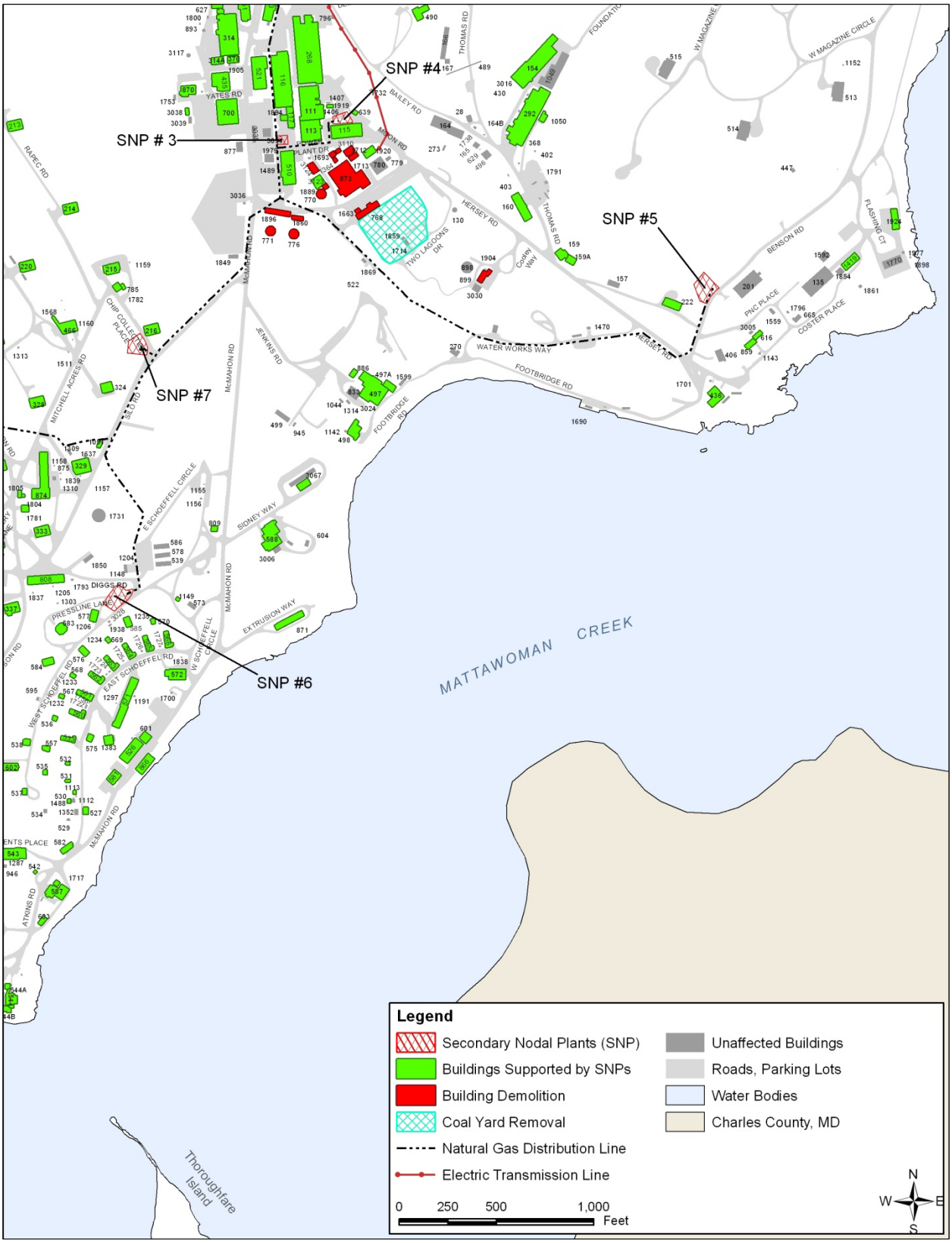

Figure 1-7. Zoom Area 4 – Proposed Action

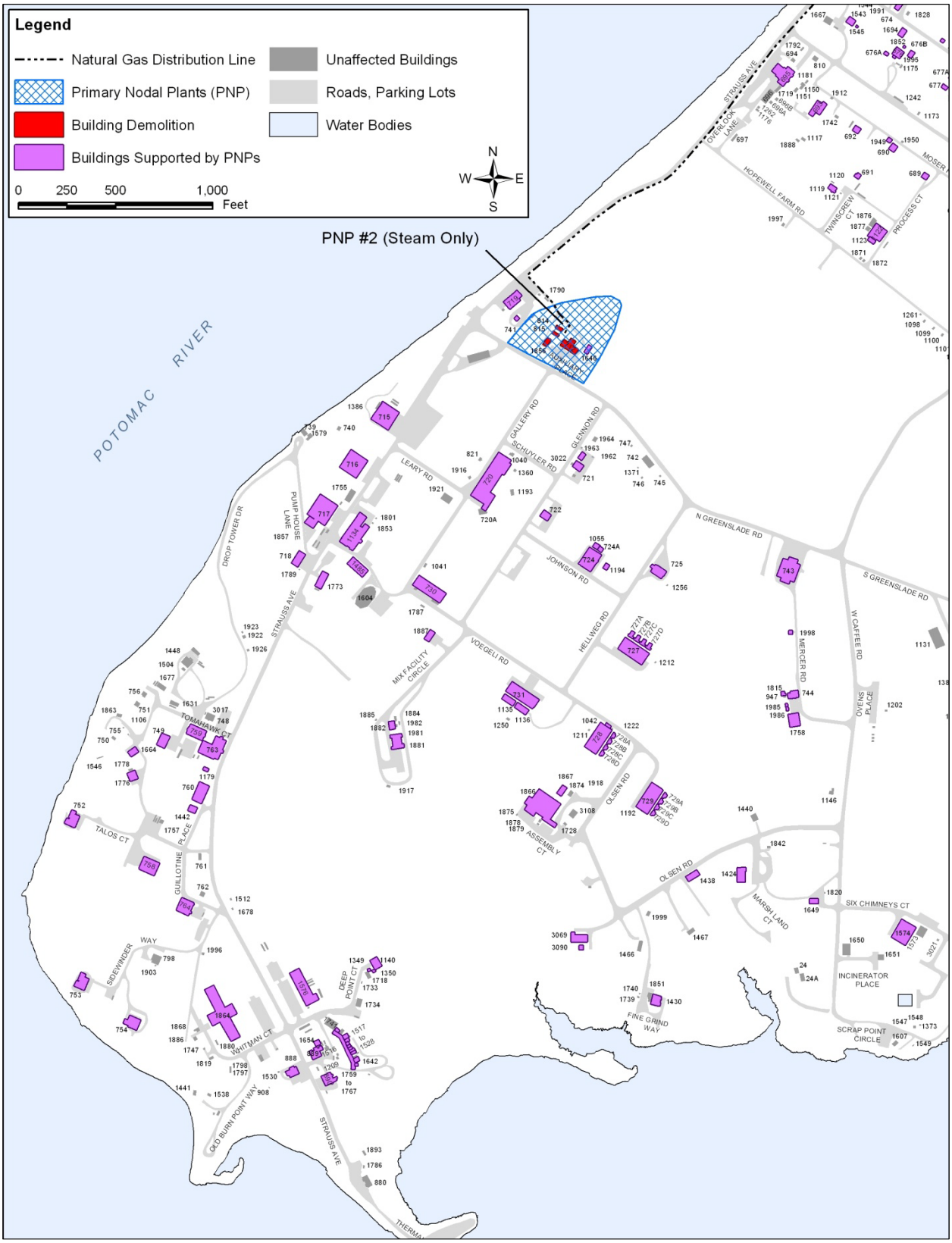

Figure 1-8. Zoom Area 5 – Proposed Action

1.3.1 Construct Primary Nodal Steam Plants with Cogeneration

Primary Nodal Plant #1 would be a cogeneration facility located near the intersection of Strauss Avenue and East Caffee Road in an undeveloped site adjacent to the Pilot Plant area (Figure 1-6). Cogeneration, which is also referred to as combined heat and power (CHP), involves the process of converting natural gas into electricity and steam via a system consisting of pressurized turbines, an electricity generator, and steam boilers (Figure 1-9). As discussed in Section 1.2, the Cast Plant and Pilot Plant would use the steam supply for curing and drying processes. The proposed system would also generate approximately 4.3 megawatts (MW) of electric power for the installation to ensure continuation of mission-critical operations in the event of an electrical grid failure. The generator for Primary Nodal Plant #1 would be connected to the installation's power distribution system for operation in parallel with the existing electrical utility power distribution system. Primary Nodal Plant #1 would be connected to a new 15kV distribution switchgear, located on the north side of the plant, by way of an existing outgoing power distribution terminal tower. New electrical lines would be required to connect the cogeneration plant to the existing NSF Indian Head electrical infrastructure via an existing substation near the Goddard Power Plant.

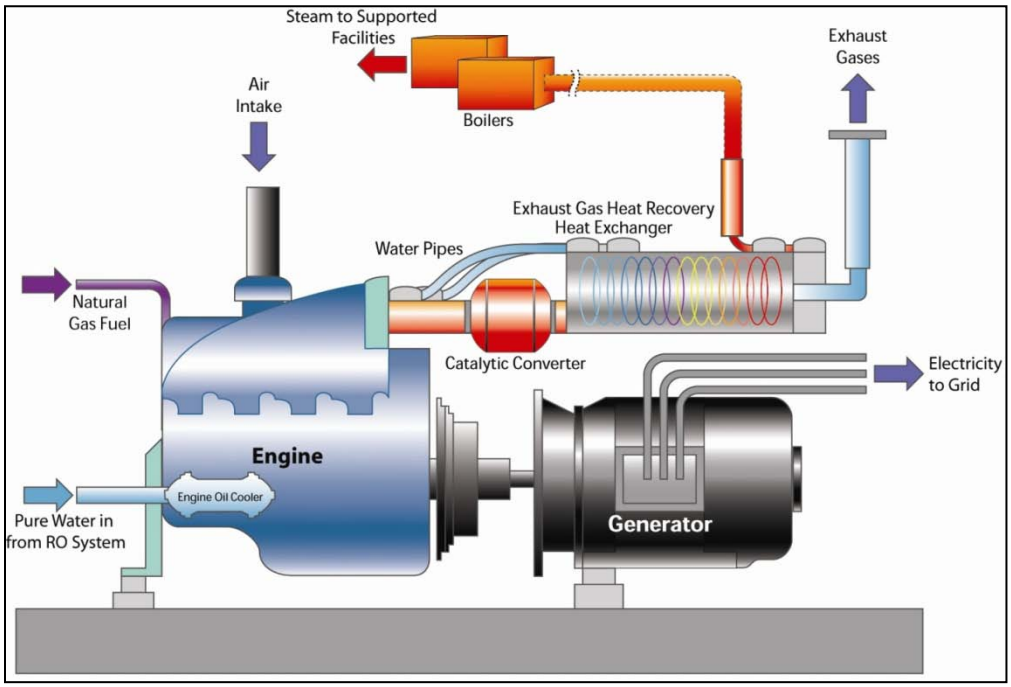

Figure 1-9. General Cogeneration Process Diagram

Primary Nodal Plant #2 would be constructed at the current site of the "Steam B Plant" (Building 712), which would be demolished. Primary Nodal Plant #2 would generate only steam and would provide a redundant source if Primary Nodal Plant #1 is off-line.

Both plants would use filtered river water as a source for steam, as well as for non-contact cooling water (NCCW). Both primary nodal plants would be pre-engineered metal buildings constructed with a steel frame, metal siding, concrete foundation, structural floor and built-up roof on insulated metal decking. Special foundation pilings would be included for the nodal plants. Both primary nodal plants would require site improvements, including approximately 900 square feet (SF) of impervious parking areas and 29,000 SF of pervious access roads. Supporting equipment and infrastructure including Reverse Osmosis (RO) water filtration buildings, RO tanks, drain lines, fuel tanks, and generators would be constructed in association with each nodal plant.

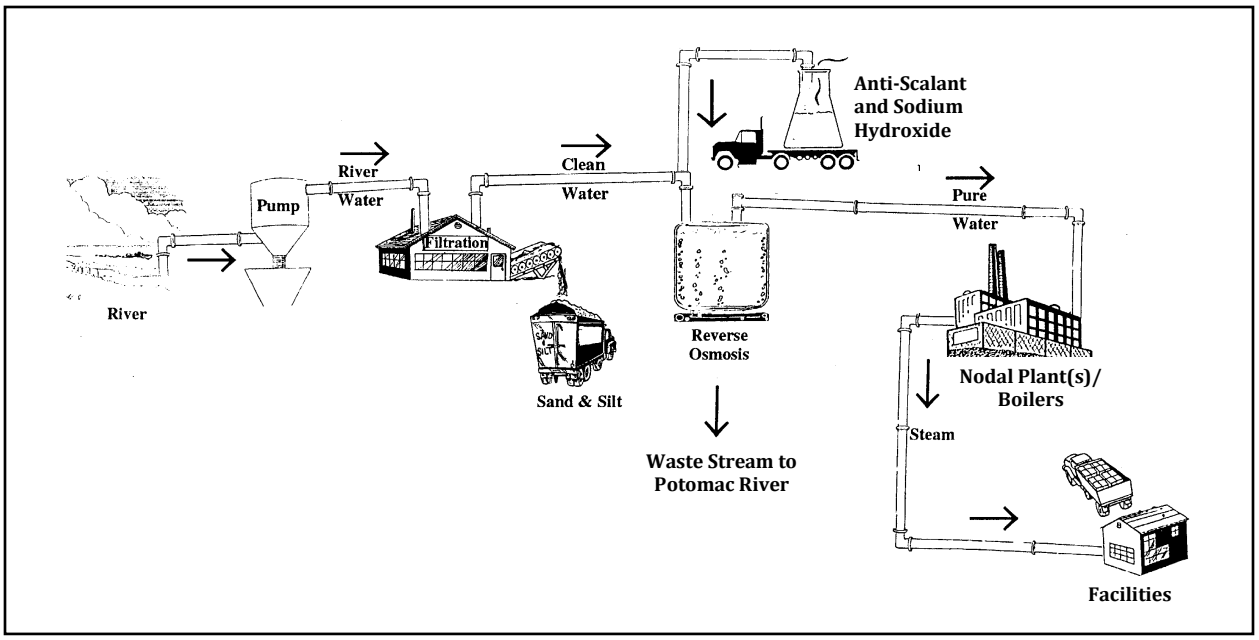

Figure 1-10. General Process of Steam Generation and Distribution

Approximately 27 miles of existing steam lines would continue to be used by the primary and secondary nodal plants. Those sections of steam lines with leaks would need to be repaired or replaced to improve efficiency and reliability.

1.3.2 Provide Secondary Nodal Plants

The Proposed Action would construct nine secondary nodal plants (gas boilers) throughout NSF Indian Head to serve facilities not supported by the primary nodal plants. These systems would be configured to support groups of buildings and have the capability to be shut down when steam is not required.

River water would be used to supply the boilers at four of the secondary nodal plants with potable water connections provided for emergency backup. The existing RO building (Building 3123) currently supplies boiler water to the Goddard Power Plant (Building 873). After the Goddard Power Plant is demolished, new RO distribution lines would be extended from this building to Secondary Nodal Plants #2, 3, 4, and 7. The five remaining secondary nodal plants (#1, 5, 6, 8, and 9) would use potable water for steam generation, requiring connections to the nearest potable water lines. The Navy is also evaluating the financial feasibility of using river water instead of potable water, requiring dedicated RO systems and all associated utility connections. This would be performed under a future project.

The remaining 10 miles of steam lines not used by the primary or secondary nodal plants would be demolished or capped and left in place to continue supporting compressed air lines that run along portions of the steam lines. In many locations, the insulation around the steam pipes contains asbestos that would require removal and proper disposal. Steam lines that are demolished would have the support posts cut at the soil surface to minimize soil disturbance.

These nine secondary nodal plants would require site improvements, including approximately 400 SF of parking areas, 5,000 SF of pervious access roads, and 2,000 SF of impervious pavement.

1.3.3 Construct Natural Gas Line

Natural gas, which was selected because it is cleaner and more efficient to manage than coal, would serve as the primary fuel source for the primary and secondary nodal plants, with oil as a backup fuel source. NSF Indian Head currently does not have any natural gas distribution infrastructure, and the nearest natural gas supply line is located approximately 6 miles northeast of the installation in the Bryans Road community (Figure 1-11). Accordingly, the Proposed Action would include the construction of buried natural gas lines as necessary to reach the installation and serve the nodal plants.

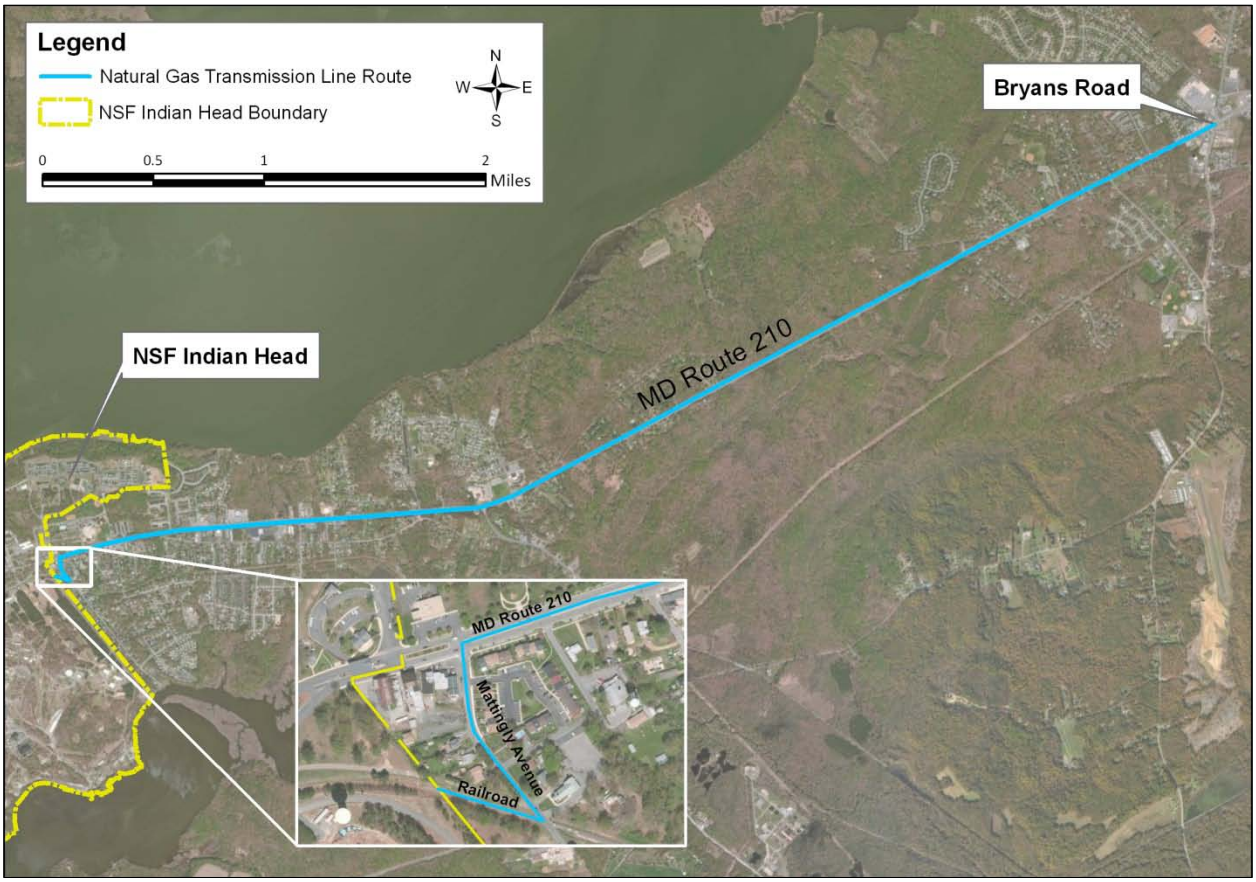

Figure 1-11. Location of Bryans Road Community in Relation to NSF Indian Head

There is a 12-inch, 250 pound-force per square inch gauge transmission line owned by Washington Gas Light Company (Washington Gas) located at Bryans Road. To meet the natural gas requirements of MILCON P222, approximately 6 miles of new 12-inch high-pressure transmission line would be installed by Washington Gas from this end point southward along the existing Route 210 right-of-way. Approximately 300 feet from the NSF Indian Head main gate, the gas transmission line would divert from Route 210, run down Mattingly Avenue, and enter the installation along the NSF Indian Head railroad. Approximately 1.6 miles of high-pressure transmission line would be installed along a new 20-foot wide right-of-way within NSF Indian Head to the proposed location of Primary Nodal Plant #1. The gas transmission line would branch off to a regulator station located near the main gate at NSF Indian Head (Figure 1-12). Low pressure gas distribution lines would be installed from the regulator station to Primary Nodal Plant #2 and the secondary nodal plants.

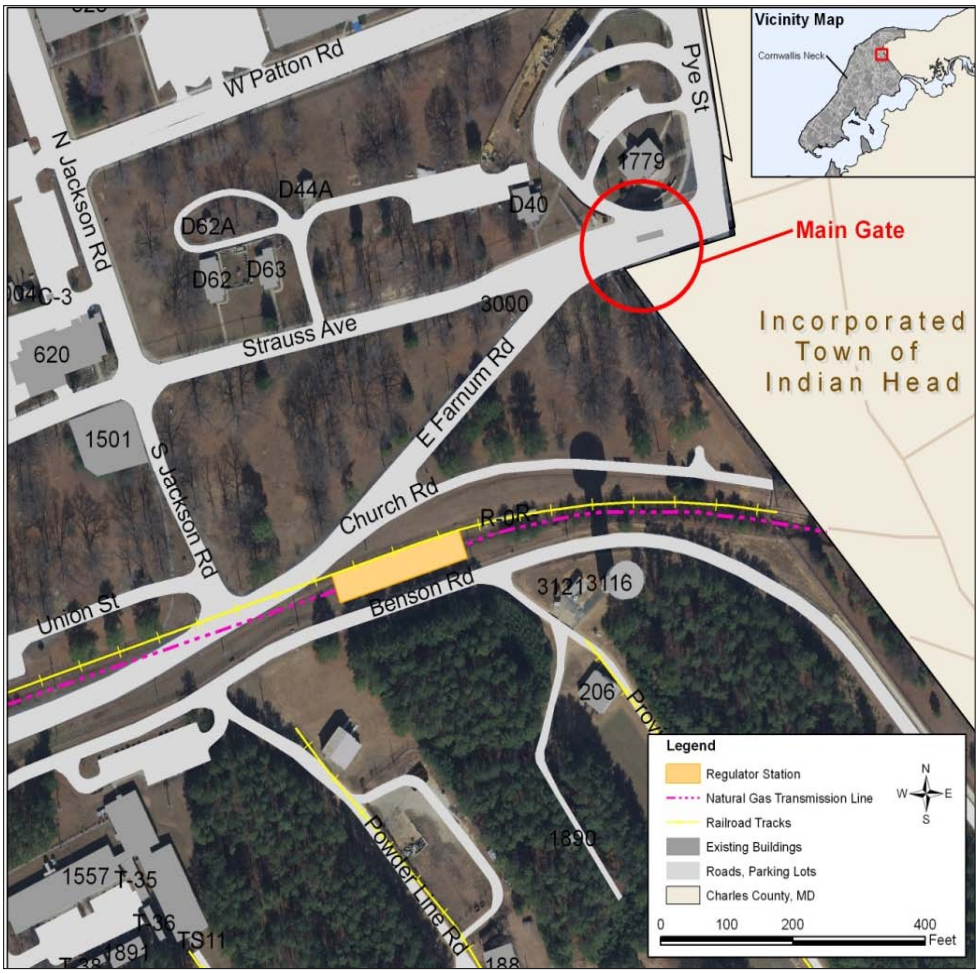

Figure 1-12. Location of Regulator Station – Proposed Action

1.3.4 Construct a Utilities and Energy Management Building

The Proposed Action would construct a new low-rise UEM Building to provide replacement space for functions that would be moved from the restricted area and their associated buildings demolished after construction of the decentralized steam distribution system is complete. The proposed location is outside of the restricted area of the installation, along the north side of Strauss Avenue and west of Lloyd Road (Figure 1-5) and is identified in the NSF Indian Head Master Plan for future development of office and administrative functions. The proposed UEM Building would diminish parking availability that is currently used by the Naval Facilities Engineering Command Washington (NAVFACWASH) transportation fleet. Overflow parking for the fleet would be made available behind Buildings 289 and/or 551.

Prior to construction, Buildings 546A, D2, D2D, and 624, which are currently located within the proposed footprint of the UEM Building and its associated site improvements, would be demolished in accordance with an existing Memorandum of Agreement (MOA) between the Navy, the State Historic Preservation Officer (SHPO), and Lincoln Housing, and would not be part of this Proposed Action. In addition, the tank farm adjacent to Building 289 will be demolished under a separate effort from MILCON P222 as part of the Navy's infrastructure reduction program before the Proposed Action would be implemented. Under the Proposed Action, the tank farm area would be filled in, stabilized, and paved with pervious concrete to provide additional parking. The proposed

UEM Building would consist of two support facilities with a total footprint of approximately 24,000 SF. The first facility would include offices, a control room (for remote nodal plant operations), a training/break room, and shop space for utilities personnel. The second facility would provide warehouse/storage space. The design, development, and construction of the UEM Building would adhere to ATFP standards and would integrate sustainable design in accordance with the Energy Independence and Security Act of 2007 (EISA 2007), Energy Policy Act of 2005 (EPAct 2005), Executive Order (EO) 13123, EO 13432, and Leadership in Energy and Environmental Design (LEED) Silver criteria.

Construction of the UEM Building would involve site improvements, including approximately 12,000 SF of pervious access roads, 31,000 SF of impervious pavement, and 42,500 SF of pervious and 8,000 SF of impervious parking areas. Landscaping and vegetation planting would be performed around the site following construction.

1.3.5 Demolish Goddard Power Plant

After construction of the decentralized steam distribution system is complete, the Proposed Action would demolish the Goddard Power Plant and its supporting facilities (Figure 1-7). This demolition would include Buildings 768, 770, 771, 776, 873, 899, 1364, 1663, 1693, 1712, 1713, 1860, 1889, 1896, 3110, and 3124, with a total footprint of approximately 56,500 SF. The adjacent coal yard would have the remaining coal removed along with the top foot of soil. The area would be closed in accordance with all applicable regulations and revegetated.

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2. ALTERNATIVES TO THE PROPOSED ACTION

The Navy considered various alternative actions to meet the requirements of the Proposed Action identified in this EA. Several factors were considered in the evaluation of potential alternatives. Only one Alternative Action (discussed in Section 2.4) fully satisfied all aspects of the purpose and need for action and was considered for further evaluation.

2.1 Alternative Evaluation Criteria

Selection of the actions and areas identified for development under the Proposed and Alternative Actions was driven by the following criteria:

- **Proximity to Operations Supported by Steam.** The majority of the facilities that require steam for operations are located in the southern half of Cornwallis Neck. The two main plants that require steam to support operations are the Pilot Plant and the Cast Plant. To increase energy efficiency and reduce the amount of steam lost through the current distribution system, any new steam generation facilities should be constructed as close as possible to the facilities they support.

- **Compatibility with Explosives Safety Constraints.** Approximately two-thirds of the land at Cornwallis Neck is encumbered by explosives safety quantity-distance (ESQD) arcs. The facilities that generate these arcs either store or handle explosive materials, posing explosives safety hazards to personnel and facilities located within the arcs. Restrictions on the construction of new facilities and infrastructure, as well as personnel occupation of these facilities, within ESQD arcs limit the developable areas of the installation. Explosives safety standoff requirements for the location of natural gas lines and the presence of mission-critical buildings that cannot be demolished or relocated, limit the potential areas for construction of steam generation facilities. The requirements and facility location rationale for the Proposed and Alternative Actions are discussed in detail in Sections 3.1 and 4.1.

- **Cost.** The Navy has limited financial resources for operating and maintaining facilities at NSF Indian Head. Because of high utility expenses and annual capitalized maintenance costs, supported commands spend substantial financial resources providing basic utilities to their buildings and have had increasing difficulty dedicating financial resources to mission-related operations. The Navy also has limited financial resources for new construction projects. Any new steam generation system must reduce utility operation and maintenance expenses and fit within the Navy's project budget.

- **Ability to Provide Continuous Steam Operations for Mission-Critical Functions.** Steam is necessary for certain mission-critical operations at NSF Indian Head because it is the safest means of providing heat for curing and drying of energetic materials. Other sources of heat, such as electric resistance heat, pose a higher risk of fire, potentially leading to explosion or detonation of energetic materials. Two plants that require steam to support their operations are the Cast Plant and Pilot Plant. Operations at both of these plants have been hindered in the past due to steam losses and inefficiencies in the system. Any new steam generation system must provide continuous steam supply during its construction and redundant steam supply after construction is complete to ensure that these mission-critical operations are able to continue without costly steam outages.

- **Ability to Meet New Emission Standards.** In July 2010, EPA proposed revisions to 40 CFR Part 63 Subpart DDDDD (National Emission Standards for Hazardous Air Pollutants) that would establish more stringent limits for particulate matter, hydrogen chloride, and mercury from existing large solid fuel boilers such as the Goddard Power Plant. After receiving numerous public comments, EPA reproposed revisions to Subpart DDDDD in December 2011. In May 2010, the Maryland Department of the Environment (MDE) promulgated more stringent opacity emission standards.

- **Elimination of Reliance on Coal.** Combustion of coal, which is the primary fuel used by the Goddard Power Plant, generates high levels of certain air pollutants, some of which are greenhouse gases. Combustion of natural gas generates fewer emissions than coal, including approximately 45 percent less CO_2 than coal per unit of energy input. The combustion of natural gas also releases very small amounts of SO_2 and NO_x, virtually no ash or particulate matter, and lower levels of CO and other reactive hydrocarbons as compared to the combustion of coal (EIA, 1999). Any new steam generation system should eliminate reliance on coal and use natural gas as the primary fuel source.

- **Minimization of Environmental and Socioeconomic Impacts.** Selection of the Proposed Action and Alternative Action sites took into account the various environmental constraints to development within NSF Indian Head. These constraints include, but are not limited to, areas that provide habitat for rare, threatened, and endangered (RT&E) species; proximity to the Potomac River shoreline; and areas that contain archeological resources. Because one of the project elements under the Proposed and Alternative Actions is located outside the boundary of NSF Indian Head, selection of the route for the natural gas line also considered the environmental constraints outside the installation boundary, as well as socioeconomic concerns such as effects to property values within the surrounding community.

- **Proximity to Water Resources.** The ability to provide steam heat to facilities at NSF Indian Head is affected by the availability of usable water. Due to restrictions on the withdrawal and use of groundwater, NSF Indian Head will rely more heavily on surface water (pumped from the Potomac River and treated by reverse osmosis) for future industrial use, including steam production.

- **Avoidance of Steep Slopes.** Terrain with steep slopes (i.e., greater than 15 percent) can be found throughout the installation, especially in areas close to the shoreline. Steep slopes significantly increase development costs and limit the type and intensity of development. According to NAVFAC's Regional Planning Instruction (NAVFACINST 11010.45), disturbance and development of steeply-sloped areas should be avoided whenever possible.

2.2 Public Involvement

The Navy recognizes the value and importance of public participation in the NEPA process. In an effort to inform the public and solicit feedback, the Navy held two public meetings. The first meeting, held on 3 March 2011, informed the public of the initial scope and potential impacts of the Proposed Action. The second meeting was held on 9 February 2012, after the project design had

been further developed and the potential impacts of the Proposed Action, Alternative Action, and No-Action Alternative had been further analyzed in the Preliminary Final EA.

Notes from the two public meetings are included in Appendix A. In addition, Table A-1 in Appendix A summarizes the comments from public meetings, written comments on the Preliminary Final EA, and changes made to the EA in response to public comments. Additional comments were provided by state and local agencies through the Maryland State Clearinghouse review process and are included in Appendix E. These comments have been addressed throughout the EA.

2.3 Alternatives Considered but Not Carried Forward

The Navy considered the following alternatives that meet the Purpose and Need identified in Section 1.2, but rejected them from further consideration based on the criteria in Section 2.1.

2.3.1 Demolish Goddard Power Plant and Construct Single New Steam Plant

The Navy considered demolishing the Goddard Power Plant and constructing a new steam generation plant to supply steam to all the facilities currently connected to the existing steam distribution system. This alternative was dismissed due to the inability of Steam B to provide the sufficient steam generation throughout the installation to continue mission operations during the demolition of Goddard and construction of the new plant. Therefore, this alternative was dismissed from further consideration.

2.3.2 Upgrade Goddard Power Plant

The Navy also considered upgrading the existing Goddard Power Plant. As discussed in Section 1.2 above, the plant has surpassed its expected operational life span, requires frequent repair and maintenance, and is inefficient to operate. Additionally, the plant is not meeting new MDE opacity emission standards and is not expected to meet the new emission standards proposed by EPA under National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart DDDDD without significant and expensive upgrades. Regardless of the extent of upgrades, the design of the Goddard Power Plant would still require the use of coal as its main fuel source.

In 2006, a Utility Infrastructure Improvements Planning study identified the need to replace or upgrade existing equipment at the Goddard Power Plant, which at that time was estimated to have between five and ten years of remaining service life. The study estimated that only 43% of the steam generated by the power plant was delivered to the end-user facilities. The remaining 57% was lost through turbine exhaust, combustion, pressure release valves, and the lack of a condensate return system in the distribution system. The study examined three alternatives for boiler replacement to improve efficiency and meet air quality standards. The most expensive option, estimated at just under $65 million, involved replacement with two 150,000 pounds per hour (PPH) circulating fluidized bed (CFB) boilers. The least expensive option, estimated at a little over $15 million, involved replacement with two 150,000 PPH natural gas boilers (Jenkins, 2011).

An economic analysis performed in 2009 examined different options for improving the steam and electrical supply for NSF Indian Head. One option involved upgrading the Goddard Power Plant and Steam B Plant. Under this option, refurbishment of all three boilers at the Goddard Power Plant and one boiler at the Steam B Plant would be required at a total cost of approximately $60 million. The study determined that maintaining this centralized system is less cost effective than a decentralized system because the dispersed end-users and variable consumption needs would still result in high steam distribution system losses and costs (Jenkins, 2011). Therefore, this alternative was also dismissed from further consideration.

2.3.3 Construct Gas Line along Alternative Routes

The Navy considered alternative routes for bringing natural gas to NSF Indian Head from the nearest connection point at Bryans Road. Alternative routes would have resulted in greater impacts to natural and cultural resources, such as wetlands and archeological sites. These routes also would have required Washington Gas to obtain more easements on private property, resulting in greater impacts to the community in Charles County and the Town of Indian Head. The Navy considered running the gas line through the NSF Indian Head main gate, which would have eliminated the potential need to obtain easements on private property along Mattingly Avenue. However, this route presented security concerns. To minimize impacts to the environment, community, and security, these alternative routes were dismissed from further consideration.

2.3.4 Use Grey Water for Steam Generation

The Navy considered using treated effluent from the NSF Indian Head sewage treatment plant (also referred to as "grey water") to supplement or replace the use of river water and groundwater for steam generation. However, the cost of using grey water was found to be non-cost effective and would exceed the costs to utilize treated river water. This system would not meet the purpose and need of the project to reduce utility costs relative to the Proposed Action. Therefore, this alternative was dismissed from further consideration.

2.4 The Alternative Action

The Alternative Action would meet the same Purpose and Need of the Proposed Action by constructing two primary nodal steam plants and upgrading the existing steam distribution system throughout the installation. The potential environmental impacts and consequences of the Alternative Action are discussed in Section 4 and summarized in Table 4-15.

The Alternative Action would construct the two primary nodal steam plants in the same locations as the Proposed Action (Figure 2-1). By selecting the same locations, the primary nodal plants would be constructed close to operations supported by steam, in accordance with applicable explosives criteria, outside of areas with steep slopes, and in close proximity to water resources needed for steam generation. However, these plants would be larger and generate more steam to support all of the facilities currently connected to the steam distribution system.

The greater cost of constructing larger primary nodal plants would be offset by not constructing secondary nodal plants or demolishing miles of steam line. Primary Nodal Plant #1 would have 5 MW of power generation capacity under the Alternative Action. As with the Proposed Action, river water would be purified via filtration and RO systems to supply the two primary nodal plants. Construction of two new nodal plants would allow for continued supply of steam during construction and redundant steam supply after construction is complete.

As with the Proposed Action, natural gas would serve as the primary fuel source for the primary nodal steam plants. The gas line would follow the same route from Bryans Road to the primary nodal plants to reduce impacts to the environment, community, and security. However, there would be no need for additional gas distribution lines because the Alternative Action would not install any secondary nodal plants. This would remove the ability to shut off steam to those facilities when steam is not required, thus reducing potential economic savings. While operational costs would be higher than under the Proposed Action, they would be lower than with the current system.

As with the Proposed Action, an electrical transmission line would run from Primary Nodal Plant #1 to the existing substation near the Goddard Power Plant to connect to the NSF Indian Head electrical infrastructure.

Under the Alternative Action, the new UEM Building would have the same location, requirements, and constraints as under the Proposed Action.

Portions of the existing steam line distribution system would be repaired or replaced to improve efficiency and reliability. As with the Proposed Action, the Goddard Power Plant and its supporting buildings would be demolished and the coal yard closed once the new nodal steam plants are operational, thus eliminating reliance on coal and enabling NSF Indian Head to meet new emission standards.

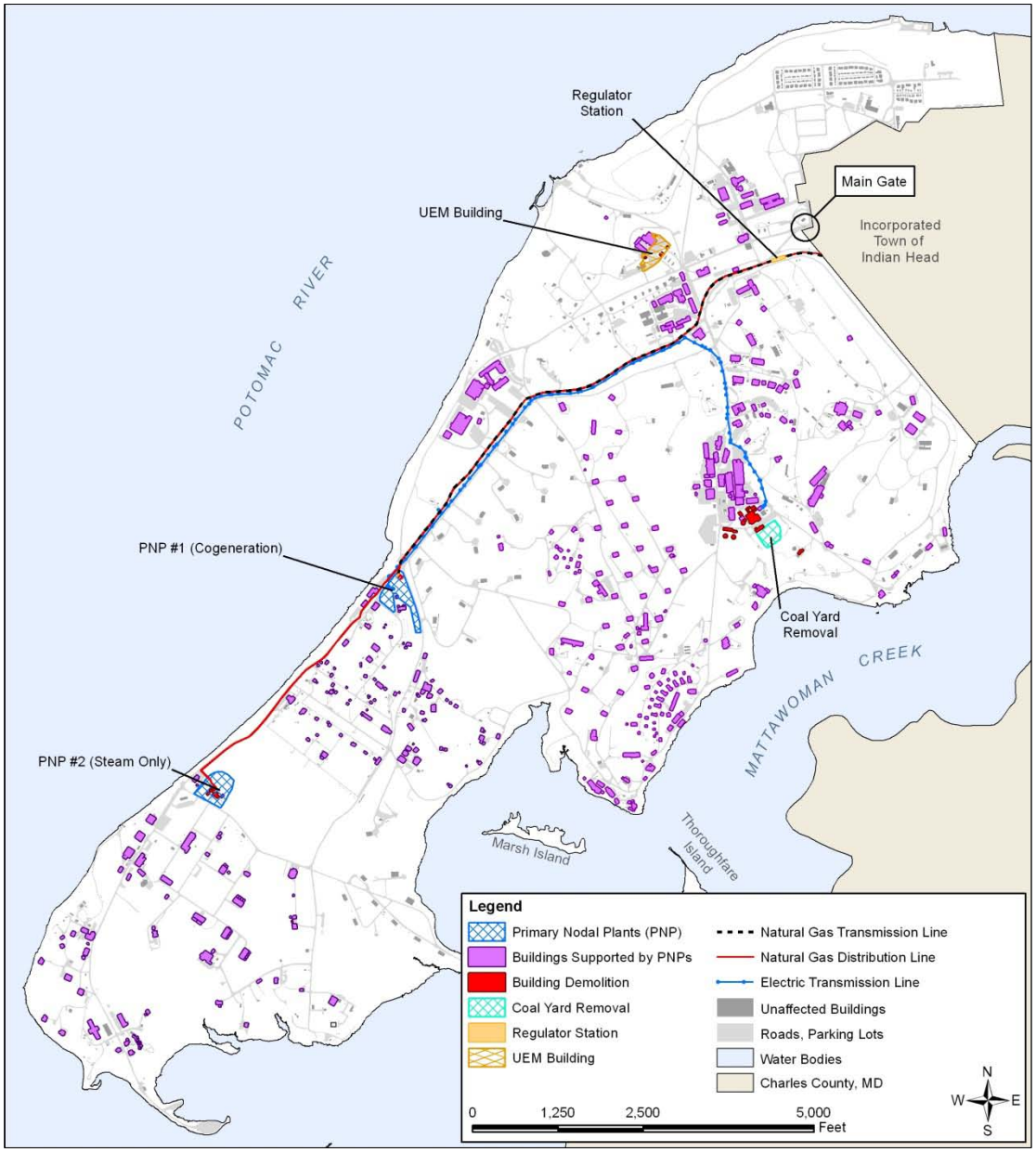

Figure 2-1. Locations of Project Elements – Alternative Action

2.5 The No-Action Alternative

The No-Action Alternative would not implement either the Proposed Action or the Alternative Action. Under the No-Action Alternative, the Goddard Power Plant would continue to provide steam to the supported commands at NSF Indian Head through the existing steam distribution infrastructure, while the Steam B Plant is only able to operate one of its two boilers. The existing steam distribution system would continue to be maintained as in the past and would continue to experience significant energy loss.

The supported commands would continue to incur high utility costs associated with providing steam for buildings and mission needs through an inefficient steam distribution system. Continued high utility costs make it difficult for supported commands to obtain appropriate financial resources for their mission-related operations.

As described in Section 1.2, the Goddard Power Plant would not meet the new emission standards proposed by EPA under NESHAP Subpart DDDDD unless significant and expensive upgrades are performed.

The potential environmental impacts and consequences of the No-Action Alternative are discussed in Section 4 and summarized in Table 4-15. The No-Action Alternative would not meet the Purpose and Need criteria defined in Section 1.2. As a result, the No-Action Alternative is considered less desirable than the Proposed Action.

3. AFFECTED ENVIRONMENT

3.1 Explosives Safety

To ensure safety and consistency in the management of explosives at U.S. Navy Installations, the Navy implemented the Naval Ordnance Safety and Security Activity (NOSSA) to establish criteria for all Navy installations where explosives are present. These criteria are codified in Naval Sea Systems Command (NAVSEA) OP 5, *Ammunition and Explosives Safety Ashore* and are based on safety standards established by the Department of Defense Explosives Safety Board (DDESB). Excavation work, new construction or major modifications to structures at or near areas where explosives are or were handled, manufactured, or stored must receive an explosives safety site approval from NOSSA and DDESB. The site approval process ensures that all structures comply with the explosives safety quantity distance (ESQD) and other safety criteria set forth in OP 5. ESQD is a series of standoff distances – referred to as arcs – that establish the separation criteria between a facility that houses explosives (an explosives facility) and other buildings and infrastructure. The purpose of ESQD arcs is to prevent the propagation of an accidental detonation to other explosives areas and minimize injury to personnel and damage to infrastructure from accidental detonation to an acceptable level. Projects that involve a munitions response (i.e., projects where there is a potential that explosives can be contacted, such as excavation work within an area known to have explosives contaminants in the soil) must be approved by NOSSA and/or DDESB. For these projects, the installation must prepare an Explosives Safety Submission (ESS) or, if the probability of encountering explosives is low, an ESS determination request (ESS-DR).

In general, ESQD arcs increase in size as the weight of explosives increases or the relative hazard of the explosive increases (NAVSEA, 2010). Each explosives facility casts multiple ESQD arcs, but the applicable ESQD arc (i.e., minimum separation distance) for a surrounding facility depends on the surrounding facility's use. Intraline (IL) ESQD arcs are the required separation distance between explosives facilities and some other facilities related to the explosives mission. Public traffic route (PTR) distance is the required separation distance from an explosives operating location or storage area to the nearest public traffic route. Inhabited building (IB) distance is the required separation distance from an explosives operating location or storage area to the nearest building that is unrelated to explosives operations.

Installation Background

NSWC IHD produces, tests, transports, and stores explosives items and materials and therefore follows OP 5 criteria for construction, renovation, and excavation work. To minimize personnel exposure to explosives, all explosives-related facilities on Cornwallis Neck are located within an area with controlled access (Figures B-3 and B-4 in Appendix B). For new construction, NSWC IHD strives to minimize the location of personnel near explosives-related facilities.

Historic uses also create explosive safety constraints. Various Installation Restoration (IR) sites and Munitions Response Program (MRP) sites exist throughout NSF Indian Head. All MRP sites have the potential to contain explosives. In addition, IR Site 24 (Abandoned Drain Lines) has also been identified as containing explosives contamination. Explosives safety regulations must be followed when working within these areas, as there is a risk of coming into contact with explosives materials (Section 3.10).

In the event of an explosion or fire on base, the Navy has on-site emergency personnel including firefighters, police officers, emergency medical technicians, and safety officers to respond to the incident. These personnel are familiar with the types of explosives in each building on station and are specially trained in responding to the associated hazards.

Proposed Action

To minimize distribution losses, the proposed locations for the two primary nodal plants are located near the explosives processes they serve. Thus the proposed locations for the two primary nodal steam plants are within ESQD arcs and the restricted area of NSF Indian Head. Five of the secondary nodal plants would be constructed within 110% of IB distance arcs, but outside of all IL distance arcs. The new overhead electric transmission line, some steam lines, a portion of the on-base gas transmission line, and some gas distribution lines would also run through ESQD arcs. The proposed location for the UEM Building is not within any ESQD arcs nor is the off-base natural gas transmission line.

The UEM Building, primary and secondary nodal plants, and natural gas transmission and distribution lines would not be constructed within IR or MRP sites with explosives safety concerns. The overhead electric transmission line would run through IR Site 24. New steam lines could potentially run within IR and MRP sites with explosive safety concerns. None of the buildings to be demolished in association with the Steam B Plant or Goddard Power Plant have been identified as having explosives contamination concerns (Caris, 2011). The Goddard Power Plant and its supporting facilities are within the restricted area, but outside of all ESQD arcs, MRP sites, and IR sites. The steam lines that would be demolished or capped and left in place are located throughout the installation, including adjacent to explosives facilities and within IR and MRP sites.

Alternative Action

Much of the affected environment under the Alternative Action would remain the same as under the Proposed Action. The affected environment would remain the same for the primary nodal plants, natural gas transmission line, natural gas distribution line to Primary Nodal Plant #2, UEM Building, Goddard Power Plant, and overhead electrical lines. No natural gas distribution lines would be installed for secondary nodal plants, as these would not be provided under the Alternative Action. The existing steam lines would remain under the Alternative Action because the two primary nodal plants would provide steam service to all facilities connected to the existing steam distribution system. Portions of the existing steam distribution system would require upgrades, possibly within ESQD arcs, depending on its current state. Additionally, short lengths of steam lines would be constructed where necessary to connect the primary nodal plants to the existing steam distribution infrastructure.

No-Action Alternative

The explosives hazards and operations surrounding the facilities and infrastructure associated with the existing steam generation and distribution systems at NSF Indian Head, including the Goddard Power Plant, Steam B Plant, and the steam distribution lines, are discussed above under the Proposed Action.

3.2 Infrastructure and Utilities

NSF Indian Head infrastructure includes water supply and treatment systems, a sanitary sewer system with a centralized sewage treatment plant, a power supply system, telecommunication systems, transportation systems, and emergency response systems. Utilities at the base include steam, compressed air, electric power, potable water, river water, sanitary sewer, stormwater, industrial wastewater, and telecommunication lines. The Navy operates the government-owned Goddard Power Plant to generate steam, compressed air, and electric power used at NSF Indian Head. The Steam B Plant is also used to supplement steam and compressed air supply. Additional electric power is obtained from the grid via electrical transmission lines to a substation adjacent to the Goddard Power Plant.

Proposed Action

The Proposed Action would be mostly within or adjacent to currently developed areas on Cornwallis Neck with existing utilities (Figures B-5 through B-8 in Appendix B). All utilities are in acceptable physical condition, accessible, and have sufficient capacity to support the primary nodal plants, secondary nodal plants, and UEM Building. In some areas, available space for the installation of new utility lines is limited by existing development, roads, and utilities.

The site for Primary Nodal Plant #1 is undeveloped, but adjacent to several developed sites. Most standard utilities, including river water, are in the immediate vicinity of Primary Nodal Plant #1 and run along the perimeter of the site within utility rights-of-way. An electrical line would run from Primary Nodal Plant #1 to the substation. Standard utilities, including river water, are available within or nearby the proposed sites for Primary Nodal Plant #2 and the UEM Building.

The nine secondary nodal plants would serve adjacent facilities that are occupied and connected to standard utilities, including the existing steam distribution system.

Existing utilities may be present within the Route 210 right-of-way and along Mattingly Avenue where the natural gas transmission line would be installed and would be identified by Washington Gas. Within NSF Indian Head, many utilities share the right-of-way of roads along which the natural gas transmission and distribution lines would be buried.

The Goddard Power Plant and its supporting facilities are in a heavily industrialized area that comprises approximately 9 acres and serves as a hub for steam, compressed air, and electricity distribution at NSF Indian Head. In addition to those utilities generated by the Goddard Power Plant, other standard utilities found within the area include potable water, river water, storm sewer, sanitary sewer, and industrial wastewater. The Goddard Power Plant is the primary user of river water at the installation, consuming over 300,000 gallons per day. The river water is treated using a reverse osmosis purification system prior to being used and disposed of through the industrial wastewater system. The Power Plant is equipped with backup generating systems that provide additional generating capacity and redundancy in the event of equipment failure.

The Goddard Power Plant generates approximately 67 percent of the electric power demand. The remaining electric power is supplied to the installation through the grid by the Potomac Electric and Power Company (Pepco), a local electric utility serving Delaware, Maryland, Pennsylvania, and Washington, D.C. Electricity in the grid comes from multiple generating stations that use a variety of fuels, including coal, natural gas, fuel oil, and nuclear. While Pepco operates the electric grid, several additional energy companies own respective power generating stations that contribute to the grid in the area of NSF Indian Head, most notably Constellation Energy Group, GenOn, and Panda Energy International.

Alternative Action

Many of the proposed locations for the project elements under the Alternative Action are the same as under the Proposed Action, including the primary nodal plants, natural gas transmission line, natural gas distribution line for Primary Nodal Plant #2, and UEM Building, as well as demolition of the existing Goddard Power Plant and portions of excess steam lines. Under the Alternative Action, the two primary nodal plants would have a larger footprint and greater steam and electrical output, but would rely on the same utilities discussed under the Proposed Action. The secondary nodal plants and associated gas distribution lines would not be constructed under the Alternative Action (Figures B-5 through B-8 of Appendix B).

No-Action Alternative

All utilities affected by the facilities and infrastructure associated with the existing steam generation and distribution systems at NSF Indian Head, including the Goddard Power Plant, Steam B Plant, and the steam distribution lines, are discussed above under the Proposed Action.

3.3 Air Quality

Air quality can be defined by ambient air concentrations of specific pollutants determined by EPA to be of concern to the health and welfare of the general public and the environment. In 40 CFR Part 50, EPA defines ambient air as "that portion of the atmosphere, external to buildings, to which the general public has access." Releases of air pollutants and the resulting changes in air quality can cause damage to human health, property, aesthetics, vegetation, fish, wildlife, and other natural resources. Poor ambient air quality typically results from emissions of fossil fuel combustion, usually from vehicles (mobile sources) or production facilities (stationary sources). Emissions from fossil fuel combustion also contain greenhouse gases (GHGs), which are very likely to be a contributor to global climate change (IPCC, 2007).

3.3.1 Ambient Air Quality

The following sections discuss several of the federal and state air quality standards and permit programs that have been established with the goal of protecting ambient air quality.

National Ambient Air Quality Standards

The Clean Air Act (CAA) designated EPA the authority to set National Ambient Air Quality Standards (NAAQS) for air pollutants considered to be harmful to public health and the environment (40 CFR Part 50). The NAAQS set limits on air pollutant concentrations in ambient air to keep airborne pollutant concentrations below these health-based benchmark levels. The air pollutants regulated under the NAAQS, commonly referred to as "criteria pollutants", include ozone (O_3), particulate matter (PM), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead (Pb) (USEPA, 2009a). PM is further divided into coarse and fine particulate matter, where coarse particulate matter (PM_{10}) are particles that are between 2.5 micrometers and 10 micrometers in diameter, and fine particulate matter ($PM_{2.5}$) are particles that are 2.5 micrometers in diameter and smaller.

To monitor the criteria pollutants, the EPA divides the United States into more than one hundred air quality control regions (AQCRs) where concentrations of the criteria pollutants are continuously measured and reported. An AQCR in which levels of a criteria air pollutant meet the health-based NAAQS is defined as an attainment area for the pollutant, while an area that does not meet the NAAQS is designated a nonattainment area for the pollutant. Attainment areas that were previously nonattainment areas are called maintenance areas. States with nonattainment AQCRs are responsible for developing a State Implementation Plan (SIP), which specifies the manner in which NAAQS would be achieved and maintained.

The CAA requires that federal agencies comply with state, federal, and local air quality requirements in the same manner as any non-governmental entity (42 U.S.C. 7418). Federal actions taking place in nonattainment or maintenance areas must conform to the region's SIP, as described by the General Conformity Rule (GCR) in 40 CFR Part 93. If the total direct and indirect emissions of a nonattainment criteria pollutant or its precursors exceed the *de minimis* emissions rates specified by federal and state regulations, a conformity determination for that pollutant is required (FedCenter, 2009). A conformity determination demonstrates that the action conforms to the region's SIP, would not cause or contribute to any new violations of NAAQS, and would not increase the frequency or severity of any existing violations. Achieving conformity with the SIP may require mitigation, potentially including emissions offsets with appropriate revisions to the SIP.

National Emission Standards for Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects (USEPA, 2011a). HAPs are regulated under the CAA (42 U.S.C. 7412). These regulations focus on air emissions from specific industries (source categories) and rely on NESHAPs. This technology-based approach establishes maximum achievable control technology (MACT) standards for each source category. These MACT standards are based on the best control technologies that have been demonstrated within each source category, taking into account the cost of achieving emissions reductions and any non-air quality health and environmental impacts and energy requirements. NESHAPs are promulgated under 40 CFR Parts 61 and 63 and are implemented in Maryland under COMAR 26.11.15.02, *Control of NESHAP and MACT Sources*.

New Source Performance Standards

The CAA (40 U.S.C. 7411) requires that EPA develop technology-based standards of performance for new stationary sources of air emissions. These standards, known as New Source Performance Standards (NSPS), are nationally uniform standards that apply to specific categories of stationary sources (e.g., boilers, emergency generators, fuel storage tanks) that are constructed, modified, or reconstructed after the standard is proposed. NSPSs are promulgated nationally under 40 CFR Part 60 and are implemented in Maryland under COMAR 26.11.06.12, *Control of NSPS Sources*. Regulated pollutants typically include one or more criteria pollutants, but may include non-criteria pollutants that are known to be prevalent in a particular source category.

Construction Permit Programs

In Maryland, a permit to construct (PTC) from MDE is required before construction or modification of an emission source (COMAR 26.11.02.09), including emergency generators and boilers, unless that source is listed under COMAR 26.11.02.10 as being exempt from PTC requirements. For large sources, preconstruction approval may need to be obtained from the New Source Review (NSR) program and/or the Prevention of Significant Deterioration (PSD) program.

The NSR program is a preconstruction review process established under the CAA to assist in efforts to achieve compliance with the NAAQS (40 CFR 51 Subparts I and P; 40 CFR 52.10). Any proposed new or modified major stationary source that will discharge significant amounts of criteria pollutants must obtain an NSR approval prior to construction. According to COMAR 26.11.02.01(C), a source is considered a major source if it meets any of the following criteria: a) emits, or has the potential to emit, 10 tons per year or more of an individual HAP, or 25 tons per year or more of any combination of HAPs; b) emits, or has the potential to emit, 100 tons per year or more of any air pollutant (including criteria pollutants in attainment status); or c) emits, or has the potential to emit, criteria pollutants in exceedance of certain thresholds for nonattainment areas. Because Charles County is a nonattainment area for ozone, NSR approval is needed for new or modified air pollution sources in Charles County that have the potential to emit 25 tons per year or more of volatile organic compounds (VOCs) or NOx (MDE, 2008a). The NSR program is implemented in Maryland under COMAR 26.11.02, *Permits, Approvals, and Registration*. The NSR application should be submitted with a PTC application and includes additional requirements to demonstrate sufficient emission controls and offsets (MDE, 2008a).

The PSD program is intended to prevent significant deterioration of ambient air quality by limiting the amount of air pollutants released by a new or modified facility located in a NAAQS attainment area. This program is implemented by MDE under COMAR 26.11.06.14, Control of PSD Sources, and

requires all PSD sources to comply with the requirements of 40 CFR 52.21, Prevention of Significant Deterioration of Air Quality. PSD approval is needed for (MDE, 2008b):

1) New air pollution sources that have the potential to emit at least 100 tons per year of any regulated pollutant, if the proposed source belongs to one of the 26 source categories listed in COMAR 26.11.01.01B.

2) New air pollution sources that have the potential to emit at least 250 tons per year of a regulated pollutant from unlisted source categories.

3) Major modifications to an existing major facility that will result in a net emissions increase above the levels listed in Table 3-1.

Table 3-1. PSD Criteria Pollutant Emission Thresholds

Pollutant	Tons per Year
CO	100
NO_x	40
SO_x	40
PM_{10}	15
VOC	40
Lead	0.6

Operating Permit Programs

Title V of the CAA requires all major sources of air pollution to obtain an operating permit known as a Title V permit. This permit consolidates all state and federal air quality requirements that apply to the source, including emissions limits and monitoring, record keeping, and reporting requirements. Sources operating under a Title V permit must apply for a permit renewal every five years. The Title V permit program is implemented in Maryland under COMAR 26.11.03, *Permits, Approvals, and Registration - Title V Permits*. For facilities with an existing Title V permit, the PTC for a new emission unit serves as a temporary operating permit for that emission unit until it can be added to the Title V operating permit upon renewal.

Maryland Air Quality Programs

The CAA affords states the authority to adopt and enforce their own air emission standards for stationary sources, as long as the state standards are not less stringent than federal standards (42 U.S.C. 7412 and 7416; 40 CFR 61.17). In accordance with this policy, Maryland has implemented its own air quality program under COMAR 26.11, *Air Quality*.

As described above, Maryland's air quality program establishes permitting requirements and incorporates NESHAP/MACT and NSPS standards. The program defines further emission standards, prohibitions, and restrictions for specific types of emission sources. In addition, Maryland's air quality program includes requirements for sources that emit toxic air pollutants (TAPs), as defined in COMAR 26.11.15. These requirements specify that new sources of TAPs must obtain a PTC and that the owner or operator of all new sources and certain existing sources of TAPs must apply the best available control technology for toxics (T-BACT).

Installation Background

EPA designated the Metropolitan Washington region, which includes Charles County, as a "moderate" nonattainment area for the 8-hour ozone standard in 2004 and a nonattainment area for the $PM_{2.5}$ standard in 2005. As shown in Table 3-2, Charles County is an attainment area for CO, SO_2, NO_2, and lead (40 CFR 81.321).

Table 3-2. NAAQS Attainment Status for Charles County and De Minimis Thresholds (2010)

Criteria Pollutant	Classification of Charles County	Pollutant or Precursor of Concern	*De Minimis* Emission Rate[1] (tons/yr)
Ozone (O_3)	Nonattainment (moderate) since 2004	NOx	100
		VOCs	50
Particulate Matter ($PM_{2.5}$)	Nonattainment since 2005	$PM_{2.5}$	100
		NO_x	100
		SO_2	100
Carbon Monoxide (CO)	Attainment	CO	N/A
Lead (Pb)	Attainment	Pb	N/A
Nitrogen Dioxide (NO_2)	Attainment	NO_2	N/A
Particulate Matter (PM_{10})	Attainment	PM_{10}	N/A
Sulfur Dioxide (SO_2)	Attainment	SO_2	N/A

N/A designates that Charles County is an attainment area for that pollutant and *de minimis* levels are therefore not applicable for that pollutant.

Because Charles County is located in a nonattainment area for $PM_{2.5}$ and ozone, a GCR applicability analysis is required for any Navy actions at NSF Indian Head that would result in emissions of these pollutants or their precursors. Due to Charles County's past and current nonattainment status, a GCR conformity determination for ozone and $PM_{2.5}$ must be performed unless the applicability analysis shows that the total of all direct and indirect nonattainment criteria pollutant emissions would be lower than the specified *de minimis* emission thresholds. The *de minimis* levels for each of Charles County's nonattainment criteria pollutants are listed in Table 3-2.

Pursuant to COMAR 26.11.03.01, NSF Indian Head requires a Title V operating permit because it meets the definition of a major source. As such, the Navy has registered or permitted all required air emissions sources with MDE and currently holds a Title V operating permit (No. 24-017-00040, issued January 1, 2011) and numerous permits to construct for activities at NSF Indian Head. This Title V permit identifies approximately 52 significant sources of air pollution and 21 different types of insignificant activities at the base. This permit consolidates all federal- and state-enforceable limitations and requirements applicable to base operations, including appropriate operating conditions found in the state permits to construct and permits to operate.

Proposed and Alternative Actions

The Proposed and Alternative Actions would affect several existing facilities with significant emission units that are listed in the Title V operating permit, including Goddard Power Plant and the Steam B Plant. As discussed in Section 1.2, the boilers and turbo-generator sets at these plants

[1] De minimis levels are emission rates specified in 40 CFR 93.153(b), which may not be exceeded by federal actions taking place in nonattainment and maintenance areas. Federal actions in nonattainment areas for $PM_{2.5}$ must also consider the de minimis levels for $PM_{2.5}$ precursors, including NOx and SO2.

combust a combination of fossil fuels (coal, No. 2 fuel oil, and No. 6 fuel oil) to generate steam, electricity, and compressed air. This combustion generates a variety of air pollutants. Current emissions from Goddard and Steam B significant emission units are shown below in Table 3-3. The Goddard Power Plant also contains a sulfuric acid storage tank (Building 873), which is listed as an insignificant emission unit in the Title V operating permit.

Table 3-3. Emissions from Goddard Power Plant and Steam B Plant Boilers (2010)

Pollutant	Goddard Power Plant Boiler Emissions[a] (tons/yr)	Steam B Plant Boiler Emissions[a] (tons/yr)
CO	9.40	0.08
CO_2	149,097	356
HCl	14.98	0
Hg	0.0014	0
NOx	123.8	0.32
Pb	0.0098	0.00002
PM_{10}	17.9	0
$PM_{2.5}$	4.8	0
SOx	392.2	0.68
VOC	22.8	0

Source: NAVFAC, 2011.
[a] – Emissions represent actual reported emissions inventory values from the NSF Indian Head *Criteria and Toxic Air Pollutants Emissions Report Calendar Year 2010*.

The existing steam line infrastructure does not directly generate air pollutant emissions.

The Goddard Power Plant does not generate enough power to support the entire installation; therefore, electricity is also purchased from the power grid. As discussed in Section 3.2, electricity in the Southern Maryland power grid is produced by multiple generating stations that use a variety of fuels including coal, natural gas, fuel oil, and nuclear. A variety of air pollutants are associated with these power generation activities, including CO, CO_2, NO_x, SO_x, VOC, and PM.

No-Action Alternative

Air emissions associated with the existing Goddard Power Plant and Steam B Plant and facilities that receive steam from these plants are discussed above under the Proposed and Alternative Actions.

3.3.2 Greenhouse Gas Emissions

GHGs are gases in the lower atmosphere that absorb infrared radiation emitted from the earth's surface and then radiate most of this energy back to the earth's surface, allowing average global temperatures to be about 60ºF warmer than they would otherwise be (USEPA, 2009b). As concentrations of GHGs have been increasing over the past century, average global temperatures have been increasing as well. Both naturally-occurring and human-generated (anthropogenic) emissions contribute to GHGs in the atmosphere. However, concentrations of naturally-occurring GHGs have remained relatively constant for thousands of years, while concentrations of anthropogenic GHGs have sharply increased in the last three hundred years (USDOE, 2009). The

primary sources of increased GHG emissions are the burning of fossil fuels (contributing more than 50% of global anthropogenic GHG emissions) and deforestation (contributing almost 20% of global anthropogenic GHG emissions) (IPCC, 2007).

According to the Intergovernmental Panel on Climate Change (IPCC), anthropogenic GHG emissions include the following: carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_4). CO_2 constitutes more than 75 percent of these emissions, globally. Though the other five major GHGs are emitted at much lower rates, they have more potent heat-trapping effects, or global warming potentials (GWPs) than CO_2.[2]

Federal Regulations and Statutes

EO 13514 requires federal agencies to compile annual GHG emission inventories according to the *Federal GHG Accounting and Reporting Guidance*, which the Department of Energy's Federal Energy Management Program (FEMP) developed in October 2010. To track progress, agencies are required to report, by January 31, 2011, their GHG emission inventories for fiscal year (FY) 2008 and FY 2010 to the Office of Management and Budget (OMB) and CEQ. Agencies will then be required to report annual inventories each January thereafter covering the previous FY. In addition, EO 13514 requires federal agencies to set GHG emission reduction targets for FY 2020, relative to FY 2008.

GHG emissions and reduction targets are classified as Scope 1 (direct emissions), Scope 2 (indirect emissions from purchased energy), and Scope 3 (other indirect emissions). Scope 1 emissions include emissions from direct fossil fuel combustion such as in the operation of boilers, generators, incinerators, and vehicles operated by the organization, as well as fugitive emissions of refrigerants and other gases (e.g., fire suppressants) with GWPs. Scope 2 emissions include upstream emissions from purchased electricity, steam, heating, and cooling. Scope 3 emissions include all other indirect emissions not included in Scope 2, such as emissions from employee commuting, employee business travel, transmission and distribution losses associated with purchased electricity, methane emissions from contracted solid waste disposal, methane and nitrous oxide emissions from contracted wastewater treatment, and upstream emissions associated with purchased products and services.

EO 13423 requires each federal agency to reduce GHG emissions through the reduction of energy intensity by 3% annually or 30% by the end of FY 2015, relative to the agency's energy use in FY 2003. Additionally, heads of federal agencies must implement sustainable practices for GHG emissions avoidance or reductions. Section 572 of EISA 2007 requires that each federal agency submit an annual report to the Director of OMB on the status of the agency's implementation of initiatives to reduce GHG emissions.

In September 2009, EPA issued the Final Mandatory Reporting of Greenhouse Gases Rule, requiring direct emitters of over 25,000 metric tons CO_2e (MT CO_2e) per year of GHG emissions to track and report their GHG emissions, beginning in 2010. Reporters must begin collecting data by January 1, 2010 and must submit the first annual report by September 30, 2011.

[2] To account for the different potencies of GHGs, a common unit of CO_2 equivalents (CO_2e) is used to represent the amount of CO_2 that would produce the same total global warming potential as the GHGs considered.

Installation Background

Operations at NSF Indian Head directly emit over 25,000 MT CO_2e per year of GHG emissions. Thus, in accordance with the Final Mandatory Reporting of Greenhouse Gases Rule (MRR), NAVFAC is currently developing a basewide GHG inventory.

Operations at NSF Indian Head produce GHG emissions through a variety of activities, including the operation of boilers and generators; electricity consumption; and vehicular travel. Under the EPA's MRR, emergency generator GHG emissions are exempt from reporting.

Proposed and Alternative Actions

Existing operations that would be affected under the Proposed and Alternative Actions generate GHG emissions through the following activities:

1. Operation of Goddard Power Plant and Steam B Plant boilers, and associated emergency generators (Scope 1);

2. Purchase of electricity from the power grid (Scope 2); and

3. Commuting of Navy employees to and between affected facilities throughout the base. (Scope 3).

These emissions-generating activities provide the baseline to determine any changes in emissions resulting from construction and operation of new facilities under the Proposed and Alternative Actions. In 2010, the Goddard Power Plant and Steam B Plant, including the boilers and associated generators, combined to emit approximately 149,533 MT CO_2e (NAVFAC, 2011).

In addition to steam and compressed air, the Goddard Power Plant generates approximately 67 percent of the electric power used at NSF Indian Head (NSASP, 2008). The remaining electricity needed to support the installation is purchased from the power grid, which is supplied by multiple generating stations that produce GHG emissions using a variety of fuels.

As of 2010, approximately 3,530 personnel work at the base (NSASP, 2010b). It is estimated that these personnel commute a total of approximately 34,476,000 miles per year and that the vehicles commuting to the base release more than 24,000 tons of CO_2 per year.[3]

No-Action Alternative

GHG emissions associated with the facilities that would remain operational under the No-Action Alternative are discussed above under the Proposed Action.

[3] Assuming an average driving speed of 40 miles per hour, an average commute time of 34 minutes, and a total of 250 roundtrips annually per employee, these personnel are estimated to commute a total of approximately 34,476,000 miles per year (U.S. Census, 2006). Using the MOBILE6 model within the EPA's National Mobile Inventory Model (NMIM) interface to model emissions, vehicles commuting to the base release more than 24,000 tons of CO_2 per year. Note that this mileage estimate is based on the assumption that each employee drives to/from NSF Indian Head alone. This does not account for personnel who live on-station, contractors who do not work on-station, and personnel who carpool or who take other methods of transportation to the base.

3.4 Water Resources

3.4.1 Stormwater

Maryland stormwater regulations stipulate that development disturbing over 5,000 SF of land area must adhere to a state-approved sediment/erosion control and stormwater management plan (COMAR 26.17.02.05). In Charles County, federal agencies must control for the 24-hour, 10-year frequency storm when designing BMPs (MDE, 2001). Maryland's stormwater program includes a water quality banking system, which issues credits for projects that decrease impervious surfaces and allows these credits to be redeemed later as offsets for projects where sufficient BMPs cannot be implemented. NSF Indian Head participates in this program and has accumulated 179,498 SF as of January 2012 (Fabey, 2012).

The State of Maryland Stormwater Management Act of 2007 requires that environmental site design (ESD) be implemented in stormwater management plans to the maximum extent practicable (MDE, 2007a). ESD includes the use of nonstructural BMPs and other better site design techniques that reduce the amount of stormwater leaving the site. As a result, the Maryland Department of the Environment (MDE) revised Chapter 5 of the 2000 Maryland Stormwater Design Manual focusing on the use of decentralized stormwater management techniques, including low-impact development (LID) practices such as green roofs, permeable pavers, bioretention, and grassed swales (MDE, 2009).

The Maryland Stormwater Management Guidelines (MSMG), published April 2010, also supplemented the 2000 Maryland Stormwater Design Manual. Stormwater management for redevelopment projects (i.e., projects at sites exceeding 40 percent impervious area) must comply with MSMG requirements, including implementation of ESD to provide water quality treatment for a minimum of 50 percent of the existing affected impervious area within the project limit of disturbance (LOD) and reduction of existing impervious areas by a minimum of 50 percent within the project LOD (MDE, 2010a).

Stormwater management requirements are also driven by the Navy LID Policy of 2007, and Section 438 of EISA 2007. The Navy LID Policy sets a goal of no net increase in stormwater volumes or sediment and nutrient loading from major renovation and construction projects. This policy directs that LID be considered in the design for all projects that have a stormwater management element in order to support this goal and reduce reliance on conventional stormwater collection systems and treatment options. EISA 2007 requires that any development or redevelopment project involving a federal facility with a footprint that exceeds 5,000 SF shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow.

Installation Background

In 2006, NSF Indian Head personnel finalized the Institutional Management Plan (IMP) for Discharges from State and Federal Small Municipal Separate Storm Sewer Systems as required by the Phase II[4] National Pollutant Discharge Elimination System (NPDES) requirements for municipal stormwater discharges. The IMP represents a comprehensive, watershed-wide approach to control

[4] Phase I requirements apply to storm water discharges associated with 11 categories of industrial activity and to municipal separate storm sewer systems serving populations of 100,000 or greater. Phase II requirements were implemented in December 1999 and require many of the facilities and localities not permitted under Phase I to obtain a NPDES permit (MDE, 2007b).

pollutants in stormwater. In addition to required control measures, the IMP contains overall stormwater management techniques specific to the unique hydrologic characteristics of the base. The IMP has streamlined the review and approval process for erosion and sediment control and stormwater management plans for new construction projects at the installation (NAVFAC, 2006).

The NSF Indian Head Environmental Office has also developed a Stormwater Pollution Prevention Plan (SWPPP), as required by the base's NPDES Industrial Permit No. MD0003158. The SWPPP includes an assessment of the sources of stormwater pollution at NSF Indian Head and a plan for preventing and eliminating polluted stormwater discharges into receiving surface waters. In accordance with the SWPPP, new sources of stormwater must be evaluated to ensure that stormwater is properly treated prior to entering receiving surface waters.

Proposed Action

The Proposed Action would occur mostly within or adjacent to existing developed areas. All of the existing buildings, parking lots, sidewalks, roads, and other impervious surfaces within the project areas under the Proposed Action generate stormwater runoff, while vegetation within these areas helps filter and slow the flow of stormwater.

The proposed location of Primary Nodal Plant #1 is mostly undeveloped, consisting of approximately 3.43 acres of pervious surfaces and 0.08 acres of impervious surfaces. The site is adjacent to the extensively developed Pilot Plant area. The proposed location of Primary Nodal Plant #1 is approximately 150 feet from the Potomac River shoreline and located entirely within Subwatershed 191 (4.5 acres) and Subwatershed 209 (643 acres) (Figure B-11 in Appendix B). Stormwater runoff from Subwatershed 191 drains in a northwesterly direction across Strauss Avenue and into the Potomac River. Subwatershed 209 encompasses the majority of the northern half of Cornwallis Neck west of McMahon Road and south of Strauss Avenue and drains in a generally southern direction towards the Hog Island Cove and into the Mattawoman Creek. The proposed location of Primary Nodal Plant #2 has been previously developed and consists of approximately 2.98 acres of pervious surfaces and 0.57 acres of impervious surfaces. The site is approximately 350 feet from the Potomac River shoreline and located within Subwatershed 154 (3.7 acres) and Subwatershed 162 (168 acres) (Figure B-12 in Appendix B). Subwatershed 154 encompasses a small area bound on the northwest by Strauss Avenue and drains in a northwesterly direction across Strauss Avenue and into the Potomac River. Subwatershed 162 encompasses a significant portion of the Cast Plant east of Voegeli Road and is bound on the east by Caffee Road and drains in a generally southerly direction through permanent and intermittent streams and into the Mattawoman Creek. The proposed sites of the primary nodal plants contain low permeability soil that does not provide for efficient infiltration of stormwater (Section 3.10). The existing steam distribution line rights-of-way at NSF Indian Head contain urban landscape, gravel, or pavement.

The proposed locations of the secondary nodal plants and associated utilities are located within or near previously developed areas. The secondary nodal plants are located in Subwatersheds 207 and 209. Subwatershed 207 (176 acres) encompasses a significant portion of the Single Base Line, the CAD/PAD facilities, the Goddard Power Plant, and the NAVFAC Public Works Production Division facilities. Although most of the sites are previously developed, due to the configuration of the buildings they serve, some of the secondary nodal plants and their associated utilities connections may be within fragmented forested areas. The existing steam lines that would not be used by the primary nodal plants or the secondary nodal plants would be demolished or capped and left in place. As discussed above, the existing rights-of-way for the steam lines either contain urban landscape, gravel, or pavement.

The natural gas transmission line from the Bryans Road community to NSF Indian Head and the supporting distribution lines within the installation would follow existing roads or rights-of-way, consisting mostly of urban landscape with small areas of fragmented forest vegetation.

The proposed location of the new UEM Building is moderately developed, consisting of approximately 0.66 acres pervious surface and 1.3 acres of impervious surfaces, and contains low permeability soil that does not provide for efficient infiltration of stormwater. The site is within existing parking lots, roadways, and buildings and is more than 200 feet from the nearest permanent stream. The entire site is located within Subwatershed 231 (181 acres) (Figure B-11 in Appendix B) and drains in a northwesterly direction through permanent streams and into the Potomac River.

The existing Goddard Power Plant and associated facilities are located in an extensively developed area that, for the purposes of impervious surface estimation, can be divided into two segments: 1) Goddard Power Plant facilities and the coal pile; and 2) water treatment facilities, including Buildings 899 and 3030 (Figure 3-1). The Goddard Power Plant and coal pile consist of approximately 2.2 acres of pervious surfaces and 5.7 acres of impervious surfaces, including buildings, roadways, and parking areas. The water treatment facilities consist of approximately 0.26 acres of pervious surfaces and 0.36 acres of impervious surfaces. The site is located within Subwatershed 207 (176 acres) (Figure B-11 in Appendix B). Stormwater runoff in this subwatershed drains in a generally southerly direction through a permanent stream south of Hersey Road that discharges to the Mattawoman Creek near Building 436, via Industrial Outfall IW-40.

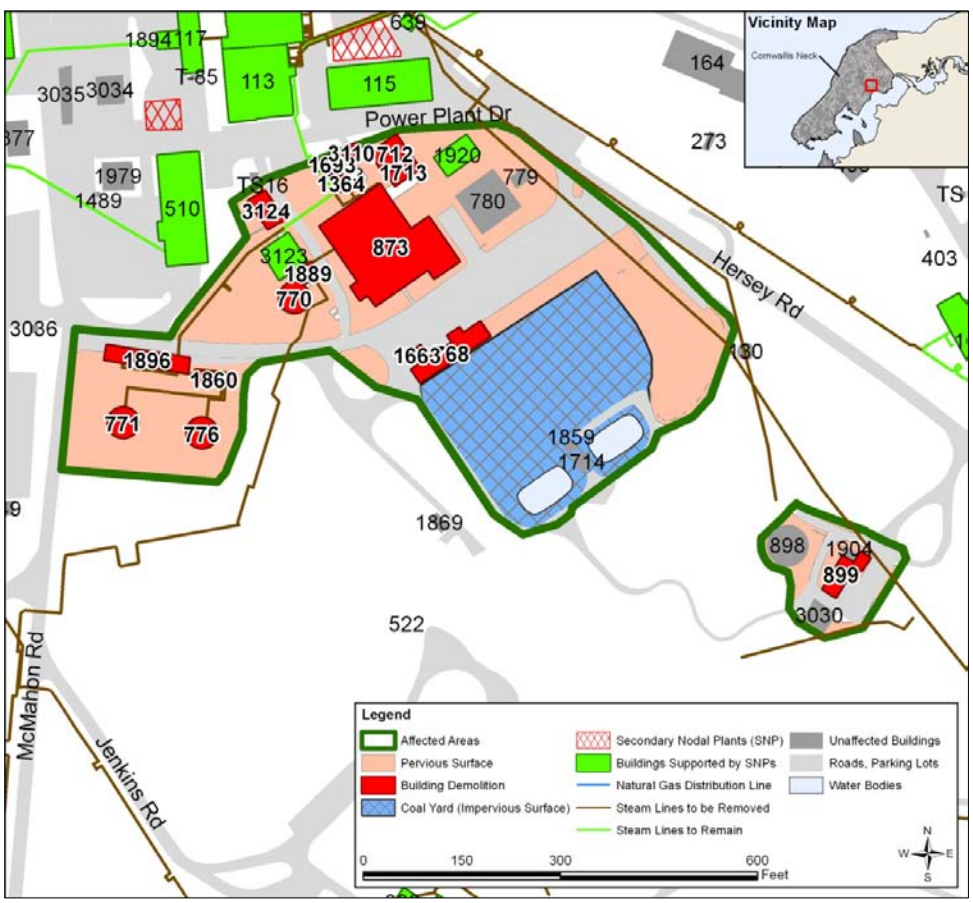

Figure 3-1. Goddard Power Plant and Associated Facilities

Alternative Action

Similar to the Proposed Action, the Alternative Action would occur mostly within or adjacent to existing developed areas. The proposed locations of the new primary nodal plants, UEM Building, and natural gas lines under the Alternative Action and demolition of the existing Goddard Power Plant and steam lines are the same as described under the Proposed Action. However, under the Alternative Action, the footprint of the primary nodal plants would be larger and no secondary nodal plants or associated natural gas distribution lines would be constructed.

No-Action Alternative

Impervious surfaces and stormwater runoff associated with the Goddard Power Plant and supporting facilities are the same as discussed above under the Proposed Action.

3.4.2 Surface Waters

Federal surface water regulations, including the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA), focus on the right to use water and the protection of water quality. The CWA protects surface water quality and preserves wetlands, and Section 402 of the CWA establishes the NPDES permit program, giving EPA the authority to limit the discharge of pollutants into navigable waters of the United States. The SDWA authorizes EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants.

Temporary construction (e.g., utility crossings) in a waterway is regulated by MDE under COMAR 26.17.04, which requires the action proponent to obtain a Joint Federal/State Waterways/ Floodplain/Wetland Permit. For utility crossings of stream channels, MDE requires the utility infrastructure to be buried a minimum of three feet below the stream bed (COMAR 26.17.04.08).

Installation Background

NSF Indian Head has more than 55 linear miles of surface water, including 32 miles of streams. The majority of these streams (26 miles) are characterized as annually flowing, freshwater, non-tidal streams. The remaining 23 miles of surface water are made up of constructed drainage systems, waterways with intermittent flows, and estuarine waters (U.S. Department of the Navy, 2008). Major surface waters surrounding Cornwallis Neck include the Potomac River and the Mattawoman Creek, which are classified as Use I waters that can support contact recreational use and limited aquatic life. Both the Potomac River and Mattawoman Creek are tributaries to the Chesapeake Bay.

In April 2003, EPA developed water quality criteria for dissolved oxygen, water clarity, and Chlorophyll A for the Chesapeake Bay and its tidal tributaries. The six states within the Bay watershed, along with Washington, D.C., agreed to fulfill the requirement to achieve compliance via the Total Maximum Daily Load (TMDL) process by 2010. MDE promulgated state-wide water quality criteria under COMAR 26.08.02.03-3 in August 2005, and revised the water quality criteria in April 2010. In December 2010, MDE established TMDLs for nitrogen, phosphorous, and total suspended solids (TSS) in the Mattawoman Creek. NSF Indian Head began to evaluate pollutant discharges to the Mattawoman Creek from the Goddard Power Plant in February 2011 (Shaffer, 2011).

The Navy discharges stormwater to the Potomac River and the Mattawoman Creek via outfalls regulated in NPDES General Permit No. MDR055501 issued by MDE. Stormwater discharges associated with industrial activities are also regulated under NPDES Permit No. MD0003158.

The centralized sewage treatment plant at NSF Indian Head treats both sanitary and process wastewater from various sources throughout the station. The current capacity of the plant is 500,000 gallons per day (gpd), with a peak capacity of 750,000 gpd. Current daily dry weather flow rates range from 350,000 to 425,000 gpd, with occasional spikes due to the inflow and infiltration of stormwater into the system during rainfall events (Rose, 2008). Under Military Construction (MILCON) P200, the Indian Head sewage treatment plant has been upgraded to Enhanced Nutrient Removal (ENR) status to reduce nitrogen and phosphorous levels in the sewage treatment plant wastewater discharge in order to comply with new NPDES permit discharge limits.

Water from the Potomac River is used for fire protection, steam generation, and other industrial uses such as NCCW at NSF Indian Head. NSF Indian Head has a State Water Appropriation Permit (Permit No. CH71S005) that allows a daily average withdrawal of 3.5 million gpd on a yearly basis. In 2010, NSF Indian Head withdrew a daily average of nearly 1 million gpd from the Potomac River (Frey, 2011).

Proposed Action

The proposed locations for the construction, renovation, and demolition activities covered by the Proposed Action are widespread and located at varying distances from streams, surface water bodies, the Mattawoman Creek, and the Potomac River (Figures B-9 and B-10 in Appendix B).

The Potomac River shoreline, located approximately 150 feet from the proposed location of Primary Nodal Plant #1, is the only surface water body within 200 feet of this site. The proposed location for Primary Nodal Plant #2 is approximately 350 feet from the Potomac River shoreline and approximately 200 feet from the nearest wetland and standing surface water. The existing Steam B Plant within the site is operated infrequently and discharges NCCW to the sewage treatment plant. The existing aboveground steam distribution lines at NSF Indian Head, including lines that would be upgraded or demolished under the Proposed Action, cross streams and wetlands at multiple locations throughout the base.

The proposed locations of the secondary nodal plants and associated utilities are located in close proximity to existing development. The secondary nodal plants would be located at least 150 feet from the nearest stream or wetland. Some new utility connections may be required to cross over streams or run along roads adjacent to wetlands.

The proposed location of the natural gas transmission line from Bryans Road to NSF Indian Head crosses or is within 100 feet of fourteen streams and nine potential wetlands (Section 3.4.6), as identified during a high level wetland survey in December 2011. The proposed location of the natural gas lines within NSF Indian Head crosses three perennial and intermittent nontidal streams and comes within 100 feet of four additional streams. The final location and method for crossing streams would be determined by Washington Gas and the Navy in consultation with resource agencies.

A permanent stream, located approximately 200 feet from the proposed location of the new UEM Building, is the only surface water body within 200 feet of this site. The existing facilities that house the functions and personnel to be relocated to the proposed UEM Building produce small quantities of domestic sanitary wastewater and small quantities of equipment wash-down water.

Surface water features within the Goddard Power Plant area include the stormwater neutralization ponds located southeast of the coal storage pile. There is also a permanent stream approximately 150 feet west of Building 768 (a Goddard support facility), which receives treated runoff from the neutralization ponds, and an intermittent stream that is located just east of the coal pile. The

Goddard Power Plant uses approximately 375,000 gallons per day of river water for steam generation, NCCW, and other industrial processes (ERG, 2008a).

Alternative Action

Similar to the Proposed Action, construction and demolition under the Alternative Action would occur near surface water bodies located throughout the base. The proposed locations of the new primary nodal plants, UEM Building, and natural gas lines, as well as demolition of the Goddard Power Plant and portions of excess steam lines would be the same as described under the Proposed Action, so affected surface waters would be similar. However, secondary nodal plants and associated utility lines would not be provided under the Alternative Action and thus would not affect any surface waters.

No-Action Alternative

River water usage and wastewater discharges associated with the existing Goddard Power Plant and supporting facilities that would remain operational under the No-Action Alternative are discussed above under the Proposed Action.

3.4.3 Industrial Wastewater

Industrial wastewater is generated by non-municipal, or industrial sources, and may include process wastewaters, cooling waters, sanitary wastewater, and stormwater runoff.

Installation Background

The Navy discharges sanitary and process wastewater, and NCCW to the Potomac River and the Mattawoman Creek via outfalls regulated in two separate permits issued by MDE. NPDES Permit No. MD0020885 regulates Outfall 001 (designated by NSF Indian Head personnel as SS-01), which discharges effluent from the centralized sewage treatment plant at NSF Indian Head into the Potomac River. Process wastewater and NCCW that are not treated at the centralized sewage treatment plant are regulated under NPDES Permit No. MD0003158.

The new industrial wastewater permit requires basewide industrial discharges to meet annual loading restrictions for nitrogen and phosphorous. The loading values of industrial wastewater are measured at the industrial outfalls. The Navy is currently conducting a basewide survey to identify locations or areas with numerous generators of industrial wastewater and correlate these wastewater generators to nitrogen and phosphorous loading values.

Proposed Action, Alternative Action, and No-Action Alternative

Stormwater from the area of the power plant and the coal storage pile discharges to IW-40, as well as to IW-80 via underground piping. During storm events, runoff from the coal storage pile flows into the settling pond, where it is treated with a 50 percent sodium hydroxide solution (caustic) and allowed to settle for three to four hours. After treatment, the water is then transferred to the finishing pond, where additional settling occurs prior to discharge. The pond system is discharged manually to IW-40 via internal monitoring point MP-140 at variable intervals, depending on rainfall. Log sheets indicate that certified operators have discharged the pond system as many as three times per month in the past. Based on annual precipitation data from the National Climactic Data Center and a runoff coefficient calculated using soil samples and analyses, it is estimated that the treatment ponds receive approximately 1,470 gallons per day of stormwater runoff from the coal pile (ERG, 2008a). A totalized meter located at monitoring point MP-140 measures flow from

the neutralization ponds, while temperature, TSS, and pH are measured in grab samples. The TSS of treated coal pile runoff has, in the past, contributed to compliance problems with the discharge permit held by NSF Indian Head (ERG, 2008a).

The ash silo (Building 1712) adjacent to the power plant is located at a topographic low and the loading area under the ash silo receives runoff from the surrounding area during storm events. After this water comes in contact with the ash silo, it is considered industrial wastewater and Public Works Department personnel must pump the water from the silo loading area by vacuum truck and send it directly to the wastewater treatment plant (ERG, 2008a).

The power plant building itself (Building 873) is also a major source of stormwater during precipitation events, and discharges to industrial outfalls via roof leaders.[5] On average, the roof leaders collect approximately 1,280 gallons per day of stormwater and discharge it to IW-40 and IW-80 (ERG, 2008a).[6] Coal pile runoff and industrial wastewater discharges to IW-40 and IW-80 are regulated by NPDES permit No. MD0003158. Types of industrial wastewater discharged to IW-40 include NCCW, containment dike water, coal pile runoff, bleed water, and condensate. Types of industrial wastewater discharged to IW-80 include condensate, wash water, contact water, NCCW, and boiler blowdown.

The Goddard Power Plant discharges NCCW, low-volume wastewater associated with steam electric generation, maintenance wastewater from the wash-down of equipment, and stormwater to IW-40 and IW-80. The Goddard cooling tower blow down and membrane reject water from the RO system in Building 3123 discharge to IW-107. Sanitary wastewater is discharged to the sewage treatment plant (ERG, 2008a). Mattawoman Creek is the receiving water body for both IW-80 and IW-40, while the Potomac River is the receiving water body for IW-107. Annual process and non-contact wastewater discharges from Goddard Power Plant operations are summarized in Table 3-4.

Table 3-4. Summary of Annual Process and Non-Contact Wastewater Discharges from Goddard Power Plant

Outfall	Process Wastewater Discharges (1,000 gpd)		Non-contact Wastewater Discharges (1,000 gpd)	
	Summer	Winter	Summer	Winter
IW-40	0.85	1.17	1.95	1.28
IW-80	2.58	2.58	30.6	13.22
IW-107	80.02	134.3	0	0
Sewage Treatment Plant	2.31	2.31	0	0
Total	85.76	140.38	32.56	14.51

Source: ERG, 2008a.

[5] According to the 1996 Wastewater Improvement Study, 13 of the roof leaders drain to IW-40 and three of the roof leaders at the power plant drain to IW-80. During a site visit on January 31, 2008, the three roof leaders draining to IW-80 were observed to be plugged by tar. Plant personnel stated that the roof has been re-finished multiple times since the installation of the roof leaders, and the tar was likely spilled into the leaders during one of these construction events.

[6] Roof leader stormwater collection estimates are based on precipitation data from the National Climactic Data Center (NCDC) and the aerial extent of the power plant roof, which was estimated to be 19,476 SF using GIS imagery.

3.4.4 Coastal Zone Management

Maryland's Coastal Zone Management (CZM) Program was created in 1978 in response to the passage of the Federal Coastal Zone Management Act (CZMA) of 1972. Maryland's CZM Program is a network of state laws and policies designed to preserve, protect, develop and, where possible, restore coastal resources of the Chesapeake Bay, coastal bays, and the Atlantic Ocean, as well as the towns, cities, and counties that have jurisdiction over the coastline. Maryland's coastal zone encompasses two thirds of the state's land area and is home to more than 65 percent of the state's residents (MDNR, 2002).

The Chesapeake Bay Critical Area Act, an enforceable policy of the Maryland CZM Program, is a joint effort by state and local governments to address the impacts of land development on habitat and aquatic resources in the Chesapeake Bay Watershed. In Maryland, the Chesapeake Bay Critical Area designation extends 1,000 feet inland from the mean high water mark or the edge of tidal wetlands (Critical Area Commission, 2010a). The Chesapeake Bay Critical Area Commission also requires a 100-foot Critical Area Buffer, regulated by MDE under COMAR 27.01.09, to be maintained around tidal waters and tributary streams in order to improve runoff water quality and reduce the amounts of toxic substances entering tidal waters (Critical Area Commission, 2008). A vegetative buffer must be established by planting or maintaining the presence of native vegetation when development activities take place outside the 100-foot Buffer, but within the 1,000-foot Critical Area on lands adjacent to tidal waters, tidal wetlands, and tributary streams (Critical Area Commission, 2010b). Buffer mitigation is required when clearing, grading, or construction takes place within the 100-foot Buffer.

Installation Background

NSF Indian Head is located in Charles County, which is part of Maryland's coastal zone (MDNR, 2002). Federally controlled lands are excluded from the coastal zone per 16 U.S.C. 1453, Section 304, Paragraph (1). However, the CZMA requires all federal activities that could affect land, water, or natural resources of a state's coastal zone to be consistent to the maximum extent practicable with the enforceable policies of the approved state CZM program. That is, even if the action occurs on federal land (excluded from the coastal zone), the action must be consistent to the maximum extent practicable with the state CZM program if it affects coastal resources.

Since the Critical Area designations do not apply to federal lands, areas within 1,000 feet of the shoreline at NSF Indian Head are referred to as the 'shoreline buffer' and are used, in conjunction with the 100-foot shoreline buffer, by NSF Indian Head as a reference to conduct CZMA federal consistency determinations. The 1,000-foot shoreline buffer at NSF Indian Head contains extensive existing development, including buildings, steam lines, roadways, and parking lots. There is also some existing development in several areas throughout the base within 100 feet of tidal wetlands, tributary streams, and the shoreline. The Navy maintains the coastal resources at NSF Indian Head by avoiding removal of trees within 100-foot riparian buffers wherever possible (U.S. Department of the Navy, 2008).

Proposed Action, Alternative Action, and No-Action Alternative

With the exception of the natural gas line from Bryans Road to NSF Indian Head, all activities associated with the Proposed and Alternative Actions would occur within the property boundaries of NSF Indian Head on federal lands excluded from the coastal zone.

Under both the Proposed and Alternative Actions, the proposed locations of the primary nodal plants, segments of the proposed natural gas lines, and segments of proposed and existing steam

lines are located within the 1,000-foot shoreline buffer (Figures B-9 and B-10 in Appendix B). In addition, under the Proposed Action, the proposed locations of Secondary Nodal Plants #5, 6, and 9 and associated utilities are located within the 1,000-foot shoreline buffer. Portions of the existing Goddard Power Plant are located within the 1,000-foot shoreline buffer, specifically the coal pile yard, neutralization ponds, and Buildings 768 and 899. Segments of existing steam lines, which would either be demolished/capped and left in place or renovated under the Proposed Action, are also located within the 1,000-foot shoreline buffer and within 100 feet of tributary streams or tidal wetlands. Vegetation in most of the project areas is limited to urban landscape and small fragmented forests.

3.4.5 Groundwater

Groundwater is subsurface water found beneath the water table in soils and geologic formations and is the most prevalent source of available freshwater that supports potable, agricultural, and industrial uses, especially in areas that lack riverine systems. Groundwater quality is impacted by interactions with soil, sediments, rocks, surface waters, and the atmosphere. Groundwater quality is known to be negatively affected by agricultural, industrial, urban, and other human actions. Confined aquifers are preferred for use as potable water sources due to the increased susceptibility of surficial groundwater and surface waters to contamination. Surficial groundwater is typically composed of shallow aquifers less than 50 feet deep, while potable water is typically drawn from deep aquifers 200 feet to 700 feet deep.

Installation Background

Groundwater is present in four water-bearing formations underlying Charles County. From deepest to shallowest, they are the Patuxent, Patapsco, Magothy, and Aquia formations (Charles County Water Advisory Committee, 2006). The Patuxent and Patapsco formations comprise the Potomac group, the lowermost and most widespread formation of the Coastal Plain aquifer system, and provide the main potable water supply for NSF Indian Head. Because of its vast size, the aquifers within the Potomac group provide groundwater for many other counties in North Carolina, Virginia, Maryland, Delaware, and New Jersey.

The Patapsco aquifer is located in a coastal area subject to saltwater intrusion, which threatens the groundwater quality at NSF Indian Head (Charles County Planning Commission, 2006). Saltwater intrusion occurs when aquifer withdrawal reduces freshwater replenishment near the coastal discharge areas and allows saltwater to be drawn toward these freshwater aquifers, thereby decreasing the amount of freshwater storage in aquifers (USGS, 2010). The Patapsco Aquifer is currently under a State of Maryland Capacity Management Strategy Plan, which is put into effect when an aquifer reaches 80% capacity use. Because of this status, use of the Patapsco Aquifer is being further limited by directing new applications to the Patuxent Aquifer, reducing some permit limits, and directing some industrial users to use alternative sources like surface water. MDE has notified NSF Indian Head of its plan to lower the installation's Patapsco Aquifer appropriation limit to 150,000 gpd. The Navy has requested that the 290,000 gpd reduction from the Patapsco Aquifer permit be replaced under the appropriation permit for a new well (to replace Well 17) to be drilled to the Patuxent Aquifer. The application for construction of the new well is still in progress and the requested appropriation has not yet been granted.

NSF Indian Head uses groundwater for domestic and industrial purposes, as well as for fire protection at Stump Neck. The groundwater system at NSF Indian Head is often referred to as the "potable water" system, since it supplies water for domestic purposes. Groundwater is pumped from four wells at Cornwallis Neck (Wells 1, 15, 16A, and 17) and two wells at Stump Neck (Wells SN43A and SN2012), as summarized in Table 3-5. The Navy has multiple MDE-issued Groundwater

Appropriation Permits, summarized in Table 3-5, that specify withdrawal allowances for each groundwater well. The average daily groundwater usage is approximately 83 percent (829,000 gpd) of the monthly permitted limit for Wells 1 and 16A (Patuxent aquifer) and approximately 30 percent (132,000 gpd) of the permitted limit for Wells 15 and 17 (Patapsco aquifer) (Frey, 2011).

Table 3-5. Groundwater Wells at NSF Indian Head

Well	Permit Number	Location	Aquifer	Limits	
				Yearly Basis (gpd)	Maximum Daily Withdrawal (gpd)
1 and 16A	CH1971G205 (04)	Cornwallis Neck	Patuxent	1,000,000	1,240,000
15 and 17	CH1971G005 (07)	Cornwallis Neck	Patapsco	440,000	800,000
43A	CH1971G305 (01)	Stump Neck	Patuxent	50,000	65,000
2012	CH1971G105 (04)	Stump Neck	Patapsco	10,000	37,000

Source: NSASP Groundwater Appropriation Permits.

Proposed Action, Alternative Action, and No-Action Alternative

The Proposed and Alternative Actions would affect existing facilities at NSF Indian Head that use groundwater for industrial and domestic purposes. In addition, several areas affected by the Proposed and Alternative Actions are located in areas that may exhibit surficial groundwater contamination.

Groundwater Usage

Groundwater is used at Goddard Power Plant for industrial processes and NCCW when the river water filtration system is not operational, which occurs as frequently as 180 days per year (Frey, 2011). On average, approximately 375,000 gpd is drawn from Wells 15 and 17 when the plant uses groundwater instead of river water for its operations. The Steam B Plant uses groundwater for steam generation operations. The plant is operated only when the Goddard Power Plant is not functioning or when supplementary steam is needed, which is usually only a few days each year during the winter (Jenkins, 2011). Many of the existing buildings at the Goddard Power Plant and Steam B Plant are connected to the potable water utility distribution system and use groundwater for domestic purposes.

Groundwater Contamination

Under the Proposed and Alternative Actions, the proposed locations of the construction, demolition, and renovation activities are within or near several Munitions Response Program (MRP) Sites and Installation Restoration (IR) Sites that could potentially contain contaminated surficial groundwater sources (Section 3.10).

3.4.6 Wetlands

Installation Background

Due to its location along the Potomac River, Mattawoman Creek, and Chicamuxen Creek, NSF Indian Head contains numerous non-tidal and tidal wetland communities. The NSF Indian Head Integrated Natural Resource Management Plan (INRMP) identifies approximately 230 acres of wetlands (U.S.

Department of the Navy, 2008). Wetlands information is maintained by the NSF Indian Head Environmental Office and is updated through project-specific wetland delineations, rather than through the completion of a new base-wide wetland inventory.

Non-Tidal Wetlands

Non-tidal wetlands, also known as palustrine or freshwater wetlands, comprise approximately 69 percent of the wetlands at NSF Indian Head. These wetlands function as transitional areas between uplands and water bodies and are covered with, or saturated by, water for all or part of the year (Critical Area Commission, 2008). Non-tidal wetlands can include the edges of rivers and lakes, freshwater marshes, bogs, wooded or shrub swamps, shallow ponds, and bottomland hardwood forests, and can be classified as either open wetlands (less than 50 percent tree cover) or forested wetlands (greater than 50 percent tree cover). The NSF Indian Head INRMP identifies approximately 5.5 acres of open wetlands and approximately 42 acres of forested wetlands described as seasonally flooded, broad-leaved deciduous forests and permanently flooded or saturated swamps.

Tidal Wetlands

Approximately 31 percent of wetlands at NSF Indian Head are classified as tidal wetlands. These wetlands can be vegetated or unvegetated areas that border or exist beneath tidal waters and are subject to regular or periodic tidal action (Critical Area Commission, 2008). These systems are usually semi-enclosed by land, but are influenced by varying freshwater flows from adjacent rivers and watercourses (Critical Area Commission, 2008). The INRMP identifies four types of brackish tidal wetland communities at NSF Indian Head: tidal shrub swamps, tidal marshes, intertidal mudflats, and intertidal shore.

Proposed Action, Alternative Action, and No-Action Alternative

The proposed locations of the new primary nodal plants, secondary nodal plants, and UEM Building, and the existing Goddard Power Plant are not located within 100 feet of any tidal wetlands or 25 feet of any non-tidal wetlands. However, some of the existing steam lines cross over wetlands, and some of the proposed steam lines and natural gas lines within NSF Indian Head may cross near wetlands (Figures B-9 and B-10 in Appendix B).

The proposed location of the natural gas transmission line from Bryans Road to NSF Indian Head is within the Route 210 right-of-way, along Mattingly Avenue, and along the railroad tracks from Mattingly Avenue to the NSF Indian Head perimeter fence. According to a desktop survey and high level field survey performed in December 2011, there are nine suspected wetlands within 100 feet of this area. The survey identified a total of approximately 0.1 acres of suspected wetlands within the Route 210 right-of-way and approximately 5.9 acres within 100 feet of the right-of-way. No suspected wetlands were identified within 100 feet of the proposed location along Mattingly Avenue and the railroad tracks.

3.4.7 Floodplains

To protect floodplains and minimize future flood damage, EO 11988 restricts development within the 100-year floodplain. Under EO 11988, all federal agencies must 1) determine if any of their actions would occur within a floodplain, 2) evaluate the potential effects of these actions, and 3) analyze alternatives to these actions. Utility crossings within a 100-year floodplain are regulated under COMAR 26.17.04.08, which establishes technical requirements for temporary construction activities within a 100-year floodplain.

Installation Background

The 100-year floodplain at NSF Indian Head is approximately 10 feet above mean sea level and is typically located next to major waterways (Bossart, 2002).

Proposed Action, Alternative Action, and No-Action Alternative

The proposed locations of the new primary nodal plants, secondary nodal plants, UEM Building and the existing Goddard Power Plant are not located within the 100-year floodplain. However, some of the existing steam lines cross through the 100-year floodplain, and the proposed natural gas distribution lines cross through the 100-year floodplain near Secondary Nodal Plants #5 and 8 (Figures B-9 and B-10 in Appendix B).

3.5 Land Use

The manner in which land is used to meet strategic, economic, social, or environmental objectives is referred to as land use. Land use planning helps to determine the future use that would result in the best overall balance of objectives for each parcel of land in an area. A well-coordinated land use plan considers a broad range of human and natural concerns to efficiently achieve and sustain stakeholder objectives. Land use planning for NSF Indian Head takes into account mission needs as well as safety, environmental, economic, and sociological factors. Consideration of these factors can positively impact development and sustainment costs, transportation efficiency, health, air pollution, energy consumption, open space and habitat preservation, economic equity, and sense of community.

Installation Background

NSF Indian Head is home to a variety of commands and associated land uses. In 2010 the Navy developed a new Master Plan to provide a focused vision and clear path forward for land and facilities use at NSF Indian Head. The Master Plan serves as a decision-making and planning tool for effective utilization, construction, and disposal of real property and supporting infrastructure. It describes a twenty-five year vision for the base and includes the following over-arching goals:

1. Consolidation: Co-locating similar functions for operational efficiency;

2. Demolition: Removing underutilized and deteriorating facilities from the building inventory and opening up areas for future development;

3. Utilities: Upgrading ageing utilities infrastructure to reduce costs and improve reliability, particularly for electricity and steam; and

4. Sustainability: Adopting more efficient and environmentally-responsible uses of energy, water, land, and other resources (NSASP, 2010).

The installation has identified the following land use areas in its current Master Plan (NSASP, 2010a):

- Community Support;
- Housing;
- Office and Administrative;
- Field Training;
- Energetics Research, Development, Testing, and Evaluation (RDT&E);
- Inert RDT&E;
- Inert Industrial;
- Inert Storage;
- Utilities;
- Energetics Processing;
- Energetics Storage; and
- Natural Areas.

All explosives facilities on Cornwallis Neck are located within the industrial area, which is separated from the rest of the installation by security fences and gates (Posts 2 and 3) to restrict access. Within the constraints of existing office and industrial space, the installation minimizes the number of personnel located near explosives facilities, except when those personnel are necessary to support explosives operations in those facilities.

Proposed Action, Alternative Action, and No-Action Alternative

Primary Nodal Steam Plants

The proposed locations of the primary nodal steam plants are within the energetics processing land use areas identified by the Master Plan. Buildings that would receive steam from the primary nodal plants are located in land use areas designated for energetics processing.

Natural Gas Line

The majority of the natural gas transmission line outside NSF Indian Head would be installed by Washington Gas within the existing Route 210 right-of-way owned by the Maryland State Highway Administration. However, approximately 300 feet from the NSF Indian Head main gate, the transmission line would be installed along Mattingly Avenue, which could require obtaining an easement on private property. Within NSF Indian Head, the transmission line would run through areas designated by the Master Plan for a variety of future land uses, including administration, community support, inert RDT&E, inert industrial, training, and energetic processing. The distribution lines would run through areas designated by the Master Plan for a variety of future land uses, including community support, housing, administration, inert industrial, utilities, energetic processing, energetic storage, training, and inert RDT&E. The proposed location of the regulator station is in an area designated by the Master Plan for administration.

Secondary Nodal Plants

The secondary nodal plants would occupy areas designated by the Master Plan for administration, energetic RDT&E, inert industrial, inert RDT&E, and energetic processing. Many of the facilities to be served by the secondary nodal plants are located in land use areas that are consistent with the future vision laid out in the Master Plan. However, in some cases, the existing operations conducted in these facilities conflict with proposed surrounding land uses.

UEM Building

The proposed location of the UEM Building is in an area that is designated by the Master Plan for administration. Housing areas and the former golf course are located immediately to the south and west of the proposed UEM Building. The functions to be relocated to the UEM Building are currently located at the Goddard Power Plant and other supporting facilities within the restricted area.

Goddard Power Plant

The Goddard Power Plant is located in an area that is currently designated by the Master Plan for utility land use.

3.6 Socioeconomics

Socioeconomics examines the social impact of economic change. Factors considered include population, housing, economics, and recreational activities.

A subset of socioeconomics is environmental justice. Environmental justice considers sensitive populations, such as children, minorities, and low-income communities. EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* (Clinton, 2004), serves to avoid the disproportionate placement of adverse environmental, economic, social, or health impacts from federal actions and policies on minority and low-income populations. EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (Clinton, 1997), states that federal agencies will identify and address environmental health and safety risks from their activities, policies, or programs that may disproportionately affect children.

Installation Background

The cumulative socioeconomic impact of activities at NSF Indian Head falls predominantly on Charles County, Maryland, particularly in the Town of Indian Head. Much of the development in the Town of Indian Head originated from the establishment of the Naval Proving Ground in 1890. During this time, many people began to settle in Indian Head and surrounding areas to work at the Navy facility, which provided much needed employment during the post-Civil War depression. Since the early 1900s, the Town of Indian Head has grown with the Navy facility, and NSF Indian Head continues to contribute to the economic viability and development of many surrounding businesses. NSWC IHD and the other supported commands of NSF Indian Head are collectively the single largest employer in Charles County, Maryland, with approximately 590 military personnel and 2,940 civilian and contractor employees (NSASP, 2010b). NSF Indian Head also is home to over 650 military family members. Sixty percent of NSF Indian Head employees live in Charles County, and 77 percent live in Maryland (Davant, 2004).

The impact of NSF Indian Head on Prince George's County, MD and northern Virginia is minimal relative to the socioeconomic influence of the D.C. metro region as a whole. However, NSF Indian Head activities could potentially cause pollution, noise, and visual impacts on these counties.

Population

Charles County, Maryland has a population of 146,551. The 3 largest cities in Charles County are Waldorf (67,752), La Plata (8,753), and Indian Head (3,844) (U.S. Census, 2010).

Population distributions in the Town of Indian Head, Charles County, and the state of Maryland are provided in Table 3-6 and Table 3-7. Table 3-6 indicates that the Town of Indian Head is populated predominantly by Blacks (55.5 percent) and Whites (35.9 percent). The town has a relatively high proportion of American Indians and Alaska natives (1.3 percent) compared to Charles County (0.7 percent) and Maryland (0.4 percent). Indian Head also has a higher population of Blacks (55.5 percent) relative to the county (41.0 percent) and state (29.4 percent).

Table 3-6. Race Distributions in Indian Head, Charles County, and Maryland

Race	Indian Head		Charles County		Maryland	
	Number of People	Percentage of Population	Number of People	Percentage of Population	Number of People	Percentage of Population
White	1,381	35.9%	73,677	50.3%	3,359,284	58.2%
Black	2,134	55.5%	60,031	41.0%	1,700,298	29.4%
American Indian and Alaska Native	49	1.3%	957	0.7%	20,420	0.4%
Asian	101	2.6%	4,366	3.0%	318,853	5.5%
Native Hawaiian and Other Pacific Islander	2	0.1%	103	0.1%	3,157	0.1%
Other or Mixed Race	177	4.6%	7,417	4.9%	371,540	6.5%

Source: U.S. Census, 2010 (100% Data).

Table 3-7. Age Distributions in Indian Head, Charles County, and Maryland

Age	Indian Head		Charles County		Maryland	
	Number of People	Percentage of Population	Number of People	Percentage of Population	Number of People	Percentage of Population
Under 5	291	7.6%	9,438	6.4%	364,488	6.3%
5 to 19	921	24.0%	33,482	22.9%	1,152,138	20.0%
20 to 44	1,441	37.5%	49,076	33.6%	1,951,312	33.7%
45 to 64	907	23.6%	40,703	27.8%	1,597,972	27.6%
65 and over	284	7.4%	13,852	9.4%	707,642	12.3%

Source: U.S. Census, 2010 (100% Data).

Table 3-7 shows the age distribution for the town, county, and state. Indian Head has a higher percentage of minors (28.2 percent) relative to Charles County (26.5 percent) and the state of Maryland (23.4 percent). Indian Head's proportion of senior citizens (7.4 percent) is low relative to the state of Maryland (12.3 percent) and Charles County (9.4 percent).

Housing

Military housing is available within NSF Indian Head, while civilian housing is available in the Town of Indian Head and elsewhere in Charles County. Housing in the vicinity of NSF Indian Head consists of apartments, condominiums, townhouses, single-family homes, and low-income housing. A residential area, consisting mainly of single-family homes, borders the northern end of Cornwallis Neck.

The location of the Town of Indian Head on a peninsula restricts the amount of land available for new housing and business development. This situation has resulted in an aging housing stock, leading to lower home prices and rents, which further attracts families with lower incomes (Maryland Department of Planning, 2008). The median home age in the Town of Indian Head in 2010 was 31 years; in Charles County, the median home age was 24 years; and in Maryland, the median home age was 36 years (U.S. Census, 2010).

Table 3-8 shows median living expenses for renters and homeowners in 2010. Although median monthly rent and mortgage costs were higher in Charles County than in Indian Head or Maryland, median rent and mortgage costs as a percentage of household income were comparable in the three regions.

Table 3-8. Median Monthly Housing Expenses for Indian Head, Charles County, and Maryland

Housing Expenses	Indian Head	Charles County	Maryland
Median Gross Rent	$1,096	$1,307	$1,091
Median Gross Rent - Percentage of Household Income	19.0%	17.7%	18.5%
Median Monthly Owner Costs – Housing Units with a Mortgage	$1,650	$1,966	$1,656
Median Monthly Owner Costs – Percentage of Household Income	28.7%	26.5%	28.1%

Source: U.S. Census, 2010 (Sampled Data).

Employment

The U.S. Department of Labor's Bureau of Labor Statistics (BLS) produces monthly and annual employment data through the Local Area Unemployment Statistics program. Data are provided at the national level down to the city level. Table 3-9 presents time-series data on the unemployment rate and employment level in Charles County and Maryland. Data are not provided for Indian Head because the Bureau of Labor Statistics does not provide data for towns/cities smaller than 25,000 inhabitants. As shown in Table 3-9, the unemployment rate in Charles County averaged 5.8% in 2009, which represents a 2.1% increase from 2008. The recent increase in unemployment rates experienced by Charles County is consistent with trends in national unemployment rates, which have risen from 4.6% in 2007 to 9.3% in 2009 (U.S. Department of Labor, 2010). However, unemployment rates in Charles County continue to remain lower than both the overall state and national rates.

Table 3-9. Unemployment Rate and Employment Level in Charles County

Employment Rates/Levels	2005	2006	2007	2008	2009
Unemployment Rate (Charles County)	3.4%	3.1%	3.0%	3.7%	5.8%
Employment (Charles County)	70,759	73,110	74,690	75,364	72,838
Unemployment Rate (Maryland)	4.1%	3.8%	3.5%	4.4%	7.0%
Employment (Maryland)	2,825,040	2,889,761	2,904,901	2,893,778	2,777,610

Source: U.S. Department of Labor, 2010.

NSF Indian Head has a significant impact on employment and income in Charles County. As of 2010, approximately 3,530 people work at NSF Indian Head (NSASP, 2010b), accounting for approximately 8.75% of the jobs in Charles County based on the reported 2010 BLS employment level.

Income

Household income distributions for the Town of Indian Head, Charles County, and Maryland are shown below in Table 3-10. The Town of Indian Head has a lower income distribution relative to either Charles County or Maryland. Per-capita income for Charles County is $35,780, and is higher

than either Maryland or Town of Indian Head income presumably due to the higher proportion of households with income in excess of $150,000. Maryland's per-capita income is $34,849, and the Town of Indian Head's per capita income is $28,380.

The annual payroll for NSF Indian Head, including supported commands, was $238 million in 2004 (NSF Indian Head, 2005). This sum includes all civilian, military, and contractor employees. Wage and salary disbursements in Charles County for 2004 were approximately $1.5 billion (U.S. Department of Commerce, Bureau of Economic Analysis, 2008); therefore, NSF Indian Head accounts for about 16 percent of wage and salary disbursements in Charles County.

Table 3-10. Income Distributions for Indian Head, Charles County, and Maryland

Income	Indian Head		Charles County		Maryland	
	Number of Households	% of Total	Number of Households	% of Total	Number of Households	% of Total
Less than $10,000	121	9.2%	1,322	2.6%	105,359	5.0%
$10,000 to $14,999	22	1.7%	1,131	2.3%	70,756	3.3%
$15,000 to $24,999	60	4.6%	2,089	4.2%	145,954	6.9%
$25,000 to $34,999	27	2.1%	2,416	4.8%	164,080	7.7%
$35,000 to $49,999	160	12.2%	4,518	9.1%	249,521	11.8%
$50,000 to $74,999	307	23.3%	8,593	17.2%	386,304	18.2%
$75,000 to $99,999	206	15.7%	8,153	16.3%	299,813	14.1%
$100,000 to $149,999	308	23.4%	12,688	25.4%	375,928	17.7%
$150,000 to $199,999	41	3.1%	5,570	11.2%	167,757	7.9%
$200,000 or more	64	4.9%	3,418	6.8%	155,575	7.3%
Total Households	**1,316**	**100.0%**	**49,898**	**100.0%**	**2,121,047**	**100.0%**

Source: U.S. Census, 2010 (Sampled Data).

Using the Federal Government's official poverty definition as directed by the Office of Management and Budget's Directive 14 and based on the U.S. Department of Agriculture (USDA) Economy Food Plan, the 2010 U.S. Census found that 3.7 percent of Charles County residents live under the poverty level, whereas 9.4 percent of Indian Head residents live under the poverty level (U.S. Census, 2010).

Fishing and Recreation

The area surrounding NSF Indian Head is popular for outdoor recreational activities including fishing, hiking, and biking. Recreational fishing in the Potomac River and the Mattawoman Creek is particularly important as a source of recreation and revenue. Smallwood State Park, located east of Stump Neck on the southern shore of the Mattawoman Creek, is a common launch point for recreational boaters, including fishermen. Approximately 80 fishing tournaments are based at the park annually.

Commercial fishing in the Potomac River includes fishing, crabbing, oystering, and clamming. Commercial crabbing in the Potomac River accounted for 4.7 percent of the Maryland and Virginia harvest in 2001, 4.8 percent in 2002, 4.3 percent in 2003, 4.8% in 2004, and 7.5% in 2005 (Chesapeake Bay Commission, 2004; Chesapeake Bay Commission, 2005). More recent data is unavailable.

Recreation areas within NSF Indian Head include 1,150 acres of designated hunting areas, approximately 2 miles of shoreline fishing areas, and 1.5 miles of nature trails. Deer and turkey hunting is permitted on the property, but is limited to active military and NSF Indian Head employees by mission and security requirements (U.S. Department of the Navy, 2008).

Environmental Justice

The preceding sections describe how the Town of Indian Head has a higher distribution of persons of low income, minorities, and children compared with Charles County as a whole.

Proposed Action and Alternative Action

The proposed locations for the majority of the project elements under the Proposed Action and Alternative Action, including the primary nodal plants, main natural gas transmission and distribution lines for the primary nodal plants, secondary nodal plants, and UEM Building, as well as the demolition of the Goddard Power Plant and portions of excess steam lines are located in the interior of Cornwallis Neck. However, the regulator station is located in close proximity to the boundary with the Town of Indian Head. In addition, the proposed natural gas transmission line would run from Bryans Road through the Town of Indian Head.

No-Action Alternative

The facilities, infrastructure, and utility lines associated with the No-Action Alternative are located completely within NSF Indian Head in the interior of Cornwallis Neck.

3.7 Vegetation

Installation Background

The INRMP identifies three types of vegetative cover at NSF Indian Head: urban landscapes, forest communities, and wetlands (U.S. Department of the Navy, 2008). This section addresses urban landscapes and forest communities, while wetlands are discussed in Section 3.4.6. The vegetative communities at NSF Indian Head are shown in Figures B-15 and B-16 of Appendix B.

Urban Landscape

Urban landscape is defined as areas that have been created, maintained, or modified by human activities. Past and current activities can substantially affect the biological composition of the urban landscape community. Overall, NSF Indian Head has over 930 acres of urban landscape, including approximately 622 acres of maintained and landscaped areas, 300 acres of successional fields, grasslands, and roadsides, and 10 acres of wildlife food plots (Department of the Navy, 2008).

Forests

Forest communities at NSF Indian Head cover 1,738 acres or 48% of the land at NSF Indian Head (ERG, 2008b). These forests provide recreational opportunities, wildlife habitat, and natural water quality buffers. Although the forests in the northern portion of Cornwallis Neck are highly fragmented, there are several large undeveloped areas in Stump Neck and the southern portion of Cornwallis Neck that contain larger tracts of contiguous forest. Bird species classified as Forest Interior Dwellers (FIDs) require large tracts of relatively undisturbed forests to maintain viable populations (Critical Area Commission, 2000). Section 3.8 discusses forest wildlife habitat at NSF Indian Head.

The forest communities at NSF Indian Head include 98 acres of pine forest, 55 acres of mixed pine-hardwood forest, and 1,584 acres of hardwood (deciduous) forest (ERG, 2008b). Pine forests in the coastal plain are often indicative of an area that has recently been disturbed. The mixed pine-hardwood forest often develops as a transition between pine and hardwood dominated forests. Hardwood forests are considered the climax vegetational stage for the areas in the Atlantic Coastal Plain, including Charles County.

Rare, Threatened, and Endangered Species

A survey by the Maryland Natural Heritage Program in 1991-1992 identified rare plant species at the installation (MDNHP, 1993). In 2004 and 2006, the Navy completed additional surveys of the RT&E plant and invertebrate species that occur within the installation boundaries (U.S. Department of the Navy, 2006). The surveys identified a total of 21 rare plant species at NSF Indian Head, none of which are currently federally listed, and 5 of which have since been removed from the Maryland Department of Natural Resources (MDNR) list of Rare, Threatened, and Endangered Plants. The following three plant species found at NSF Indian Head are currently state-listed as threatened or endangered (U.S. Department of the Navy, 2008; Maryland Department of Natural Resources, 2010):

- Narrow melicgrass (*Melica mutica*)—threatened;
- Eastern arborvitae (*Thuja occidentalis*)—threatened; and
- Climbing cucumber (*Melothria pendula*)—endangered.

Chesapeake Bay Critical Area Act

The Critical Area (Section 3.4.4) provides habitat for wildlife and maintains water quality through sediment trapping, increased nutrient uptake, and immobilizing toxic substances (Chesapeake Bay Program, 1995). Recognizing these benefits, the Critical Area Act Criteria and the Charles County Chesapeake Bay Critical Area Program require that all forests within the Critical Area that are cleared or developed be replaced on not less than an equal area basis (COMAR 27.01.02.04; Charles County Department of Planning and Growth Management, 2001). Although land within 1,000 feet of the mean high water mark on federal lands is not designated as Critical Area, the Navy must demonstrate consistency with the CZMA for any activities in these areas with the potential to affect coastal resources. Consistency with the CZMA is demonstrated through the submission of a federal consistency determination to MDE. MDE may request the Critical Area Commission review consistency determinations to determine if mitigation is required for vegetation clearing within the 1,000-foot shoreline buffer.

Proposed Action

The majority of activities associated with the Proposed Action would occur within or adjacent to currently developed areas. As a result, the vegetation in most of the project areas is limited to urban landscape and small fragmented forests.

Primary Nodal Plants

The proposed location for Primary Nodal Plant #1 is mostly wooded, containing approximately 2.33 acres of deciduous forest with a dominant overstory of sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum)*, American beech (*Fagus* grandifolia), and yellow poplar (*Liriodendron tulipifera)* and 1.12 acres of urban landscape consisting mainly of grass. The forested area within the proposed location is part of a small fragmented forest surrounded by roadways and other development.

The new electrical line from Primary Nodal Plant #1 to the step-down substation near the Goddard Power Plant would run along roads and in utility rights-of-way containing urban landscape. Approximately 2,230 LF of the proposed location for the new electrical line is located within the 1,000-foot shoreline buffer.

The proposed location for Primary Nodal Plant #2 contains the facilities and infrastructure associated with the existing Steam B Plant. In addition, the site contains 1.15 acres of deciduous forest dominated by sweetgum, red maple, American beech, and yellow poplar and approximately 0.51 acres of urban landscape. Both of the proposed locations for the primary nodal plants are within the 1,000-foot shoreline buffer.

Vegetation within the rights-of-way for the existing steam distribution lines at NSF Indian Head, including the lines that would be upgraded under the Proposed Action, is generally limited to urban landscape. The rights-of-way are cleared on a regular basis to prevent the overgrowth of vegetation. However, the steam line that runs across the forested area north of the existing Steam B Plant crosses through a Flora Protection Area containing primrose willow (*Ludwigia decurrens*), which is listed as a rare species by MDNR (MDNR, 2010a). None of the other existing steam lines cross through any Flora Protection Areas.

Secondary Nodal Plants

The proposed locations for the nine secondary nodal plants are located in close proximity to existing development, including the buildings they would serve, and contain only urban landscape. However, the proposed locations of Secondary Nodal Plants #6 and 9 contain small areas of forest vegetation. The proposed locations for Secondary Nodal Plants # 5, 6, and 9 are also located within the 1,000-foot shoreline buffer.

With the exception of RO water and natural gas, all utility services required for the secondary nodal plants are located within the proposed location of the plants or across adjacent roadways. As a result, the proposed locations for the utility lines for the secondary nodal plants contain minimal vegetation. The proposed locations of the RO connections for Secondary Nodal Plants # 3 and 4 are located within the highly developed Goddard Power Plant area and thus contain no significant vegetation. The RO lines for Secondary Nodal Plant #7 would run along the rights-of-way for McMahon and Silo Roads, which contain grass and urban landscape. The proposed location of the RO connection for Secondary Nodal Plant #2 runs through two small forested fragments, including between Building 109 and 108A and between Building 1799 and the proposed location for the plant. The existing vegetation within the proposed locations of the new natural gas connections for the secondary nodal plants is discussed below under Natural Gas Lines.

Natural Gas Lines

The proposed location for the natural gas transmission line from Bryans Road to NSF Indian Head runs along the existing Route 210 right-of-way and Mattingly Avenue, which contain mainly urban landscape. Within NSF Indian Head, the proposed location of the transmission line also follows existing roadways, thus limiting existing vegetation to mainly urban landscape. However, in some areas of NSF Indian Head, the transmission line (including the required 20-foot right-of-way) would cut through the edge of forested areas. As a result, the proposed location from the main gate to Primary Nodal Plant #1 contains approximately 0.51 acres of deciduous forest. In addition, 3,150 LF of the proposed line is located within the 1,000-foot shoreline buffer.

The proposed locations for the natural gas distribution lines within NSF Indian Head serving Primary Nodal Plant #2, the nine secondary nodal plants, and the UEM Building run mainly along existing roads, utility rights-of-way, or railroad tracks, which also contain mainly urban landscape. However, in some areas the proposed locations of the distribution lines run through small forest fragments or the edge of forested areas found along the roadways and rights-of-way. Overall, the proposed locations of the natural gas distribution lines contain approximately 0.5 acres of forested area. In addition, approximately 4,770 LF of the gas lines would be located within the 1,000-foot shoreline buffer.

The proposed location for the gas regulator station is near the highly developed main gate for NSF Indian Head. As a result, the site contains only approximately 0.19 acres of urban landscape.

UEM Building

The proposed location for the UEM Building is currently developed, containing mainly impervious surface and only minimal urban landscape.

Goddard Power Plant

The existing Goddard Power Plant and its supporting facilities are located in an area with minimal urban landscape. However, several small fragments of deciduous forest are found adjacent to the

coal pile and to the south and east of the power plant. These forest fragments are dominated by sweetgum, red maple, American beech, and yellow poplar. The coal yard and several of the buildings which support the Goddard Power Plant are located within the 1,000-foot shoreline buffer.

Alternative Action

Many of the proposed locations for the project elements under the Alternative Action are the same as under the Proposed Action, including the two primary nodal plants, the natural gas transmission line, the gas distribution line to Primary Noda l Plant #2, and the UEM Building, as well as the existing Goddard Power Plant and steam lines. The vegetation in and around these sites is discussed above under the Proposed Action. However, the footprint of the primary nodal plants would be larger under the Alternative Action. As a result, the proposed location for Primary Nodal Plant #1 under the Alternative Action contains an additional 0.69 acres of deciduous forest as compared to the Proposed Action. The proposed location for Primary Nodal Plant #2 contains an additional 1.54 acres of urban landscape and 0.57 acres of deciduous forest as compared to the Proposed Action. In addition, secondary nodal plants would not be constructed under the Alternative Action; therefore, natural gas distribution lines to the secondary nodal plants would not be required. Thus no additional vegetation would be affected by these project elements under the Alternative Action. The existing vegetation within the proposed locations for the Alternative Action is shown in Figures B-15 and B-16 of Appendix B.

No-Action Alternative

The vegetation surrounding the facilities and infrastructure associated with the existing steam generation and distribution systems at NSF Indian Head, including the Goddard Power Plant, Steam B Plant, and the steam distribution lines, is discussed above under the Proposed Action.

3.8 Fish and Wildlife

Three federal laws, the Endangered Species Act of 1973, the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act all affect the mission of NSF Indian Head and the supported commands.

The Endangered Species Act (ESA) affords flora and fauna species in danger of extinction federal protection. This act requires federal agencies to ensure that their actions and those of their contractors will not jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of the critical habitat associated with these species. Under the ESA, any federal action that may affect a threatened or endangered species requires consultation with the U. S. Fish & Wildlife Service (USFWS) or the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries).

Installation Background

OPNAV 5090.1C requires that NSF Indian Head develop an Integrated Natural Resource Management Plan (INRMP) to manage fish and wildlife resources in a manner that supports the various missions at NSF Indian Head (U.S. Department of the Navy, 2008). An overview of the fish and wildlife resources at NSF Indian Head and the requirements of the INRMP is provided below.

Fish

NSF Indian Head is located on the banks of the tidally-influenced Potomac River and two of its tributaries, the Mattawoman Creek and the Chicamuxen Creek. The Potomac River, Mattawoman Creek, and Chicamuxen Creek provide spawning and nursery habitat for at least 33 species of local and regional fish, including several anadromous and semi-anadromous and catadromous species[7]. In addition, the Mattawoman Creek is home to several freshwater species of gamefish (U.S. Department of the Navy, 2004).

Areas of submerged aquatic vegetation (SAV) have been found in the Potomac River, Mattawoman Creek, and Chicamuxen Creek. SAV fulfills many important ecological roles including serving as spawning grounds and nurseries for fish and benthic species and as a valuable food source for waterfowl. SAV is abundant in the Mattawoman Creek and SAV species identified include coontail (*Ceratophyllum demersum*), spiny naiad (*Najas marina*), and hydrilla (*Hydrilla verticillata*).

Wildlife

The diverse collection of ecological communities at NSF Indian Head offers exceptional wildlife habitat. This habitat is becoming increasingly valuable due to recent increases in residential and commercial development in the areas surrounding the base.

The Maryland Natural Heritage Program (NHP), in conjunction with supporting monitoring and inventory activities, has identified 256 different fauna species at NSF Indian Head. Based on these surveys and monitoring activities, an estimated 103 insect species, 33 mammalian species, 18 reptilian species, 23 amphibian species, and 176 avian species inhabit NSF Indian Head (U.S.

[7] Anadromous fish spend most of their adult lives in saltier water, but return each year to spawn in freshwater. Catadromous species live in freshwater and return to the ocean to spawn. Semi-anadromous species live in fresh to brackish waters of the Chesapeake Bay and migrate to upstream freshwater to spawn (USFWS Chesapeake Bay Field Office, 2009).

Department of the Navy, 2008; Maryland Natural Heritage Program, 1993; and NSF Indian Head Environmental Office, 2007).

The 16.5 miles of shoreline at NSF Indian Head surrounded by the Potomac River, Mattawoman Creek, and Chicamuxen Creek provide excellent habitat for waterfowl. The Mattawoman Creek, in particular, is host to an abundant population of over-wintering waterfowl, such as the mallard (*Anas platyrhynchos*), American black duck (*Anas rubripes*), and wood duck (*Aix sponsa*) (U.S. Department of the Navy, 2004).

Species of Special Concern

Two state-listed RT&E species have been identified on the installation, including a marsh bird known as the least bittern (*Ixobrychus exilis*) and a butterfly known as the frosted elfin (*Incisalia irus*) (Maryland Natural Heritage Program, 1993; NSF Indian Head Environmental Office, 2007; and MDNR, 2010b). These state-listed species are not afforded federal protection; however, the Navy protects these species from impacts whenever possible through implementation of the NSF Indian Head INRMP and environmental planning. NSF Indian Head also supports breeding and migrating populations of the recently state and federally de-listed bald eagle. Additionally, several birds known to be FID species have been observed in the larger hardwood forest fragments at the base (NSF Indian Head Environmental Office, 2007).

The INRMP identifies areas of ecological significance, or species protection areas, at NSF Indian Head that have the potential to contribute to the long-term protection of rare species at the base. General land use management guidelines have been established for these species protection areas and development within these areas is avoided whenever possible. Of the wildlife species of special concern on the base, the bald eagle is the species most likely to be impacted by current and planned activities. Bald eagle management practices at NSF Indian Head are discussed in detail below.

Bald Eagles

Bald eagles are known to nest at NSF Indian Head since at least 1989. Between 1989 and 2011, the number of nests documented at NSF Indian Head has increased from one to the current number of sixteen, seven of which were active during the 2010-2011 nesting season. Eagles will nest near the shoreline and build nests in the upper canopy of large trees. NSF Indian Head is also host to a large bald eagle roost area (approximately four acres) along the Stump Neck property boundary. In addition, foraging areas are located on the north end of Cornwallis Neck adjacent to the Town of Indian Head and along much of the shorelines of both Cornwallis Neck and Stump Neck.

Effective August 8, 2007, the bald eagle was delisted from the ESA. The bald eagle is also no longer listed as a state threatened species in Maryland (MDNR, 2010b). However, the bald eagle continues to be protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, both of which applied prior to the bald eagle's listing under the ESA.

A number of bald eagle mortalities have been documented at NSF Indian Head in recent years. Most of these mortalities were the result of in-flight collisions with overhead utility lines or electrocutions due to the power line infrastructure (e.g., insufficient power line spacing and exposed phases). As a result, the Navy entered into a formal consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the ESA in February 2007, resulting in the issuance of a Biological Opinion (BO) on August 2, 2007. The BO specifies the terms and conditions that the Navy must follow to avoid violation of the ESA.

Under the terms of the BO, the Navy must continue to implement the protection measures described in the Raptor Electrocution Prevention Study (REPS) and the Bald Eagle Management Plan (BEMP), which were developed by the Navy in 2005 and 2006, respectively. The BEMP was revised in 2010 to reflect the current status of the bald eagle and issues at NSF Indian Head. The REPS recommends modifications to the power line infrastructure (e.g., phase covers, increased line spacing, perch guards, and flight diverters) to alleviate the risk of electrocution to bald eagles and other raptors. In accordance with the BEMP, NSF Indian Head maintains protection zones around new and existing bald eagle nests. These protection zones remain in effect while the nest is active and for three consecutive nesting seasons after the last season in which the nest was occupied. The PZ1 protection zone (defined below), which applies to construction activities, extends from the nest to a radius of 750 feet. Activities that were routinely conducted at the time the nest was established are permitted within PZ1. However, NSF Indian Head must consult with USFWS if a proposed action involves any of the following:

- Potential to directly result in the take, harm, or harassment of an individual eagle;
- Activities within 750 feet of an active nest (PZ1) that were not routinely conducted at the time the nest was established and will occur during the bald eagle nesting season (December 15 through June 15); or,
- Permanent changes to the landscape within 750 feet of a nest (PZ1) (NSF Indian Head, Environmental Office, 2010a).

On August 14, 2008, USFWS published a Federal Register Notice for the draft environmental assessment of a proposed permit program intended to protect bald and golden eagles, while providing the flexibility necessary for individuals to manage their lands and businesses. On November 26, 2008, in accordance with the process outlined in the Federal Register Notice, the Navy submitted a letter to the USFWS Regional Office requesting that the current BO Incidental Take Statement be transitioned from coverage under the ESA to the Bald and Golden Eagle Protection Act (BGEPA). On March 10, 2011, USFWS responded that it will extend Incidental Take Statement coverage through the CFR 22.28 Eagle Permit, which extends coverage of the BO under the BGEPA and provides for revision of the Incidental Take Statement. USFWS also expressed a desire to move toward a programmatic take permit. The Navy will take further action once USFWS finalizes this approach.

Proposed Action

The activities associated with the Proposed Action would occur mostly within or adjacent to currently developed areas. As a result, the wildlife habitat within the project areas is mostly limited to urban landscape and small forest fragments. However, some of the project areas are located within eagle protection zones. The wildlife resources within the vicinity of the project areas under the Proposed Action are discussed in more detail below and shown in Figures B-15 and B-16 of Appendix B.

Primary Nodal Plants

The proposed location for Primary Nodal Plant #1 contains approximately 2.33 acres of deciduous forest that provides some habitat for forest-dwelling species. As shown in Figure B-15 in Appendix B, the affected forest is surrounded by roadways and other development and is too small to support the breeding populations of FIDs or other sensitive forest-dwelling species. However, FIDs may use the forest for foraging or as part of a migratory route. The remainder of the vegetation within the proposed location of Primary Nodal Plant #1 consists of urban landscape, which provides limited

wildlife habitat. The proposed location for the new electrical line from Primary Nodal Plant #1 to the step-down substation near the Goddard Power Plant runs along existing roads and utility rights-of-way containing minimal wildlife habitat.

The proposed location for Primary Nodal Plant #2 contains the facilities and infrastructure associated with the existing Steam B Plant. In addition, the northern portion of the site contains 1.15 acres of deciduous forest. This forested area is part of a larger forest fragment, which, due to its size and proximity to the Potomac River, provides some of the higher quality wildlife habitat on Cornwallis Neck.

The rights-of-way for the existing steam distribution lines at NSF Indian Head generally contain gravel, pavement or urban landscape; thus providing minimal wildlife habitat. Neither the buildings that would be supported by the primary nodal plants nor the associated steam lines that would be upgraded under the Proposed Action are located within eagle protection zones.

Secondary Nodal Plants

The proposed locations for the secondary nodal plants are located in close proximity to existing development, including the buildings they would serve. Thus most of the proposed locations for the plants are in previously developed areas consisting of existing pavement or poor quality urban landscape providing minimal wildlife habitat. However, the proposed locations for Secondary Nodal Plants # 6 and 9 both contain small areas of forest vegetation that may provide habitat for some forest dwelling species. The affected forest fragments in both of these areas are less than 0.25 acres and are not sufficient to support breeding populations of FIDs or other sensitive forest-dwelling species.

With the exception of RO water and natural gas lines, all utility services required for the secondary nodal plants are currently located within the proposed location of the plants or across adjacent roadways. As a result, the proposed locations for the utility connections for the secondary nodal plants contain minimal wildlife habitat. The proposed location of the RO connection for Secondary Nodal Plant #2 runs through two small forest fragments, which are surrounded by development and crossed by existing utilities, providing only poor quality edge habitat.

Several activities associated with the Secondary Nodal Plants would occur within eagle protection zones. The proposed location for Secondary Nodal Plant #5 is within the protection zone for the Building 436 eagle nest. A total of 2,760 LF of steam lines that would be demolished or capped and left in place by the Proposed Action are located within the protection zones for the Building 436, Extrusion, Biazzi and Burn Point eagle nests. In addition, a total of approximately 17,295 LF of the existing steam lines that would remain to support the Secondary Nodal Plants are located within the protection zones for the Building 436, Extrusion, Biazzi, Greenslade, Burn Point and Large Motor Test eagle nests.

Natural Gas Lines

The proposed location for the natural gas transmission line from Bryans Road to NSF Indian Head contains mainly urban landscape providing minimal wildlife habitat. The Navy requested information from both USFWS and MDNR regarding any RT&E species habitat found within the proposed location for the transmission line. USFWS indicated that except for occasional transient individuals, no federally proposed or listed endangered or threatened species are known to exist within the proposed location. MDNR noted that the proposed location for the transmission line is within the headwaters of the Mattawoman Creek, which is known to support numerous rare, threatened, and endangered species. However, no known state-listed rare, threatened, or

endangered species were identified within the limits of the proposed location for the transmission line. Correspondence with USFWS and MDNR is provided in Appendix E.

The proposed location of the natural gas transmission line from the main gate to Primary Nodal Plant #1 contains approximately 0.51 acres of forested area. The proposed locations for the natural gas distribution lines serving Primary Nodal Plant #2, the nine secondary nodal plants, and the UEM Building contain an additional 0.50 acres of forested area. These forested areas provide habitat for a variety of forest-dwelling species. Although FIDs may use these areas for foraging or as part of migratory routes, the forest fragments which they are part of are too small to support the breeding populations of FIDs or other sensitive species. Approximately 1,776 LF of the natural gas distribution line for Secondary Nodal Plant #5 is located within the protection zone for the Building 436 eagle nest.

The proposed location for the gas regulator station near the main gate contains only urban landscape providing minimal wildlife habitat.

UEM Building

The proposed location for the UEM Building is currently developed, containing mainly impervious surface and only minimal urban landscape. As such, the site provides minimal wildlife habitat.

Goddard Power Plant

The existing Goddard Power Plant and its supporting facilities, including the coal pile, are adjacent to several small fragments of deciduous forest that provide minimal wildlife habitat.

Alternative Action

Many of the proposed locations for the project elements under the Alternative Action are the same as under the Proposed Action, including the two primary nodal plants, the natural gas transmission line, the natural gas distribution line to Primary Nodal Plant #2, and the UEM Building, as well as the existing Goddard Power Plant and steam lines. The wildlife habitat affected by these project elements is discussed above under the Proposed Action. However, the footprint of the nodal plants would be larger under the Alternative Action. As a result, the proposed locations for Primary Nodal Plants #1 and #2 under the Alternative Action contain an additional 0.69 and 0.57 acres of forest habitat as compared to the Proposed Action, respectively. Secondary nodal plants would not be constructed under the Alternative Action and therefore, natural gas distribution lines to secondary nodal plants would not be required. Thus no wildlife habitat would be affected by these project elements under the Alternative Action. The locations of the eagle protection zones and species protection areas in the vicinity of the project elements under the Alternative Action are shown in Figures B-15 and B-16 of Appendix B.

No-Action Alternative

The wildlife habitat and resources in the areas surrounding the facilities and infrastructure associated with the existing steam generation and distribution systems at NSF Indian Head, including the Goddard Power Plant, Steam B Plant, and the steam distribution lines, is discussed above under the Proposed Action.

3.9 Cultural and Historic Resources

To ensure the protection of cultural resources, the National Historic Preservation Act (NHPA) was created by the U.S. Congress in 1966 and amended three times: in 1976, 1980, and 1992. Section 106 of the NHPA requires federal agencies to consider the effects of undertakings (i.e., actions) on any district, site, building, structure, or object that is included or eligible for inclusion in the National Register of Historic Places (the National Register), and to afford the NHPA-established Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings. An adverse effect is anything that could alter the historic fabric (i.e., characteristics) that makes the property eligible. Examples of adverse effects include changes to the property or alterations to landscape, noise levels, visual characteristics, traffic patterns, or land use near the property.

The NHPA also authorized the creation of a SHPO for each state. The SHPO participates in statewide historic preservation planning and surveying activities; nominates properties for the National Register; provides advice, assistance, training, and public outreach; and participates in Section 106 undertaking reviews. In Maryland, the Maryland Historical Trust (MHT, a division of the Maryland Department of Planning) serves as the SHPO.

Additionally, the Maryland Historical Trust administers its own program for properties that are of significance to American history and culture. The Maryland Register of Historic Places (the Maryland Register) includes all properties from the National Register that are located in Maryland, plus additional properties that are considered significant in Maryland history and culture. Properties listed in the Maryland Register are afforded certain regulatory protections.

A draft Integrated Cultural Resources Management Plan (ICRMP) was prepared for NSF Indian Head in 1998. The purpose of the ICRMP is to provide procedural guidance for identifying, evaluating, nominating, and managing historic properties located at the installation. The Navy is currently in the process of executing historic architectural surveys to update its inventory of cultural resources at NSF Indian Head, and will revise the draft ICRMP once this inventory is complete.

The cultural and historic resources present at NSF Indian Head can be divided into two categories: architectural resources and archeological resources. These two categories are discussed in the following subsections.

3.9.1 Architectural Resources

Installation Background

The Navy has completed historic architectural surveys and determinations of eligibility for 1,091 buildings and structures at NSF Indian Head. These surveys identified three structures – the Nitration Building at the Biazzi Plant (Building 786), the White Plains Railroad, and the proposed "Moon Bounce" Facility – as being individually eligible for listing on the National Register. These surveys also identified four historic districts as being eligible for listing on the National Register, as well as a total of 287 buildings (261 of which are still standing) that should be considered eligible for listing on the National Register as "contributing elements" to their respective district. Such buildings retain sufficient historic integrity and are associated with the historically significant qualities of the district. Other buildings, such as those that have been extensively renovated or were constructed after a district's period of significance, are not considered contributing elements. None of the eligible structures at NSF Indian Head have had the associated documentation submitted to the National Park Service for formal listing on the National Register.

The four historic districts at NSF Indian Head are described below.

- **Indian Head Residential Historic District (CH-490).** The Indian Head Residential Historic District occupies approximately 150 acres on both sides of Strauss and Dashiell Avenues and includes the main residential area of the installation, as well as the former golf course and several community-oriented buildings. This historic district is considered historically significant because it represents the evolution of military housing over two major periods of installation expansion from 1890 to 1945 (R. Christopher Goodwin and Associates, 1998a).

- **Naval Powder Factory Historic District (CH-491).** The Naval Powder Factory Historic District consists of approximately 370 acres in the easternmost section of Cornwallis Neck. The district is considered historically significant as the first major chemical factory operated by the Navy and an important supplier of smokeless powder during World Wars I and II. Research and development conducted in these facilities contributed significantly to the development of more efficient manufacturing processes and new armament technology. Its period of significance spans from 1900 to 1945 (R. Christopher Goodwin and Associates, 1998a).

- **Naval Proving Ground Historic District (CH-492).** The Naval Proving Ground Historic District consists of approximately 23 acres flanking Torrens Road in the northern section of Cornwallis Neck, along the Potomac River. The district is considered historically significant as the original location of the proof work for weapons manufactured at the Washington Navy Yard and for its later role in testing smokeless powder manufactured at the nearby Single Base Line. The Naval Proving Ground Historic District is also significant for its distinctive design; the landscape and the buildings in the proving ground were designed specifically for testing weaponry. The period of significance for this district spans from 1890, when the proving ground was established, to 1921, when proofing activities were transferred to Dahlgren, Virginia (R. Christopher Goodwin and Associates, 1998a).

- **Extrusion Plant Historic District (CH-493).** The Extrusion Plant Historic District encompasses both the Extrusion Plant and the Ballistic Laboratory (now the Small Motor Test area), which are situated along the southern edge of Cornwallis Neck facing Mattawoman Creek. It is considered historically significant as the first full-scale rocket propellant production facility operated by and for the Navy and its unique building layout. The buildings comprising the plant were built into a hillside in a terraced manner and form a semicircular configuration. The period of significance for the Extrusion Plant spans from 1943, when the plant was established, to 1946 (R. Christopher Goodwin and Associates, 1998a).

The United States Army Corps of Engineers (USACE) has submitted a draft architectural survey to update the inventory of historic buildings at NSF Indian Head. As part of the draft findings, USACE has recommended two additional historic districts for listing on the National Register, as described below.

- **Polaris Propellant Test Facility Historic District.** The proposed Polaris Propellant Test Facility Historic District encompasses approximately 26 buildings and structures off of Bronson Road, near the center of Cornwallis Neck. This complex is being proposed as historically significant due to its association with the development of the Polaris missile, the Navy's first ballistic missile. The Polaris

Plant was established in 1960 to produce the high-energy casting powder for A2 and A3 second-stage Polaris missiles.

- **Operation Moon Bounce Historic District.** The proposed Operation Moon Bounce Historic District encompasses the site of an in-ground parabolic antenna at the Stump Neck Annex. The antenna supported the Navy's efforts in the 1950s to develop a telecommunications system that used the moon as a natural communications satellite. The results of this program supported the eventual development of the Navy's artificial satellite communication system (USACE, 2010).

The Navy has reviewed USACE's draft findings and submitted Determination of Eligibility (DOE) forms to SHPO for review. The railroad system within NSF Indian Head, the steam distribution system, and Building 873 at the Goddard Power Plant were also determined by SHPO to be individually eligible for the National Register. Furthermore, Buildings 770 and 1364 at the Goddard Power Plant, though not individually distinguished, when grouped with Building 873, contribute to a significant and distinguishable entity, and therefore were determined by SHPO to be eligible for the National Register. The Navy is preparing a report to document the history and use of the railroad track system within the Installation dating back to the early 1890s and expanded through the different eras of the Installation's development.

In September 2010, the Navy finalized an MOA with SHPO to address various short-term demolition projects at NSF Indian Head that will affect historic buildings. Under the MOA, the Navy will prepare Historic American Engineering Record (HAER) documentation of the Naval Powder Factory and Extrusion Plant Historic Districts and associated historic buildings.

Proposed Action

The Proposed Action would involve construction, demolition, and renovation activities within and adjacent to the four historic districts at NSF Indian Head as well as the proposed Polaris Propellant Test Facility Historic District and railroad tracks.

Primary Nodal Steam Plants

The proposed locations for the primary nodal steam plants under the Proposed Action are not located within or directly adjacent to any existing historic districts (Goodwin, 2005). The proposed location for Primary Nodal Plant #2 includes part of the NSF Indian Head railroad system.

The Proposed Action would also upgrade some of the existing steam lines that would be used by the two primary nodal plants, but this work would not occur within any historic districts. The primary nodal plants would support Building 786, a nitration house that is individually eligible for the National Register (Goodwin, 2005).

Secondary Nodal Plants

The secondary nodal plants and their associated utility connections would be located throughout Cornwallis Neck, including the Indian Head Residential, Naval Powder Factory, and Naval Extrusion Plant Historic Districts, and the proposed Polaris Propellant Test Facility Historic District.

Natural Gas Lines

The proposed route of the natural gas transmission line between Bryans Road and NSF Indian Head would run mostly along Route 210 (except for a short stretch along Mattingly Avenue), which is

approximately 1,250 feet from the entrance to Chapman State Park. This state park consists mostly of Mount Aventine, the historic plantation on which the prominent Chapman family lived for over 150 years (Maryland Historical Trust). The main house at Mount Aventine sits approximately 3,000 feet from Route 210. Mount Aventine is the only site between Bryans Road and NSF Indian Head that is listed on the National Register.

There are seven properties listed on the Maryland Register that are within 1,500 feet of the proposed natural gas transmission line between Bryans Road and NSF Indian Head. These include St. Charles Roman Catholic Church, site (CH25), Edward Pye's Grave (CH175), Knott House (CH319), Thomas Brown Dwelling (CH377), Robert and Louise Boykin House (CH499), Glymont School (CH504), and Kabin-on-a-Korner Tavern (CH525) (Maryland Historical Trust. 2011b). Washington Gas will consult with SHPO to identify any other historic properties within the area of potential effect of the natural gas transmission line construction outside NSF Indian Head.

The proposed location of the natural gas transmission line to Primary Nodal Plant #1 within the NSF Indian Head boundary would run through the Naval Powder Factory and Indian Head Residential Historic Districts. However, the proposed location is not within 100 feet of any of the contributing elements to these districts and will follow existing roadways and utility corridors. The natural gas transmission line and regulator station would be located within some areas containing railroad tracks once used as part of the NSF Indian Head railroad system. The proposed location of the natural gas distribution line for Primary Nodal Plant #2 is not located within any historic districts.

The proposed locations of the natural gas distribution lines for the secondary nodal plants are within the Indian Head Residential, Naval Powder Factory, Naval Extrusion Plant, and the proposed Polaris Propellant Test Facility Historic Districts. Some of the proposed locations of the gas distribution lines are also within existing railroad tracks.

UEM Building

The proposed location of the UEM Building is adjacent to the Indian Head Residential Historic District, including the historic residences on Pickens Lane (Buildings D2, D6, D7, and D8) and their associated garages (D2D, D6B, and D7A). All four residences are currently vacant. The proposed location of the UEM Building is also located approximately 400 feet from the Naval Proving Grounds Historic District and adjacent to other areas of the Indian Head Residential Historic District. Depending on the final site plan, the area of potential effect for the UEM Building is likely to include portions of these districts.

Goddard Power Plant

Goddard Power Plant and its supporting facilities include a total of 16 buildings. Three of these buildings (770, 873, and 1364) were determined by SHPO to be eligible for listing on the National Register. Four of the remaining thirteen buildings (768, 771, 776, and 1712) are more than 50 years old, but have been determined to be not eligible for the National Register through consultation with SHPO (Goodwin, 2003 and Goodwin, 2005). Building 899, the Well-Water Pump House, is located within the Naval Powder Factory Historic District. However, SHPO concurred with the Navy's determination that Building 899 is not a contributing element to the district (Milner, 1995). The remaining Goddard Power Plant facilities are neither potentially historic nor located within a historic district.

Alternative Action

The scope of the Alternative Action is similar to that of the Proposed Action, and would therefore affect the same buildings and historic districts.

No-Action Alternative

The architectural resources associated with the existing steam generation and distribution facilities and infrastructure at NSF Indian Head, including the Goddard Power Plant, Steam B Plant, and steam distribution lines, are discussed above under the Proposed and Alternative Actions.

3.9.2 Archeological Resources

Installation Background

A preliminary archeological reconnaissance survey was performed at NSF Indian Head in 1985. Since then, several Phase I archeological surveys have been performed, covering portions of Cornwallis Neck and the entirety of Stump Neck. A Phase I survey is an examination conducted by a qualified professional in sufficient detail to make generalizations about type and distribution of archeological properties that may be present. The Navy performs Phase I surveys of any areas that may be disturbed by construction, renovation, decontamination, or demolition activities and have not been previously disturbed or surveyed. Additionally, and as funds become available, the Navy performs Phase I surveys of areas that are believed to have high potential for archeological resources. In areas where a Phase I survey has identified potentially significant archeological resources, the Navy may perform a more in-depth Phase II survey. A Phase II survey is a systematic, detailed examination designed to gather sufficient information about the property's historic context and cultural significance to determine the site's eligibility for the National Register. All survey work is carried out by a qualified professional archeologist and performed in accordance with the Standards and Guidelines for Archeological Investigations in Maryland (Shaffer and Cole, 1994).

Phase I surveys have resulted in the identification of 116 archeological sites within the boundaries of NSF Indian Head. After consultation with SHPO, 6 of these sites have been determined to be eligible for listing on the National Register, 56 have been determined to be ineligible, and 54 require additional surveys for a determination to be made. The Navy does not submit eligible sites for formal listing on the National Register, but treats those sites as though they were listed by consulting with SHPO on undertakings that may affect those resources.

Predictive archeological models for NSF Indian Head were developed in 1997 by R. Christopher Goodwin & Associates, Inc. and in 2009 by Louis Berger Group, Inc. in order to identify areas with low and high potential for archeological resources. These models are used for planning facilities and mission needs and provide guidance in determining site locations. The Navy considers the results of both predictive models when determining whether an undertaking has the potential to disturb areas with high potential for archeological resources.

Proposed Action and No-Action Alternative

The activities associated with the Proposed Action would occur mostly within or adjacent to currently developed areas. Therefore, many of the proposed locations have been previously disturbed by the construction of the existing facilities, pavements, or utility lines. As a result, any archeological resources that may have been present were likely disturbed. Phase I surveys performed in February 2012 recovered no historic or prehistoric artifacts and resulted in a

recommendation that no further archeological surveys are warranted in any of the areas affected by the Proposed Action.

Potential archeological resources within the proposed locations for the primary and secondary nodal plants, natural gas lines, UEM Building, and Goddard Power Plant demolition under the Proposed Action are identified in Table 3-11 and discussed below.

Primary Nodal Steam Plants

The proposed locations for Primary Nodal Plants #1 and 2 were identified by both predictive models as having a high potential to contain archeological resources. However, Phase I surveys performed in February 2012 resulted in a recommendation that these sites be determined not eligible. Most of the proposed location of Primary Nodal Plant #2 has been previously disturbed. Archeological site 18CH260, located approximately 60 feet south of the proposed Primary Nodal Plant #2 site, will be avoided and therefore no further action is required.

The existing steam lines that would be upgraded and repaired under the Proposed Action for use by the two primary nodal plants run through three previously identified archeological sites (Table 3-12). Additionally, the steam lines that would support the primary nodal steam plants are located in several areas identified as having a high potential to contain archeological resources.

The electric transmission line from Primary Nodal Plant #1 to the substation at the Goddard Power Plant would be located within approximately 30 feet of two previously identified archeological sites (18CH283 and 18CH284). Site 18CH284 has been determined not eligible for the National Register, while 18CH283 requires further survey to determine eligibility (Barse, 1985).

Table 3-11. Archeological Sites in the Vicinity of the Proposed and Alternative Actions

Archeological Site	Subtype	Eligibility	Further Work	Approximate Distance (ft)
Primary Nodal Plants				
18CH260	Historic	Unknown	Further Phase I	60
Secondary Nodal Plants				
18CH672	Prehistoric	Unknown	Phase II	10
Existing Steam Lines to be Demolished/Capped and Left in Place				
18CH258	Prehistoric	Unknown	Further Phase I	100
18CH274	Prehistoric	Unknown	Further Phase I	0
18CH275	Prehistoric	Unknown	Further Phase I	0
18CH276	Prehistoric	Unknown	Further Phase I	0
18CH281	Prehistoric	Eligible	No Disturbance	0
18CH282	Prehistoric	Eligible	No Disturbance	0
18CH386	Historic	Eligible	No Disturbance	80
18CH672	Prehistoric	Unknown	Phase II	30
18CH716	Historic	Unknown	Phase I	75
Natural Gas Distribution Lines				
18CH275	Prehistoric	Unknown	Further Phase I	50
18CH276	Prehistoric	Unknown	Phase II	0
18CH672	Prehistoric	Unknown	Phase II	10
Electric Transmission Line				

Table 3-11. Archeological Sites in the Vicinity of the Proposed and Alternative Actions

Archeological Site	Subtype	Eligibility	Further Work	Approximate Distance (ft)
18CH283	Prehistoric	Unknown	Further Phase I	30
UEM Building				
None				
Goddard Power Plant				
None				

Secondary Nodal Plants

Installation of new utilities (e.g., natural gas, river water) would be required to support some of the secondary nodal plants. The proposed location of Secondary Nodal Plant #9 is directly adjacent to archeological site 18CH672, a site of unknown eligibility requiring further survey. The proposed locations of Secondary Nodal Plants #1, 2, 5, and 7, and 8, and their associated utilities are within areas identified as having a high potential for containing archeological resources.

The steam lines that would not be used by the primary nodal plants or secondary nodal plants would be demolished or capped and left in place as part of the Proposed Action (Table 3-11). These lines run through three previously identified archeological sites, two of which require further surveys to determine if any significant archeological resources are present (Barse, 1985, and Jefferson Patterson Park and Museum, 1999). Additionally, these steam lines are located in several areas identified in predictive models as having a high potential to contain archeological resources.

Natural Gas Lines

The proposed route of the natural gas transmission line from Bryans Road to NSF Indian Head would not run through any identified sites that are listed on the Maryland Register. The proposed location of the natural gas transmission line within NSF Indian Head follows existing roadways where no eligible sites are present (Goodwin, 2000). Based on two predictive models, several areas along the proposed route of the gas transmission line within NSF Indian Head have a high potential for archeological resources. The proposed regulator station is also in an area that has high potential to contain archeological resources.

Three previously identified archeological sites are located within the path of the proposed natural gas distribution lines and four additional sites within 100 feet of the proposed natural gas lines (Table 3-12). The eligibility of archeological sites 18CH275, 18CH276, and 18CH672 has not yet been determined. All other sites are not eligible for the National Register. Natural gas distribution lines are also located within areas identified as having a high potential for archeological resources.

UEM Building

Phase I surveys performed in February 2012 identified one previously unrecorded archeological site within the proposed location of the UEM Building – Site 18CH819. The survey determined that Site 18CH819 does not represent a historic property and no further archeological investigation was recommended.

Goddard Power Plant

The buildings within the Goddard Power Plant that would be demolished under the Proposed Action are not located within or near any sites containing known archeological resources.

Alternative Action

The scope of the Alternative Action is similar to that under the Proposed Action, and would occur in many of the same locations. However, the Alternative Action would not involve the installation of secondary nodal plants or the associated utility lines. While the footprint of the primary nodal plants would be larger under the Alternative Action, the archeological resources in these expanded areas are the same as described under the Proposed Action. The Alternative Action would also affect the same existing steam lines as the Proposed Action. However, instead of demolishing portions of excess steam lines, the Alternative Action would repair and upgrade these lines.

3.10 Geology and Soils

The geology of an area encompasses characteristic rocks, sediments, and land features and the forces affecting them. Soils are important because of the significant functions they perform, including the following:

- Sustaining biological activity, diversity, and productivity;
- Regulating and partitioning water and solute flow (e.g., sediment);
- Filtering, buffering, degrading, immobilizing, and detoxifying organic and inorganic materials;
- Storing and cycling nutrients and other elements; and
- Supporting socioeconomic structures (USDA Natural Resources Conservation Service, 2007).

An assessment of the geologic and soil resources in an area can provide insight into environmental impacts of potential actions on that area and its surroundings. Alterations to the physical makeup of an area, including soil, rocks, or faults, can lead to soil contamination, soil erosion, and detrimental impacts on water bodies in or near the area. Unfavorable geologic and soil characteristics could make the development of an area impractical (Freeze & Cherry, 1979). Soils are classified by a complex taxonomy that includes soil associations, series, and phases (USDA Soil Conservation Service, 1974).

The physical characteristics of soils and the impact of potentially contaminated soils can affect the suitability of the site for development and dictate the types of precautionary measures that should be implemented to minimize impacts to human health and the environment during earth disturbance. Various physical characteristics of soils make specific soil types more susceptible to high water erosion rates, windthrow hazards, and emissions of particulate matter and therefore require the establishment of mitigation and precautionary measures. Contaminated soils can also present risks to human health, safety, or the environment when disturbed. Prior to conducting activities in areas known to exhibit contamination, it is important to understand the associated risks of the area to implement necessary remediation efforts or soil management measures to ensure the safety of workers and the surrounding environment.

Installation Background

The geology of NSF Indian Head consists mostly of gravel, sand, silt, and clay deposits from the Appalachian and Piedmont region (Chesapeake Division NAVFAC, 1990). The soils at NSF Indian Head were identified and classified in the Soil Survey of Charles County, Maryland issued by the U.S. Department of Agriculture's Soils Conservation Service in 1974 and updated in 2008 (United States Department of Agriculture Soil Conservation Service, 2008). Four dominant soil associations are found at NSF Indian Head: Beltsville-Gravelly Land-Bourne Association, Beltsville-Exum-Wickham Association, Evesboro-Keyport-Elkton Association, and Bibb-Tidal Marsh-Swamp Association.

The soil surveys of Cornwallis Neck identified detailed soil map units and provide descriptions of the soil associations. Soil phases affected by the Proposed Action are shown in Figures B-19 and B-20 in Appendix B (U.S. Department of the Navy, 2008).

Soil Characteristics

Soil characteristics are important to consider when developing new areas or conducting activities that require large amounts of earth disturbance. The wind erodibility, erosion potential, and hydraulic conductivity of a soil type can serve as indicators of how the soil may respond to earth disturbance or new development and may also help to predict how soil types will impact surrounding areas and resources.

Contaminated Soils

In addition to evaluating soil characteristic, any soils with hazardous or explosives contamination must be identified to allow for proper management and handling. Approximately 61.7% of the land at NSF Indian Head is used for industrial purposes with the remaining land used for maintenance/utilities, administration, community facilities and services, housing, or limited development to preserve natural systems.

Past operations at the installation generated a variety of explosive, reactive, and hazardous wastes. Industrial waste and wastewater were historically deposited into pits and landfills, burned openly, or discharged to septic systems, ditches, and storm sewers that emptied directly into surrounding water bodies. These practices resulted in a number of potentially contaminated sites, called IR sites. An Initial Assessment Study (IAS) performed in 1983 and a supplemental preliminary assessment report prepared in 1992 identified a total of 46 potential IR sites (Naval Energy and Environmental Support Activity, 1983 and 1992). Further site investigations have since identified additional IR sites at NSF Indian Head.

A Site Management Plan was written in accordance with the U.S. Navy IR Program to discuss the conditions and remediation activities associated with the IR sites on Cornwallis Neck. NAVFACWASH, formerly Engineering Field Activity Chesapeake, updated the Site Management Plan in October 2009. The Navy is involved in ongoing efforts to remediate these sites.

The MRP builds on the goals of the IR Program. The MRP was established in 2001 to manage the environmental, health, and safety issues presented by unexploded ordnance (UXO), discarded munitions, munitions constituents, and other munitions and explosives of concern (MEC). Activities within MRP sites must be addressed through the ESS process (Section 3.1). To date, the Navy's MRP and IR Program have identified 70 total sites at NSF Indian Head.

Proposed Action

Soil Characteristics

The activities associated with the Proposed Action would occur within soils of differing characteristics. The soils range from gentle to steep slopes, low to high erodibility, minimal to high windthrow hazard, and well drained to poorly drained (Table D-1 in Appendix D). Soil phases affected by the Proposed and Alternative Actions are referred to throughout this section by their soil phase designations (e.g., BuB) as identified in Table 3-12.

Table 3-12. Soil Phases Affected by Specific Project Elements under the Proposed and Alternative Actions

Soil Phase Designation	Project Element							
	Primary Nodal Plants	Secondary Nodal Plants	Existing Steam Lines	UEM Building	Natural Gas Transmission Line	Natural Gas Distribution Lines	Electric Transmission Line	Goddard Power Plant
BaB		X	X		X	X	X	
BaC					X			
BgB	X		X		X	X	X	
BuB		X	X	X	X	X		
GcB					X			
GmD			X		X	X		
GmF			X		X	X		
GwD		X	X		X	X	X	X
HgB	X		X		X	X	X	
LQA					X			
LsB			X					
LxD			X					
MaB					X			
McE					X			
PcA			X					
PcB			X		X	X		
Pu			X		X	X		
UK		X	X		X	X	X	X
UoB		X	X					
UoD		X	X		X	X		
UpB	X		X		X			
WdA			X					
WdB		X	X		X	X		

The proposed location for Primary Nodal Plant #1 is comprised entirely of soil phase HgB, which is characterized by its high windthrow susceptibility, low water erodibility, and low stormwater infiltration efficiency. The majority of the proposed site for Primary Nodal Plant #2 is comprised of soil phase UpB, while the northernmost and easternmost boundaries of the site are comprised of soil phases HgB and BgB, respectively. Soils of UpB characteristics are not highly susceptible to water erosion and are susceptible to wind erosion. BgB soils have a higher potential for water erosion and a lower susceptibility to windthrow than UpB soils.

The steam lines to remain, steam lines to be demolished or capped and left in place, secondary nodal plants, and natural gas lines would be located within an array of soils with varying characteristics (Table 3-12).

The proposed location for the UEM Building is comprised of soil phase BuB, which is potentially highly erodible and has a medium potential for windthrow hazards.

The existing Goddard Power Plant and its supporting facilities are almost entirely located within soil phase UK, which has a high potential for stormwater runoff and is not highly erodible. Building 899, the one supporting facility that is not located in soil phase UK, is in an area comprised of soil phase GwD, which is characterized by its medium to high runoff class, high water erodibility, and low windthrow potential.

Contaminated Soils

Contaminated soils in the proposed locations of the construction, demolition, and renovation activities associated with the Proposed Action are described in Table 4-14 and shown in Figures B-21 and B-22 in Appendix B.

The proposed location for Primary Nodal Plant #1 is within IR Site 47, which is referred to as the Mercuric Nitrate Disposal Area (CH2MHill, 2003). The proposed location of Primary Nodal Plant #2 is outside the boundaries of all IR and MRP Sites. In the areas that would be supported by the primary nodal plants, there are three IR sites within which steam lines would be demolished or capped and left in place. The electric transmission line that would run from Primary Nodal Plant #1 to the existing substation at the Goddard Power Plant would be located within IR Site 24 (Abandoned Drain Lines) and IR Site 53 (Mercury Contamination of the Sewage System) and would run adjacent to the unidentified IR site surrounding Building 259 (Building 259 Mercury Release Area).

The secondary nodal plants would not be located within any IR or MRP sites. However, in the areas that would be supported by the secondary nodal plants, there are nine IR sites and two MRP sites within which steam lines would be demolished or capped and left in place.

Two locations along the proposed route of the natural gas transmission line between Bryans Road and NSF Head have motor oil contamination concerns. Within NSF Indian Head, there are no IR or MRP sites within the proposed route of the natural gas transmission line. The natural gas distribution lines would be within the boundaries of IR Site 9 and would be located adjacent to IR Site 19 and the unidentified IR site surrounding Building 259 (Building 259 Mercury Release Area).

There are no IR or MRP Sites within the proposed location for the UEM Building.

None of the buildings or associated infrastructure to be demolished at the Goddard Power Plant are located within IR or MRP Sites. The coal pile associated with the Goddard Power Plant would require cleanup. While this area is not currently an IR site, further investigation would be required to determine if environmental contamination is present.

Alternative Action

Soil Characteristics

Under the Alternative Action, the proposed location for the primary nodal steam plants, UEM Building, natural gas transmission and distribution lines for the primary nodal plants, and the affected area of the Goddard Power Plant are the same as under the Proposed Action. However, under the Alternative Action, there would be no secondary nodal plants or associated gas distribution lines, resulting in less soil disturbance.

Contaminated Soil

The majority of areas with contamination concerns that would be affected under the Alternative Action are the same as under the Proposed Action. The proposed locations of the primary nodal plants, UEM Building, the natural gas transmission line, and the affected area of the Goddard Power Plant are not within the boundaries of any IR or MRP sites. Under the Alternative Action, the secondary nodal plants and associated gas distribution lines would not be constructed, so IR Site 9 would not be affected. Sections of existing steam lines identified for upgrade and repair run through IR and MRP sites that could potentially be affected by these repairs.

No-Action Alternative

The soil characteristics and soil contamination under the facilities and infrastructure associated with the existing steam generation and distribution systems at NSF Indian Head are discussed above under the Proposed Action.

3.11 Topography

Topography indicates the relative position and elevation of natural and man-made features within an area. Changes to the topography of an area can affect surface and subsurface water pathways and quantities, result in increased sedimentation, impact stormwater runoff, and ultimately affect water quality in nearby waterways and wetlands.

Installation Background

Cornwallis Neck has very low elevation profiles typical of the Coastal Plain physiographic province. According to the U.S. Navy's Shore Facilities Planning Manual, sloping terrain at NSF Indian Head can be classified into the following areas:

- Gentle (0-5 percent);
- Rolling (5-15 percent); and
- Steep (over 15 percent).

Proposed Action and No-Action Alternative

The proposed location for Primary Nodal Plant #1 is relatively flat with the majority of the site having slopes of less than 5%. The northeast section is an area of rolling terrain. The proposed location for Primary Nodal Plant #2 is composed entirely of gentle slopes of less than 5% gradient. The terrain along the proposed route of the electric line between Primary Nodal Plant #1 and the power substation adjacent to the Goddard Power Plant is mostly characterized by gentle and rolling slopes between 0 and 15% gradient with A few locations distinguished by steep slopes. The existing steam lines that would be connected to the primary nodal steam plants are mostly located on gentle or rolling slopes with a few areas located within steep slopes.

The secondary nodal plants would be located mostly on gentle and rolling slopes. Secondary Nodal Plant #6 is the only secondary nodal plant that is partially located on greater than 15% slopes. The existing steam lines that would be demolished or capped and left in place under the Proposed Action are in areas that have gentle, rolling, and steep slopes.

The proposed location for the natural gas transmission line from Bryans Road to NSF Indian Head is mostly gentle and rolling with a few more steeply sloped areas. Within NSF Indian Head, natural gas lines would encounter slopes varying from gentle to steep.

The proposed location for the UEM Building is relatively flat, consisting almost entirely of gently sloped terrain, with the exception of steep slopes to the north and west.

Most of the buildings and supporting infrastructure to be demolished within the Goddard Power Plant area are located on either gently sloping or rolling terrain, with a small area near the center of the coal pile that has steep slopes.

Alternative Action

Under the Alternative Action, the proposed locations for the primary nodal steam plants, UEM Building, natural gas transmission line to NSF Indian Head, main natural gas distribution line for the primary nodal steam plants, and the affected area of the Goddard Power Plant would be the same as under the Proposed Action. However, no secondary nodal plants or supporting natural gas distribution lines would be installed under the Alternative Action.

3.12 Solid and Hazardous Waste

Solid waste is any garbage, refuse, sludge, or other discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, agricultural, or community activities. A hazardous waste is defined by EPA as a solid waste that exhibits a characteristic of ignitability, corrosivity, reactivity, or toxicity, or is specifically listed as a hazardous waste. Hazardous and non-hazardous solid wastes are regulated by federal, state, and county laws.

The Resource Conservation and Recovery Act (RCRA) authorizes EPA to control hazardous waste from "cradle to grave." This lifecycle includes the generation, transportation, treatment, storage, and disposal of waste. EPA has delegated the enforcement of RCRA in Maryland to MDE. EPA also controls toxic chemicals through the Toxic Substances Control Act (TSCA), which addresses chemical substances and mixtures whose manufacture, processing, distribution in commerce, use, or disposal may present an unreasonable risk of injury to health or the environment.

Installation Background

A variety of solid waste is generated at NSF Indian Head, including construction and demolition debris, industrial waste, and regular garbage. Many of the buildings are more than 50 years old and have the potential to contain hazardous materials including asbestos, mercury, lead-based paint, and polychlorinated biphenyls (PCBs). Due to energetics research, testing, and development performed at NSF Indian Head, construction and demolition debris and other solid waste also has the potential to contain explosives residue.

The Navy implements construction waste management programs at NSF Indian Head that include packaging waste minimization, salvage and reuse of waste, and salvage for resale or donation, recycling, and disposal. Only those materials that cannot be economically salvaged or recycled are transported to a landfill, incinerator, or a hazardous waste disposal facility, as appropriate.

Demolition materials that present no explosives hazard and cannot be reused, salvaged, or recycled are removed from the installation by a contractor and disposed of offsite. The hauling and disposal of demolition debris, including hazardous wastes containing lead, asbestos, and air conditioner refrigerant, is performed in compliance with local, state, and federal codes and requirements.

It is Navy policy to decontaminate all materials that have come into direct contact with explosives prior to sending the materials for recycle or disposal. These explosives wastes and explosives-contaminated materials are decontaminated by high-pressure hot water washing, chemical treatment, or thermal decontamination, depending on the type of material and level of contamination.

Proposed Action, Alternative Action, and No-Action Alternative

Primary Nodal Steam Plants

The proposed location of Primary Nodal Plant #1 is currently an undeveloped site and does not generate any solid or hazardous waste. The proposed location of Primary Nodal Plant #2 is occupied by the Steam B Plant, which is currently on standby mode, is used minimally throughout the year, and does not generate any hazardous waste. Any general repair waste is removed and disposed of appropriately (Jenkins, 2011).

The construction of Primary Nodal Plant #2 would require demolition of the existing Steam B Plant and supporting facilities. These buildings are over 55 years old and may contain asbestos-

containing materials, lead-based paint, PCBs, and/or mercury. In addition, many of the existing steam lines that would be retained for use by the primary nodal plants have asbestos-containing insulation. It is not expected that explosive contamination is present within any of the buildings to be demolished under the Proposed Action (Caris, 2011).

Secondary Nodal Plants

The majority of buildings that would be supported by the secondary nodal plants under the Proposed Action were constructed prior to 1981. According to the Occupational Safety and Health Administration (OSHA), buildings constructed prior to 1981 should be assumed to contain asbestos-containing material and buildings constructed prior to 1978 should be assumed to contain lead-based paint. Additionally, existing steam lines that would be demolished or capped and left in place may contain asbestos-containing insulation and may occur within contaminated sites (Section 3.10).

Natural Gas Lines

There are no known areas that generate or store hazardous waste within the proposed location of the natural gas transmission line. However, two locations along Route 210 have motor oil contamination concerns. The natural gas lines would not affect any areas that generate or contain solid or hazardous waste. Natural gas distribution lines for the secondary nodal plants would be installed through IR Site 9 and IR Site 19 (Section 3.10).

UEM Building

The vacant buildings currently located at the proposed location of the UEM Building do not generate solid or hazardous waste. Construction of the UEM Building would require demolition of Buildings D2, D2D, 546A, and 624, which are over 55 years old and may contain asbestos, lead-based paint, and PCBs.

Goddard Power Plant

Operation of the Goddard Power Plant generates both solid and industrial waste. The only process waste generated by the Goddard Power Plant is non-hazardous fly ash, which totaled 4,700 tons in 2009. Fly ash is generated from the combustion of coal and is comprised of the fine particles that rise with the flue gases and are collected in chimneys and the bottom of furnaces. Additional waste includes general office and shops waste, such as used oil (Jenkins, 2011).

The Goddard Power Plant also disposes of granular activated carbon (GAC) used to treat industrial wastewater from energetics operations. As a permitted treatment for energy recovery, the spent GAC is mixed with coal and subsequently burned. The GAC that is not burned at the Goddard Power Plant is disposed of offsite as either hazardous or non-hazardous waste, depending on whether it shows reactive characteristics. Offsite disposal is coordinated through DoD's Defense Logistics Agency (DLA) Disposition Services and complies with appropriate regulations (Davidson, 2010).

The age of the Goddard Power Plant buildings suggests that their original construction materials may have included hazardous materials such as lead-based paint, asbestos, mercury, and/or PCBs. It is not expected that explosive contamination is present within any of the buildings that would be demolished at the Goddard Power Plant (Caris, 2011).

3.13 Health and Safety

Public safety includes a large variety of health and safety concerns, including fire safety, emergency response, law enforcement, water quality, and air quality. Worker safety and public safety should be taken into consideration for all projects, processes, and activities. Health and safety concerns should be re-evaluated on a continual basis as well as when any changes are being made to existing conditions.

The primary health and safety topics associated with the Proposed Action, Alternative Action, and No-Action Alternative are discussed in Sections 3.1, 3.10, and 3.12.

3.14 Noise

High noise levels that occur over a long duration can impact the health of exposed populations and be a nuisance to the surrounding community. The A-weighted decibel scale (dBA) is a logarithmic scale generally used to measure noise levels because it can account for the sensitivity of the human ear across the frequency spectrum.

OSHA regulates workplace noise with standards for two different types of noise: constant and impulse. The limit for constant noise is 90 dBA for 8 hours (29 CFR Part 1910.95). The maximum sound level for impulse noise is 140 dBA (29 CFR Part 1910.95). The Navy observes the OSHA maximum sound level for impulse noise, but has set a lower noise standard of 84 dBA for 8 hours of constant noise (U.S. Department of the Navy, 2005).

Noise within the community is regulated by state and local government agencies. In March 2007, the Charles County Commission passed Bill 2004-01, which established Chapter 260 (Noise Control). Table 3-13 lists the maximum allowable noise levels established by the legislation.

Table 3-13. Charles County Noise Exposure Limits

Land Use of Receiving Property	Daytime (7:00 a.m. – 10:00 p.m.) (dBA)	Nighttime (10:00 p.m. – 7:00 a.m.) (dBA)
Residential	60	50
Industrial	75	75
Commercial	67	62

The noise limits established by Charles County are the same as the standards set by the state under COMAR 26.02.03 with the exception of the residential limits. The residential limits established by the county are more stringent than the limits established by the state, which set a maximum noise level of 66 dBA during daytime hours and 55 dBA during nighttime hours.

Installation Background

The four main sources of noise at NSF Indian Head (in decreasing order of noise level) are ballistic testing, construction activities, other industrial operations (including ordnance processing), and vehicular traffic. Hazardous noise areas at NSF Indian Head are designated as such by the Industrial Hygiene Department. Industrial hygienists periodically survey construction and industrial operations on the installation to ensure that employees are not exposed to noise levels above the established limits.

Explosives testing, evaluation, and training operations are typically conducted at NSF Indian Head seven days a week between the hours of 7 a.m. and 4 p.m., although infrequent activities may occur outside of these times. No noise complaints related to NSF Indian Head have been received within the last 5 years (Berry, L., 2010).

Proposed Action, Alternative Action, and No-Action Alternative

The facilities addressed under the Proposed Action, Alternative Action, and No-Action Alternative have minimal noise concerns. All of the noise associated with these facilities is a result of human activity and vehicular traffic.

Primary Nodal Steam Plants

The proposed locations for Primary Nodal Plants #1 and 2 under the Proposed and Alternative Actions are within industrial areas and are not adjacent to the Town of Indian Head. No noise hazards have been identified in adjacent buildings. Noise in the adjacent area is associated with vehicular traffic to and from the buildings.

The existing steam lines across the installation produce both intermittent and sustained noise. Intermittent noise occurs when pressure in the pipes is too high and steam pressure escapes from the release valves. Sustained noise occurs from leaks within the lines. Although the noise from the leaking lines is sustained, it is not does not present a noise hazard to personnel. Human exposure to this noise is limited only to when a person is outside and very close to the line and therefore not a classified as a constant exposure. To monitor and repair the lines, a roving patrol vehicle inspects the steam lines and is a standard pickup truck that does not present any noise concerns.

Secondary Nodal Plants

Under the Proposed Action, the secondary nodal plants would be installed at nine locations in close proximity to the buildings they serve and existing developed areas. Many of the buildings that would be supported by the secondary nodal plants produce operational noise. Workers in these buildings follow posted noise precaution guidelines. Noise outside the buildings is not sustained and does not present a risk to personnel. Under the Alternative Action, no secondary nodal plants would be installed.

Natural Gas Lines

Under the Proposed and Alternative Actions, the natural gas transmission line and gas distribution lines would be installed along Route 210 and Mattingly Avenue outside NSF Indian Head, and primarily along existing roads, utility rights-of-way, or railroad tracks within NSF Indian Head. Noise in these locations is generally limited to vehicle traffic and periodic road maintenance.

UEM Building

Existing facilities adjacent to the location of the UEM Building under the Proposed and Alternative Actions include office space, storage, a maintenance garage (Building 290), a maintenance shop for heavy equipment (Building 525), and the Pickens Lane residences. The two maintenance facilities generate noise associated with vehicle maintenance and repair. However, both facilities comply with OSHA, U.S. Navy, MDE, and Charles County noise guidelines and standards. The UEM Building would replace several shops and offices that would be demolished as part of the Goddard Power Plant demolition. Operations at the shops include the preparation of materials for general utility repairs. Equipment at the shops includes pipe fitters, threading machines, various saws, and welding equipment. These shops produce noise, but comply with all applicable noise regulations. Personnel working in these shops follow posted instructions for hearing protection and complete annual safety training to be made aware of noise hazards (Jenkins, 2011).

Goddard Power Plant

The existing Goddard Power Plant has several boilers and fuel oil powered generators that produce noise during general operations. Noise produced during operation of the Plant does not generate noise hazards outside the plant. Within the plant, hearing protection requirements are posted where personnel are required to don hearing protection. All personnel working within the plant are trained in noise hazards as part of their required safety training (Jenkins, 2011).

3.15 Transportation

Installation Background

NSF Indian Head is located along the shoreline and is therefore accessible by land and water. The main mode of transportation is by ground (i.e., cars and trucks). The Navy also maintains infrastructure at the installation for limited accessibility by air (CBIRF helicopter pad) and boat (marina for recreational use and emergency response). Although rail infrastructure is still present at Cornwallis Neck, it is no longer used or maintained and is gradually being removed.

Cornwallis Neck is accessible to vehicle traffic via Route 210, a highway that starts at Maryland's border with Washington, D.C., and ends at the main gate of NSF Indian Head. The main gate is the only operational vehicular entrance point to Cornwallis Neck. Inside the main gate, Route 210 turns into the two-lane Strauss Avenue, which is the main artery through the installation. The average daily two-way traffic volume on Strauss Avenue is approximately 6,700 vehicles (Gannett Fleming, 2007).

Proposed Action, Alternative Action, and No-Action Alternative

The activities associated with the Proposed and Alternative Actions would occur mostly within or adjacent to currently developed areas served by a variety of transportation infrastructure including roadways and parking areas. Existing transportation infrastructure and traffic within the proposed locations for the primary nodal steam generation plants, steam lines, secondary nodal plants, natural gas lines, UEM Building, and the Goddard Power Plant are discussed below.

Primary Nodal Steam Plants

The proposed location for Primary Nodal Plant #1 under the Proposed and Alternative Actions requires vehicles to enter the restricted area through Post 2 and take Hanlon Road southwest to access the proposed site. Typical of most traffic throughout the installation, the intersection is most active during morning, noon, and afternoon peak periods. Currently, there is minimal traffic along West Farnum Road due to the renovations to Post 3. Strauss Avenue and East Caffee Road are considered primary roads within the installation. The proposed location for Primary Nodal Plant #2 under the Proposed and Alternative Actions is located off of Auxiliary Place and can be accessed from North Greenslade Road or using a cut through from Strauss Avenue. Parking at this site is currently located in front of the Steam B Plant. Personnel accessing the proposed locations of Primary Nodal Plants #1 and 2 must travel through ESQD arcs (Section 3.1). The existing steam lines that would be used by the primary and secondary nodal plants run parallel to and occasionally cross over many of the roads throughout NSF Indian Head.

Secondary Nodal Plants

Under the Proposed Action, the secondary nodal would be installed at locations throughout NSF Indian Head, which are currently monitored for repair and maintenance of the heating systems by a roving patrol vehicle on a daily basis. The steam lines that would be demolished or capped and left in place run parallel to and occasionally cross over roads throughout NSF Indian Head. The crossings occur over primary roads and roads that limit access to government vehicles, which considerably decreases the amount of traffic on these roads. Under the Alternative Action, no secondary nodal plants would be installed.

Natural Gas Lines

Under the Proposed and Alternative Actions, the natural gas transmission line would be installed within the existing Route 210 right-of-way and along Mattingly Avenue. Approximately 12,500 to 15,500 vehicles per day travel Route 210 from near Bryans Road to NSF Indian Head (MDOT, 2009). Mattingly Avenue is a two-lane, primarily residential road that runs a little less than a mile from Route 210 to Mattingly Park on the Mattawoman Creek.

Within NSF Indian Head, the gas distribution lines would be installed primarily along existing roads, including East Farnum Road, which is one of the heaviest traveled roads at NSF Indian Head and serves as an exit route. Approximately 2,000 to 4,000 vehicles use this road on a daily basis. The intersections of Farnum Road and South Patterson Road and East Farnum Road and South Jackson Road are two of the busiest intersections at NSF Indian Head. Respectively, these intersections receive approximately 650 vehicles during the noon peak hour and 725 vehicles during the afternoon peak hour (Gannett Fleming, 2007).

UEM Building

Under the Proposed and Alternative Actions, the UEM Building would provide replacement space for personnel and functions currently located at the Goddard Power Plant. An estimated 53 personnel work within the Goddard Power Plant and associated shops. These personnel typically park their personal vehicles outside the Goddard Power Plant and use government vehicles to travel throughout the installation as needed. Currently, Goddard personnel enter the restricted area through Post 2 in their personal vehicles and pass through ESQD arcs to perform base-wide routine monitoring, repair and maintenance.

The proposed location of the UEM Building is along the north side of Strauss Avenue and west of Lloyd Road. The building would be constructed over portions of Wilroy Lane, Lloyd Road, Pickens Lane and a parking lot. These portions of road and parking serve Buildings 290, 525, and 544 and are adjacent to Building 289. Buildings 290 and 525 are maintenance shops that often store vehicles in the parking lot in between the buildings. Buildings 289 and 544 are both offices that support approximately 12 and 6 personnel, respectively. Personnel working at these buildings drive their personal vehicles to the buildings and park at adjacent parking lots.

Goddard Power Plant

In addition to Goddard support personnel, an average of 12 tractor trailers (6 to 25 depending on truck availability) deliver coal to the Power Plant each day (Jenkins, 2011). These vehicles follow Route 210 through the main gate, through Post 2, and travel through ESQD arcs to reach the Plant.

The roads within the existing Power Plant area and the roads used to access facilities that support the testing of cartridge-actuated devices (CADs), propellant-actuated devices (PADs), and Energetic Chemical Processing are not considered to be among the busiest throughout NSF Indian Head (Gannett Fleming, 2007).

4. CONSEQUENCES

4.1 Explosives Safety

Proposed Action

The Proposed Action would not have significant impacts on explosives safety at NSF Indian Head. The main criteria that apply to each aspect of the project are described below.

Primary Nodal Steam Plants

Under the Proposed Action, the two primary nodal steam plants would be constructed within ESQD arcs, which would require an explosives safety site approval from NOSSA and DDESB. Because steam is a critical utility for the NSWC IHD mission, the nodal plants would be configured with redundancy to comply with explosives safety criteria in OP 5. Even though these facilities would be within ESQD arcs, the risk to personnel would be minimal because they would be unmanned except when performing inspections or maintenance. All overhead electrical lines would have to adhere to the siting requirements in OP 5, which specify that electrical lines must be at least PTR distance away from any potential explosion site (PES) if they carry less than 69 Kilovolts (kV) and power cannot be rerouted (NAVSEA, 2010). Electrical lines in this design would carry 13.2 kV, but would be part of a feeder system such that power would be able to be rerouted if necessary. Thus, the only limitation on these lines would be that the length of the lines must be shorter than the distance to any open PES or PES of combustible construction unless an alternative technique is used to mitigate risk (NAVSEA, 2010).

Secondary Nodal Plants

The construction of Secondary Nodal Plants #2, 6, 7, 8 and 9 would require an explosives safety site approval, as they would be located within 110% of IB arcs. As all boilers would be placed outside of IL arcs, Construction Worker Authorization approval or other mitigating measures would not be necessary for their construction. Additionally, as the secondary nodal plants would be constructed outside of all IR and MRP sites with explosives safety concerns, neither an ESS nor an ESS-DR would have to be submitted for approval by NOSSA and/or DDESB. Personnel working within IL arcs while constructing, upgrading, and demolishing portions of excess steam lines, would require mitigation or NOSSA approval of a Construction Worker Authorization.

Natural Gas Lines

On base, the natural gas lines would meet the siting criteria in OP 5, which specifies that a minimum distance of 80 feet is required between the gas line and any explosives facility; this distance increases if the facility is approved to store more than 18,963 pounds of Class Division 1.1 explosives. When the separation distance from explosives facilities is not met by running the gas line along the road, it would be rerouted, possibly leading to further environmental impacts, such as vegetation clearing (Section 4.7) and impacts to fish and wildlife (Section 4.8). The gas lines would not run through any IR or MRP sites with explosives safety concerns. However, personnel working within IL arcs to construct portions of these gas lines would require mitigation or NOSSA approval of a Construction Worker Authorization. Routine maintenance on the gas lines would not require a Construction Worker Authorization. Wireless transmitting meters that could be installed at facilities connected to the natural gas utility would have to be endorsed by the NSWC IHD Safety Department and approved by NOSSA (NSWC IHD, 2009).

UEM Building

Upon construction of the UEM Building, about 50 people would relocate from the restricted area to this facility (Jenkins 2011). Personnel would still have to enter the restricted area and travel through ESQD arcs to perform inspections and maintenance on utility lines and the nodal plants.

Goddard Power Plant

Due to its location and lack of explosives contamination, demolition of the Goddard Power Plant would have no impact on explosives safety (Section 3.1).

Alternative Action

The impacts associated with the primary nodal plants and associated gas lines, UEM Building, Goddard Power Plant, and overhead electrical lines would remain the same as for the Proposed Action. The potential number of transmitting meters would be lower because the two primary nodal plants would be the only facilities receiving natural gas. The level of exposure would be lower for personnel, who would spend less time constructing and maintaining gas lines within ESQD arcs.

No steam lines would be demolished or capped and left in place under the Alternative Action. Upgrades to steam lines, as well as the construction of a limited number of new steam lines, would be performed where necessary throughout the base, and any work requiring workers to be within IL arcs would require mitigation or NOSSA approval of a Construction Worker Authorization. Overall, this would likely result in work being performed on a shorter total length of the steam lines, and thus less exposure for workers and less impact on explosives operations. Secondary nodal plants would not be provided under the Alternative Action. This would eliminate the need for workers to construct, maintain, and repair these plants, reducing any potential exposure that may have resulted from work done within ESQD arcs.

No-Action Alternative

The No-Action Alternative would not result in any of the changes described for the Proposed Action and Alternative Action. Rather, the system would continue to run as it does currently, and no personnel would be relocated from the restricted area to the UEM Building. Therefore, the No-Action Alternative would result in no change in explosives safety concerns.

4.2 Infrastructure and Utilities

Proposed Action

Buried utility lines within proposed construction areas would be located and marked prior to construction. If existing utilities interfere with proposed activities, the existing lines may be rerouted to accommodate construction requirements and meet applicable standards. Aboveground electrical lines would be relocated in advance of construction and rerouted and/or buried in order to accommodate proposed buildings, roadways, and parking areas. Any new or relocated aboveground utility lines would comply with the Raptor Electrocution Prevention Study and Biological Opinion (Section 4.8).

The majority of new building space provided under the Proposed Action represents a replacement of existing facilities, resulting in a decrease in utility use due to new standards. The number of personnel employed at NSF Indian Head and types of functions they perform is not expected to change substantially as a result of the Proposed Action. New facilities would provide adequate space for equipment and personnel, allowing for efficient industrial operations. The new system would improve steam service, reduce physical infrastructure, and enhance the efficiency of steam generation and distribution without any anticipated impact to the level of service for other utilities.

Primary Nodal Steam Plants

To provide redundancy, each primary nodal plant would have the generating capacity to supply the full load of steam for mission critical facilities. Both primary nodal plants would be remotely operated from the UEM building through the connection of fiber optic lines. Other than routine inspections and maintenance, personnel are not anticipated within either primary nodal plant.

Although the river water system is fully capable of supporting the Proposed Action, it will undergo a phased replacement under a separate effort to ensure continued reliable delivery of water to end users, including the primary nodal plants (Bragunier and Jenkins, 2010). Both plants would require a connection to the potable water distribution system for backup use in the event that river water becomes unavailable. Approximately 27 miles of existing steam lines would remain to serve mission critical facilities and would be upgraded to improve the efficiency of distribution. Sections of steam line would be refurbished and/or replaced and excess steam lines would be demolished or capped and left in place to support compressed air lines that run along the steam lines.

The back-up fuel supply (No. 2 fuel oil) tanks for the primary nodal plants would be installed in compliance with all appropriate regulations and permits.

Construction of Primary Nodal Plant #1 would require utility line extensions, including fiber optic, electrical, sanitary sewer, river water, steam, industrial wastewater, and potable water. Primary Nodal Plant #1 would be designed as a cogeneration facility, providing approximately 4.3 MW of electric power as a byproduct of steam generation. The new power generation capacity would be greater than the Goddard Power Plant's current power supply of 3.9 MW, resulting in a decrease in power pulled from the grid.

The Steam B Plant would be demolished to accommodate construction of Primary Nodal Plant #2. As a result, preexisting utilities would be available within the site of the new plant. Relocation and short extensions of utility lines may be required, depending on the exact size and orientation of the new plant. Industrial wastewater lines, which are not currently used by the Steam B Plant, would be extended from the intersection of Galley and Schuyler Roads, approximately 550 feet southwest of the site.

Secondary Nodal Plants

Each of the nine secondary nodal plants would require a connection to potable water, electrical, fiber optic, and natural gas lines. Secondary Nodal Plants #2, 3, 4, and 7 would also require a connection to river water lines. If the use of river water is determined to be financially feasible under a future project, Secondary Nodal Plants #1, 5, 6, 8, and 9 would also require river water line connections. The nine secondary nodal plants would generally be located in close proximity to existing utilities needed for each plant, but in some cases would require longer extensions of 250 feet to 500 feet. The secondary nodal plants would allow much of the existing steam lines that do not serve mission critical facilities to be demolished or capped and left in place, greatly reducing steam distribution infrastructure and increasing energy efficiency. Each secondary nodal plant would serve multiple buildings, creating a localized node of steam distribution that may require the construction of new steam lines to reach each supported building.

Natural Gas Lines

The natural gas transmission line serving Primary Nodal Plant #1 would require a 20-foot wide right-of-way and the gas distribution lines would require a 6-foot wide right-of-way. All gas distribution lines would be required to comply with applicable offsets and setbacks (Section 3.1). All gas lines on and off base would be installed so as not to interfere with or require relocation of existing utilities along the identified routes. Washington Gas would not take other utilities out of service during installation of the gas lines and would follow all Miss Utility guidelines as required in Maryland.

UEM Building

Personnel, shops, and monitoring capabilities of the Goddard Power Plant would be relocated to the UEM Building, allowing for consolidated and efficient management of the primary nodal plants. The proposed location for the UEM Building contains all the necessary utilities for the new facility including electric power, potable water, sanitary sewer and fiber optic lines. The existing utility lines within the site would be extended, moved, or modified as necessary to serve the proposed facility.

Goddard Power Plant

Demolition of the Goddard Power Plant and its associated facilities would eliminate infrastructure and the use of utilities associated with these buildings, most notably river water. All associated utility lines serving Goddard exclusively would be removed to the point of connection with the supply main. Also, any undamaged components of utility lines would be salvaged for reuse by the NAVFAC Public Works line crew. Electrical utilities, including a power substation, would not be demolished, but rather reconfigured to accept power from Primary Nodal Plant #1. Existing roads, parking areas, and sidewalks associated with the Goddard Power Plant and its related facilities would be removed, as long as this infrastructure does not directly support any other buildings or operational areas. The removal of any transportation infrastructure would not adversely affect the installation's transportation system.

Alternative Action

Under the Alternative Action, the impacts associated with the UEM Building and Goddard Power Plant would be the same as under the Proposed Action. Secondary nodal plants would not be required and each primary nodal plant would be designed to fully supply steam demands for all facilities connected to the steam distribution network on Cornwallis Neck. The two primary nodal

plants would be located in the same locations as under the Proposed Action, but would have a higher steam generation capacity. Standard utilities would be required and it is anticipated that existing utility systems would be adequate to support each primary nodal plant. To provide a higher steam output, each primary nodal plant would require a greater supply of natural gas and a larger storage capacity of backup fuel. Primary Nodal Plant #1 would be a cogeneration facility with the potential for up to 5 MW of generating capacity, requiring less power from the grid, and would require associated electric power infrastructure.

Existing steam lines throughout Cornwallis Neck would be repaired to minimize leaks and improve the efficiency of distribution from each primary nodal plant. Despite upgrading the steam lines, the Alternative Action would likely prove less efficient when compared to the Proposed Action due to the greater length of steam lines in the steam distribution system. No secondary nodal plants or associated gas distribution lines would be required, eliminating the need to construct additional infrastructure and any associated impacts to utilities.

No-Action Alternative

Under the No-Action Alternative, no new facilities or infrastructure would be constructed, refurbished, or demolished. The Goddard Power Plant would remain the primary source of steam, compressed air, and electrical power to the installation and continue to utilize the existing steam distribution system. Coal would remain the primary fuel source.

4.3 Air Quality

4.3.1 Ambient Air Quality

Proposed Action

As described in more detail in the subsections below, the Proposed Action would have the potential to directly and indirectly affect air quality at NSF Indian Head as a result of the following actions:

- Direct effects
  - New emissions associated with operation of primary and secondary nodal plants
  - Elimination of emissions from Goddard Power Plant and Steam B Plant
  - Changes in electricity and steam consumption
  - New emissions associated with operation of emergency generators
  - Elimination of emissions from coal delivery trucks
  - Temporary new emissions from construction, demolition, and renovation activities
- Indirect effects
  - Changes in emissions resulting from reduced reliance on off-base sources of electricity
  - Reduction in emissions associated with changes in vehicle use

Air permitting changes that would need to be made if the Proposed Action is implemented are identified in Section 4.3.2.

Operation of Primary and Secondary Nodal Plants

The dual-fuel primary nodal plants would be able to operate on both natural gas and No. 2 fuel oil; however, No. 2 fuel oil would only be used in emergency situations when there is an interruption in natural gas supply. The secondary nodal plants would use only natural gas. Regardless of fuel source, the nodal plants would produce emissions of NOx, CO, VOCs, SOx, HCl, PM, and other trace pollutants, including a variety of metals and organic air pollutants; however, emissions of SOx, PM, and NOx are expected to be greater when the primary nodal plant boilers are operating on No. 2 fuel oil as compared to natural gas.

Projected emissions from the combustion turbine with duct-fired heat-recovery steam generator (CT-HRSG) and boilers that would be installed at both the primary and secondary nodal plants under the Proposed Action were estimated using design specifications and EPA's AP-42 emission factors for external combustion sources and are presented in Table 4-1 (USEPA, 1998 and USEPA, 2010a). The projected actual emissions (PAE) estimates were calculated by multiplying the expected annual natural gas consumption for the CT-HRSG and the secondary nodal plant boilers by the corresponding emission factor for each pollutant.

The Proposed Action would install one 750-horsepower boiler and one CT-HRSG with a total heat input rating of approximately 91.8 MMBtu/hr(HHV) at Primary Nodal Plant #1 and three supplementary 750-horsepower boilers at Primary Nodal Plant #2. Each boiler is rated to provide 25,875 pounds per hour of steam, which requires a heat input of approximately 31.4 MMBtu/hr. The PAE estimates for the CT-HRSG from Primary Nodal Plant #1 and boilers from the secondary nodal plants are summarized in Table 4-1. The PAE estimates are based on projected actual natural gas consumption of 409,767 MMBtu per year for the primary nodal plants and 254,340 MMBtu per

year for the secondary nodal plants. It is assumed that Primary Nodal Plant #2 would only operate as a backup when Primary Nodal Plant #1 is not operational and that the 750-horsepower boiler in Primary Nodal Plant #1 would only operate during peak loads. Therefore, the PAE estimates are based on the assumptions that the entire natural gas demand of the primary nodal plants is consumed by operation of the CT-HRSG and that the four 750-horsepower boilers are not operated. The potential emissions from the primary nodal plants would vary based on the proportion of natural gas and No. 2 fuel oil operating time. No. 2 fuel oil would only be used in emergency situations when there is an interruption in natural gas supply. Therefore, the PAE estimates are based on the assumption that the primary nodal plants will operate entirely on natural gas.

Table 4-1. Emissions Associated with Steam and Electricity Generation under the Proposed Action

		CT-HRSG (Primary Nodal Plant #1)	Secondary Nodal Plant Boilers	Total
Projected Natural Gas Consumption (MMBtu/year)		409,767	245,340	655,107
CO	Emissions (tons/yr)	22.5	9.0	31.5
CO_2	Emissions (tons/yr)	26,575.5	14,334.7	40,910.2
HCl	Emissions (tons/yr)	0.0	0.0	0.0
Hg	Emissions (tons/yr)	0.0	0.0	0.0
NOx[b]	Emissions (tons/yr)	19.6	4.5	24.1
Pb	Emissions (tons/yr)	0.0	0.0	0.0
PM_{10}	Emissions (tons/yr)	4.8	0.9	5.7
SO_2	Emissions (tons/yr)	0.0	0.1	0.1
VOC	Emissions (tons/yr)	1.6	0.7	2.3

a - Projected emissions are based on emission factors from multiple sources. Design specifications were used to derive CT-HRSG emission factors for CO, NOx, PM_{10}, SO_2, and VOC, and secondary nodal plant boiler emission factors for CO and NOx. AP-42 Ch. 1.4 (natural gas combustion) was used to derive Hg and Pb emission factors for the CT-HRSG and Hg, Pb, PM_{10}, SO_2, and VOC emission factors for the secondary nodal plant boilers. 40 CFR 98, Subpart C, Table C-1 was used to derive CO_2 emission factors and 40 CFR 63, Subpart DDDDD was used to derive HCl emission factors.

b - These emission estimates represent uncontrolled emissions; however, NSPS standards may require control devices to control criteria pollutant emissions from the primary nodal plants.

In addition to the emissions listed in Table 4-1 above, each primary nodal plant has the potential to emit VOCs from one 100,000 gallon diesel fuel tank connected to each plant. Fugitive VOC emissions from the fuel storage tanks are assumed to be negligible compared to VOC emissions associated with steam and electricity generation and thus were not quantified.

Under the Boiler MACT Rule, all boilers under the Proposed Action would belong to the "Gas 1 subcategory" because these boilers are designed to burn natural gas and not solid fuels and are

expected to burn fuel oil only during natural gas curtailment or emergencies. Therefore, these boilers are not subject to emissions limits and do not require emissions control devices. Instead of control devices, these boilers are subject to work practice standards (e.g. tune ups every 1, 2 or 5 years). However, if a boiler burns fuel oil for more than 48 operating hours per year or burns fuel oil during non-emergencies, the boiler would then fall into the liquid fuel subcategory and be subject to PM, CO (and possibly Hg and HCl) emission limitations and have different work practice standards (USEPA, 2010b).

The Proposed Action would discontinue operation of the existing emission units at the Goddard Power Plant and Steam B Plant discussed under Section 3.3 (Air Quality). Although the operation of the primary nodal plants and secondary nodal plants would result in new air emission sources, these operations would represent a reduction in air pollutant emissions of CO_2, HCl, NO_x, PM, SO_2, and VOC as compared to the existing emissions from Goddard Power Plant and the existing Steam B Plant (Table 4-2). The Proposed Action also has the potential to result in increased emissions of CO. The combustion of natural gas releases virtually no ash or particulate matter, and lower levels of SO_2, NO_x, and CO_2 as compared to the combustion of coal (EIA, 1999).

Table 4-2. Comparison of Emissions Associated with Steam and Electricity Generation Under Existing Conditions and Proposed Action

	Total Emissions (tons/yr)		
	Existing (Goddard and Steam B Plant)	Proposed Action (Primary and Secondary Nodal Plants)	Net Change
CO	9.5	31.5	22.0
CO_2	149,453	40,910	(108,543)
HCl	15.0	0.0	(15.0)
Hg	0.0	0.0	0.0
NOx	124.1	24.1	(100.0)
Pb	0.0	0.0	0.0
PM_{10}	17.9	5.7	(12.2)
SO_2	392.9	0.1	(392.8)
VOC	22.8	2.3	(20.5)

a - The net changes in air pollutant emissions summarized are based on the projected actual natural gas consumption estimates of 409,767 MMBtu/yr for the primary nodal plants and 254,340 MMBtu/yr for the secondary nodal plants.

b - Emission estimates for the Proposed Action represent uncontrolled emissions; however, NSPS standards may require control devices to control criteria pollutant emissions from the primary nodal plants.

Reduced emissions of NO_x, SO_2 and VOCs would help Charles County achieve attainment with the NAAQS standards for ozone and $PM_{2.5}$. Overall, the Proposed Action would reduce on-base pollutant emissions associated with steam and electricity generation at NSF Indian Head and contribute to improved air quality in Charles County and the Metropolitan Washington region.

Changes in Electricity and Steam Consumption

As described in Section 4.2 above, the Proposed Action would reduce the distances between the nodal steam plants and the buildings they serve to increase distribution efficiency. Increased distribution efficiency enables the use of smaller boilers, which could lead to reduced fuel consumption and fewer air emissions.

The new buildings and equipment constructed under the Proposed Action, including the UEM Building and primary nodal plants, would result in new sources of electricity consumption. However, the electricity consumption associated with the operation of these new buildings and equipment is expected to be equivalent to or less than the amount of electricity currently consumed by Goddard Power Plant and its supporting facilities, which would be demolished under the Proposed Action. Construction of the new UEM Building would incorporate sustainable design principles and energy-efficient equipment; therefore, the Proposed Action is expected to reduce the overall energy consumed by UEM personnel.

Generator Use

Under the Proposed Action, seventeen emergency generators would provide backup power in the event of a power failure at the following locations:

- Primary Nodal Plant #1 (one 1,650 kW generator)
- Primary Nodal Plant #2 (one 1,000 kW generator)
- Secondary nodal plants (nine 175 kW generators)
- UEM Building (one 200 kW generator)
- Utility sub-station area (four 1,250 kW generators)
- Building 3123 (one 750 kW generator)

The generators would produce emissions of NOx, CO, VOCs, SOx, and PM during regular testing and emergency operation. The emergency generators would operate approximately 15 minutes once per week for regular testing. These new generators would be more efficient than the three existing generators at the Goddard Power Plant.

Projected emissions from the generators were estimated using tier 2/3 allowable emission rates (40 CFR 89.112) for emergency generators and EPA's AP-42 emissions factors for stationary internal combustion sources (USEPA, 2009c) and are presented in Table 4-3. All three of the Goddard emergency generators operated an average of 150 hours per year for the years 2009 to 2011. Thus, projected actual emissions for the new generators are based on a conservative maximum usage rate of 150 hours per year. The new primary nodal plants are expected to be more reliable than the aging Goddard Power Plant and thus it is expected that the actual operating schedule for the new generators would be less than 150 hours per year. As a result, emissions from generator operation would likely be lower than the emissions levels provided in Table 4-3 below.

Table 4-3. Criteria Pollutant Emissions from Emergency Generators under the Proposed Action

Equipment	Total Capacity	Operating Schedule (hrs/year)	Pollutant	Emission Factor	Total Expected Annual Emissions (tons)
Small Emergency Generators (<600 hp or <560 kW)	2,383 hp (1,775 kw)	150	VOC	2.25×10^{-3} lbs/hp-hr[a]	0.40
			CO	3.5 g/kw-hr[b]	1.0
			NOx	4.0 g/kw-hr[b]	1.2
			$PM_{2.5}$	0.2 g/kw-hr[b]	0.06
			SO_2	2.05×10^{-3} lbs/hp-hr[c]	0.37
Large Emergency Generators (>600 hp or >560 kW)	11,257 hp (8,400 kw)	150	VOC	6.42×10^{-4} lbs/hp-hr[a]	0.54
			CO	3.5 g/kw-hr[b]	4.9
			NOx	6.4 g/kw-hr[b]	8.9
			$PM_{2.5}$	0.2 g/kw-hr[b]	0.28
			SO_2	1.21×10^{-5} lbs/hp-hr[c]	0.01

a - VOC emission factors are based on EPA's AP-42 emissions factors for total organic compounds (TOC) for stationary internal combustion sources (Tables 3.3-1 and 3.4-1). In accordance with the Table 3.4-1, footnote f, TOC is assumed to be 9% methane and 91% non-methane.

b - Emission factors based on the tier 2/3 allowable emission rates (40 CFR 89.112) for the emergency generators.

c - SO_2 emission factors are based on EPA's AP-42 emissions factors for SO_x for stationary internal combustion sources (Tables 3.3-1 and 3.4-1). It is assumed that ultra low sulfur diesel (ULSD) fuel will be used with a sulfur content of 15 ppm.

The emergency generators would be subject to the NESHAP requirement for Reciprocating Internal Combustion Engines (RICE) (40 CFR Part 63 Subpart ZZZZ). These generators may also be subject to NSPS Subpart IIII—Standards of Performance for Stationary Compression Ignition Internal Combustion Engines.

Elimination of Emissions from Coal Delivery Trucks

Demolition of the Goddard Power Plant would eliminate emissions from daily tractor trailer deliveries of coal to fuel the Goddard boilers.

Construction, Demolition, and Renovation Activities

Construction, demolition, and renovation (CDR) activities required for the Proposed Action would result in temporary minor emissions of NO_x, VOC, CO, PM, and SO_2 from the use of on-road vehicles, such as delivery vehicles, tractor trailers, and dump trucks, as well as nonroad construction vehicles, such as excavators, cranes, track loaders, backhoes, and bulldozers over the course of an approximately five-year period. Emissions from construction equipment and privately owned vehicles associated with the proposed CDR activities were estimated using EPA's NMIM, a consolidated emissions modeling system for EPA's MOBILE6 and NONROAD models. The maximum annual projected NO_x, VOC, CO, PM, and SO_2 emissions from construction activities are shown in Table 4-4. The methodology used to calculate these emissions can be found in Appendix C.

Table 4-4. Estimated Total Demolition and Construction Emissions under the Proposed Action

Vehicle Type (Nonroad/On-Road)	NO_x Emissions (tons)	VOC Emissions (tons)	$PM_{2.5}$ Emissions (tons)	SO_2 Emissions (tons)
On-Road	0.27	0.12	4.37×10^{-3}	3.65×10^{-3}
Nonroad	11.01	0.90	1.07	1.36×10^{-2}
Total	**11.28**	**1.02**	**1.07**	**1.72×10^{-2}**
GCR de minimis levels (tons/year)	50	100	100	100

CDR activities often cause fugitive dust (PM) emissions that might have a temporary impact on local air quality. Dust emissions during building construction are associated with land clearing, ground excavation, grading, and the construction of the building itself. Emissions may vary substantially from day to day, depending upon the level of activity, specific type of activity, and weather conditions. The quantity of dust emissions from construction operations is proportional to the area of land where the activity is taking place, as well as the level of construction activity.

The Navy is required to take reasonable precautions to prevent PM from becoming airborne, per COMAR 26.11.06.03D. These precautions may include a number of air quality best management practices, which would limit fugitive dust impacts to temporary, minimal health or environmental effects. These practices would include, but would not be limited to, the following:

- Watering down active construction areas to reduce fugitive dust emissions;
- Stabilizing exposed or graded areas (e.g., by paving roads and hydroseeding open areas) as soon as possible upon completion of grading;
- Properly covering trucks hauling fill material or maintaining at least two feet of free-board;
- Limiting truck speeds on unpaved areas of the site to 15 miles per hour or less;
- Grading sites in phases, thereby limiting the time that disturbed soil is exposed; and
- Temporarily halting construction activities when winds exceed 25 miles per hour.

It is likely that several of the Goddard Power Plant buildings and portions of the steam line infrastructure addressed under the Proposed Action have regulated asbestos-containing materials. All asbestos air quality hazards in these buildings would be removed prior to demolition. In addition, some of the buildings that would be supported by the secondary nodal plants may also contain asbestos, which could be disturbed if modifications are made to the buildings as part of the installation of the new heating systems or the removal of existing steam lines. All construction and demolition activities affecting asbestos-containing materials would be performed in accordance with 40 CFR Part 61 Subpart M, the National Emissions Standard for Asbestos.

Several of the Goddard Power Plant buildings to be demolished under the Proposed Action also have heating, ventilating, and air conditioning (HVAC) and refrigeration equipment that contains ozone-depleting substances (ODS). Removal and disposal of equipment containing ODS would be performed in accordance with 40 CFR Parts 261 to 268. Applicable record keeping requirements would also be performed in accordance with 40 CFR Part 62 and CAA Section 114(a).

Indirect Effects

The Goddard Power Plant currently supplies approximately 3.9 MW of electricity to NSF Indian Head. Under the Proposed Action, the new cogeneration plant would supply approximately 4.3 MW of electricity. Due to this increase in on-base electricity production, a smaller quantity of electricity would need to be purchased from the power grid, which could marginally impact the demand for electricity production from coal-fired plants or new source construction off the installation.

The Proposed Action would not impact the number of personnel commuting to and working at NSF Indian Head, thus having negligible or no impact on vehicle-related air emissions.

Alternative Action

The potential reductions in air emissions would be similar in nature and quantity under the Proposed and Alternative Actions. The primary nodal plants would be larger under the Alternative Action, as compared to the Proposed Action, in order to provide steam to additional buildings; however, there would be no secondary nodal plants. Steam production would likely be greater under the Alternative Action than the Proposed Action to compensate for energy losses in the larger distribution system.

In comparison to the Proposed Action, the emergency generators for the primary nodal plants would need to be slightly larger under the Alternative Action; however, this would be offset by the lack of emergency generators for secondary nodal plants. Therefore, emissions associated with emergency generator use would be similar to the Proposed Action. Temporary emissions due to construction of the primary nodal plants would be slightly greater due to the larger building sizes; however, this would be offset by the avoided construction of secondary nodal plants. Changes in vehicle use under the Alternative Action are expected to be the same as under the Proposed Action.

Overall, recurring air emissions under the Alternative Action are expected to be similar in quantity to the Proposed Action.

No-Action Alternative

The No-Action Alternative would not result in any new air emissions or impacts to air quality. The emissions-producing operations described in Section 3.3 would continue at their existing locations in accordance with the installation's Title V permit. Therefore, there would be no potential for emissions reductions due to discontinued operation of the inefficient Goddard Power Plant and Steam B Plant, and no potential for reduced steam demand due to increased efficiency of the utility infrastructure.

Under the No-Action Alternative, operations at the Goddard Power Plant would be in non-compliance with recently revised MDE air quality regulations and proposed NESHAP standards. The Goddard Power Plant would require significant and expensive upgrades to become compliant with these more stringent emission standards.

4.3.2 Permitting Implications

Proposed Action and Alternative Action

General Conformity Determination

As presented in the GCR Applicability Analysis (Appendix C), the net emissions from the Proposed and Alternative Actions would be below the *de minimis* levels for O_3 and $PM_{2.5}$. As such, a conformity determination was not prepared for the Proposed or Alternative Actions[8]. Though a minor increase in temporary air emissions due to construction activities would result from the Proposed and Alternative Actions, both actions conform to the region's SIPs, would not cause or contribute to any new violations of NAAQS, and would not increase the frequency or severity of any existing violations.

Construction Permits

Prior to executing the Proposed Action or Alternative Action, the Navy would submit a permit to construct (PTC) application for all non-exempt emission units and control devices, pursuant to COMAR 26.11.02. PTCs would likely be required for the CT-HRSG and up to twenty-two boilers associated with the primary and secondary nodal plants and seven emergency generators associated with the primary nodal plants, UEM Building, utility sub-station, and Building 3123. The PTC program ensures that each emission unit complies with all applicable air pollution control regulations.

Pursuant to 40 CFR 52.21 and COMAR 26.11.17, the Proposed Action would be subject to the requirements of NSR if the associated emissions increase is greater than the applicable threshold for at least one pollutant. Because the Proposed Action consists of new emission units and the removal of existing emission units, a "hybrid test" NSR applicability determination must be used. In the case of the Proposed Action, the emissions increases are primarily equal to the difference between the potential to emit of the new units and the baseline actual emissions of the units that would be removed. Corresponding calculations indicated that the emissions increases for CO and $PM_{2.5}$ may exceed the applicable NSR thresholds unless the potential to emit is reduced to more closely reflect the projected actual emissions of the Proposed Action. As a result, NSR would be avoided by accepting federally enforceable limitations (e.g., a fuel cap) that reduce the Proposed Action's potential to emit and subsequent emissions increases. The establishment of a limitation is not expected to affect facility operations because the base's projected annual energy demand from the primary and secondary nodal plants is significantly less than the amount of energy that can be produced.

Installation of the cogeneration facility would require correspondence with the Public Service Commission of Maryland. A Certificate of Public Convenience and Necessity (CPCN) from the Public Service Commission of Maryland must be obtained prior to construction of a new electricity generating station. A generating station is eligible for a CPCN exemption if its capacity does not exceed 70 MW and it does not supply power to the local electric company or another entity (MPSC, 2008). The cogeneration facility would have a capacity of 4.3 MW and all of the electricity generated would be consumed on-site; therefore, the facility would be eligible for a CPCN exemption.

[8] The General Conformity Rule applicability analysis for the Proposed and Alternative Actions relies on the emission inventories in the May 23, 2007 SIP for the 8-hour ozone standard and is based on the AQCR's designation as a moderate nonattainment area.

For any new emergency generator larger than 500 hp, the Navy would also apply for a waiver ('Application for Commission Approval to Construct a Generating Station') with the Public Service Commission of Maryland, which must be obtained before the PTC can be filed with MDE. The Public Service Commission requires a waiver for any emergency generator "that (1) would not be synchronized with the local electric company's transmission and distribution system ('Electric System') and (2) would be configured so that there is no export of electricity to the Electric System" (MPSC, 2009). Under the Proposed Action, there are seven new emergency generators larger than 500 hp that meet these Public Service Commission waiver criteria and thus would require a waiver.

Title V Permit

All new applicable emission units, such as the boilers and emergency generators associated with the primary nodal plants, secondary nodal plants, and UEM Building, would be added to the Title V operating permit. Diesel reciprocating emergency generators of 500 hp (373 kW) or less and boilers of 1 MMBtu or less are considered insignificant sources for federal Title V permitting. Under the Proposed Action, 10 emergency generators would be installed that meet these criteria. These generators would be added to NSF Indian Head's Title V air permit as insignificant sources. Seven generators over 500 hp (373 kW), 22 boilers over 1 MMBtu, and the CT-HRSG would be added to the Title V Permit as significant sources and would require annual emissions reporting.

All significant and insignificant emission units located in demolished buildings would be removed from the Title V permit upon its next renewal, including the boilers and generators associated with the Goddard Power Plant and Steam B Plant.

No-Action Alternative

Under the No-Action Alternative, the emissions-producing operations described in Section 3.3 would continue at their existing locations in accordance with the installation's Title V permit. However, the Goddard Power Plant would not be able to comply with the installation's Title V permit once the more stringent air emission limits, discussed in Section 3.3, become effective and the Title V permit is updated accordingly. No new air quality permits would be required under the No-Action Alternative.

4.3.3 Greenhouse Gas Emissions

Proposed Action

Construction, renovation, and demolition activities would generate temporary GHG emissions, while steam, heat, and electricity generation activities and operation of the new facilities, including periodic emergency generator use, would generate recurring GHG emissions. The replacement of existing facilities with more energy efficient buildings would be expected to reduce operational electricity usage (Scope 2). As discussed in further detail below, under normal operating conditions, actual GHG emissions associated with the steam and electricity consumed at NSF Indian Head are expected to decrease due to the replacement of the Goddard Power Plant with a more efficient decentralized steam distribution system and the resulting decreased reliance on the power grid for electricity. Emissions from air conditioning (Scope 1) and on-base vehicle trips (Scope 3) under the Proposed Action are anticipated to be equal to or less than the emissions resulting from current operations in existing facilities. Thus, for this analysis, only construction activities; generation of steam, heat, and electricity; use and maintenance of emergency generators; and production and transportation of construction materials are considered.

Scope 1 Recurring GHG Emissions - Steam and Electricity Generation Activities and Generator Use

The Proposed Action would affect recurring Scope 1 GHG emissions generated by the on-base production of steam. Consistent with Section 4.3.1 above, the projected emissions from the boilers were estimated using emission factors from 40 CFR Part 98 for general stationary fuel combustion sources and are presented in Table 4-5. Projected emissions are based on the fuel consumption rates presented in Table 4-5. GHG emissions associated with the purchase of electricity from the grid are discussed below under *Scope 2 and 3 Emissions*. Table 4-5 presents the annual GHG emissions from steam and electricity generation activities under the Proposed Action.

Table 4-5. Annual GHG Emissions from Steam and Electricity Generation under the Proposed Action

		Primary Nodal Plants		Secondary Nodal Plants		Change in Electricity from Grid	
		CT-HRSG Emissions (Natural Gas)		Boiler Emissions (Natural Gas)		Indirect Scope 2 Emissions	
Energy Consumption		409.8	MMscf/yr	245.3	MMscf/yr	-0.4	MW
N_2O	Emission factor	0.22	lb/10^6 scf	0.22	lb/10^6 scf	n/a	
	Emissions (tons/yr)	**0.05**		**0.03**		n/a	
CH_4	Emission factor	2.2	lb/10^6 scf	2.2	lb/10^6 scf	n/a	
	Emissions (tons/yr)	**0.5**		**0.3**		n/a	
CO_2	Emission factor	117,000	lb/10^6 scf	117,000	lb/10^6 scf	n/a	
	Emissions (tons/yr)	**26,575**		**14,335**		n/a	
CO_2e	Emission factor	(N_2O × 310[a)] + (CH_4 × 21[b)] + CO_2		(N_2O × 310[a)] + (CH_4 × 21[b)] + CO_2		1,432	lbs CO_2e/ MWh
	Emissions (tons/yr)	**26,599**		**14,349**		**-2,509**	
Total GHG Emissions from Steam and Electric Generation under the Proposed Action:				**38,439**	**tons/yr CO_2e**		

a – The GWP for N_2O is 310; therefore N_2O emissions are multiplied by 310 to express the emissions in CO_2e.
b – The GWP for CH_4 is 21; therefore CH_4 emissions are multiplied by 21 to express the emissions in CO_2e.
c – For comparison with Table 4-1, a conversion factor (natural gas energy density) of 1,000 MMBtu per 1 MMscf was used to convert natural gas consumption to energy consumption.

Recurring Scope 1 GHG emissions would also be generated from the use of the emergency generators installed under the Proposed Action. Consistent with Section 4.3.1 above, these generators are assumed to operate 500 hours per year. Emissions from these generators were estimated using emission factors from EPA's Mandatory GHG Reporting Rule (Tables C-1 and C-2 of 40 CFR Part 98, Subpart C) and assuming a fuel consumption factor of 0.06 gallons per horsepower-hour. Table 4-6 presents the annual GHG emissions from emergency generators under the Proposed Action.

Table 4-6. Annual GHG Emissions from Emergency Generators under Proposed Action

Equipment	Total Capacity (hp)	Operating Schedule (hrs/yr) [c]	Fuel Consumption (gal/yr)	N_2O (tons/yr)	CH_4 (tons/yr)	CO_2 (tons/yr)	CO_2e (tons/yr)
Proposed Action							
Emissions Factors (lb/10³gal)				*0.185*	*0.924*	*22,800*	$N_2O \times 310^a + CH_4 \times 21^b + CO_2$
New Generators	13,640	150	26,914	0.0025	0.012	306.8	307.9
Existing Generators							
Goddard Generators (Bldg 1920)	4,100	150	8,090	0.0008	0.003	92.2	92.5
Net Change				**0.0017**	**0.009**	**214.6**	**215.4**

a - The GWP for N_2O is 310; therefore N_2O emissions are multiplied by 310 to express the emissions in CO_2e.
b - The GWP for CH_4 is 21; therefore CH_4 emissions are multiplied by 21 to express the emissions in CO_2e.
c - The estimated annual operating schedule and fuel consumption for the existing generators is based on the actual operating data for the three Goddard generators from 2009 to 2011. These data are used to conservatively estimate the operating schedule and fuel consumption rate for the new generators. The new primary nodal plants are expected to be more reliable than the aging Goddard Power Plant and thus it is expected that the actual operating schedule for the new generators would be less than 150 hours per year.

Scope 1 Temporary GHG Emissions - Construction, Demolition, and Renovation Activities

During CDR activities under the Proposed Action, temporary Scope 1 GHG emissions would be generated by construction vehicles and equipment. The assumed construction fleet consists of both nonroad and on-road vehicles and is described in Section 4.3.1. Emission factors from EPA Climate Leaders GHG Protocol for mobile combustion sources were used to calculate the total amount of GHG emissions due to construction activities, and results are summarized in Table 4-7.

Table 4-7. Total GHG Emissions from Construction, Demolition, and Renovation

Type	N_2O Emissions (tons)	CH_4 Emissions (tons)	CO_2 Emissions (tons)	Total CO_2e (tons)
On-road	0.003	0.004	201.8	202.8
Nonroad	0.05	0.12	2,102.8	2,122.0
Total Mobile	0.053	0.124	2,304.6	2,324.8

Scope 2 and 3 Emissions

Replacement of the Goddard Power Plant, which supplies the base with approximately 3.9 MW of electricity, with a 4.3-MW cogeneration facility, would decrease the amount of electricity that NSF Indian Head draws from the power grid. Many electricity generating stations that supply electricity to the grid use fossil fuels that generate GHG emissions, including coal, natural gas, and fuel oil. Thus, the Proposed Action would decrease indirect (Scope 2) GHG emissions associated with the purchase of electricity from the power grid. The generation of electricity in the State of Maryland has an estimated CO_2 intensity of 1.43 lbs/kWh (Leonardo, 2010). As presented in Table 4-5, the

reduction in electricity purchased from the grid is expected to decrease the amount of CO_2e generated by 2,509 tons per year.

As discussed in Section 4.15, overall on-base vehicular travel would likely be slightly reduced under the Proposed Action. Therefore, changes in commuting patterns (Scope 3 emissions) are not expected to contribute to additional GHG emissions.

Temporary indirect GHG emissions would be generated during the production and transportation of new materials used in construction (Scope 3 emissions). These emissions are difficult to quantify, but would be reduced through the use of materials with recycled content and regionally produced materials.

Total GHG Emissions

Under projected actual operating conditions, the Proposed Action is expected to decrease basewide annual GHG emissions by 110,443 tons CO_2e per year, which is a 74 percent reduction from current emission levels associated with the Goddard Power Plant and Steam B Plant operations. The net change in GHG emissions under the Proposed Action is summarized in Table 4-8. Construction activities under the Proposed Action would generate a single occurrence of 2,325 tons CO_2e. In addition, the Proposed Action would replace existing functions with more energy-efficient and less CO_2e-intensive operations, utilizing natural gas, which emits approximately 45 percent less CO_2 than coal.

Table 4-8. Net Change in GHG Emissions under the Proposed Action

Frequency of Emissions	Activity Source	Existing GHG Emissions (tons CO_2e)	GHG Emissions under Proposed Action (tons CO_2e)	Net Change in Emissions (tons CO_2e)
Annually recurring	Steam Generation	149,097	40,948	(108,149)
Annually recurring	Change in Electricity from Grid	n/a	(2,509)	(2,509)
Annually recurring	Emergency Generators	93	308	215
Total		**149,190**	**38,747**	**(110,443)**

The U.S. EPA is currently phasing in GHG permitting requirements. Beginning on July 1, 2011, new sources with the potential to emit 100,000 tons per year CO_2e will be required to apply for GHG permits. The potential to emit analysis for GHG emissions from the primary and secondary nodal plants assumes that the CT-HRSG and all boilers would operate continuously at maximum capacity for a total of 8,760 hours per year. Although projected actual emission estimates from the primary and secondary nodal plants are less than 100,000 tons per year CO_2e, the primary and secondary nodal plants have the potential to emit greater than 100,000 tons per year CO_2e under worst-case operating conditions. Therefore, the Navy would likely need to submit a GHG permit application for approval by MDE (MDE, 2010b).

Alternative Action

The change in GHG emissions would be similar in nature and quantity under the Proposed and Alternative Actions. The primary nodal plants would be larger under the Alternative Action, as

compared to the Proposed Action, in order to provide steam to additional buildings; however, there would be no secondary nodal plants. Steam production would likely be greater under the Alternative Action than the Proposed Action to compensate for energy losses in the larger distribution system. The larger cogeneration plant would also supply more electricity to NSF Indian Head, resulting in a greater decrease in reliance on the power grid.

In comparison to the Proposed Action, the emergency generators for the primary nodal plants would need to be slightly larger under the Alternative Action; however, this would be offset by the lack of emergency generators for secondary nodal plants. Therefore, GHG emissions associated with emergency generator use would be similar to the Proposed Action. The increase in electricity generated by the cogeneration plant would result in a decrease in GHG emissions associated with electricity supplied by the grid. Temporary GHG emissions due to construction of the primary nodal plants would be slightly greater due to the larger building sizes; however, this would be offset by the avoided construction of secondary nodal plants. Changes in vehicle use under the Alternative Action are expected to be the same as under the Proposed Action.

Overall, net changes in recurring GHG emissions under the Alternative Action are expected to be similar in quantity to the Proposed Action.

No-Action Alternative

Under the No-Action Alternative, the Goddard Power Plant would remain operational; therefore, a reduction in recurring GHG emissions would not occur. The No-Action Alternative would not involve any CDR activities and thus would not generate any temporary GHG emissions.

4.4 Water Resources

4.4.1 Stormwater

Proposed Action

The construction and demolition projects associated with the Proposed Action would add new impervious surface within some project areas and remove existing impervious surface in others, thus impacting stormwater generation and transport in the affected watersheds. For the purposes of this stormwater analysis, conservative worst-case estimates of impervious surface construction are assumed.

The construction of the primary nodal plants, UEM Building, secondary nodal plants, and supporting infrastructure would result in the addition of approximately 33,000 SF (0.76 acres) of impervious surface. The primary nodal plant sites contain some existing development including parking areas and access roads, the demolition of which would reduce the area of new impervious surface associated with construction of these plants. Primary Nodal Plant #1, which would be constructed on a site with some existing roadways, would construct up to 17,000 SF (0.39 acres) of new impervious surface. Primary Nodal Plant #2 would demolish the existing Steam B Plant, removing up to 8,900 SF (0.20 acres) of impervious surface, and construct up to 15,150 SF (0.35 acres) of impervious surface, resulting in a net increase of approximately 6,250 SF (0.14 acres) of impervious surface. Development of the proposed location for the UEM Building would add up to 8,600 SF (0.20 acres) of impervious surface. The secondary nodal plants would involve the construction of nine small facilities with a boiler on a concrete pad. The secondary nodal plants combined would result in new impervious surface of 15,000 SF (0.35 acres) and may require LID measures.

The Proposed Action would also result in the removal and revegetation of a total of 120,500 SF (2.77 acres) of impervious surfaces through demolition of the Goddard Power Plant, its supporting facilities, and the coal yard.

Overall, the Proposed Action would change the total impervious area (TIA) within six subwatersheds at NSF Indian Head (Table 4-9). Installation of the natural gas transmission and distribution lines would likely require the disturbance of urban landscape and forest vegetation; however, the disturbed areas would be revegetated and would not result in a net change in TIA.

Table 4-9. Net Changes in TIA within Subwatersheds under the Proposed Action

	Subwatershed						NSF Indian Head
	154	162	191	207	209	231	
Total Area (acres)	3.74	168	4.5	176	643	181	1,977
Current TIA (acres and percent)	1.1 29.4%	12.3 7.3%	2 44.0%	34.9 19.9%	107.7 16.7%	37.2 20.6%	301 15.2%
Primary Nodal Plant #1 new impervious area (acres)	—	—	0.29	—	0.10	—	0.39
Primary Nodal Plant #2 new impervious area (acres)	0.08	0.12	—	—	—	—	0.20
UEM Building new impervious area (acres)	—	—	—	—	—	0.20	0.20
Secondary Nodal Plants new impervious area (acres)	—	—	—	0.12	0.21	—	0.33

Table 4-9. Net Changes in TIA within Subwatersheds under the Proposed Action

	Subwatershed						NSF Indian Head
	154	162	191	207	209	231	
Demolition (Goddard Power Plant, Steam B Plant, excess steam lines) of impervious area (acres)	—	—	—	-2.77	—	—	-2.77
Net Changes in TIA (acres and percent)	0.08 2.14%	0.12 0.07%	0.29 6.44%	-2.65 -1.51%	0.31 0.05%	0.20 0.11%	-1.65 -0.08%
Future TIA (acres and percent)	1.18 31.6%	12.42 7.4%	2.29 50.9%	32.25 18.3%	108.01 16.8%	37.40 20.7%	299.35 15.1%

As shown in Table 4-9, the Proposed Action would increase the amount of TIA within Subwatersheds 154, 162, 191, 209, and 231, which could impact stormwater quantity and quality. Navy Instructions and EISA require all future construction actions to meet specific stormwater guidelines. To mitigate potential impacts to stormwater, the Proposed Action would implement stormwater management systems designed in accordance with the Navy's LID Policy, EISA, and the Maryland Stormwater Management Act of 2007. Appropriate and feasible LID practices would be incorporated into the stormwater management plan and the project designs to restore the predevelopment hydrology to the maximum extent technically feasible in the affected subwatersheds. Furthermore, the stormwater management plan would ensure that LID measures are implemented at the nodal plant sites to encourage infiltration and minimize the velocity and volume of stormwater that drains toward the Potomac River shoreline in order to prevent further shoreline erosion. LID measures would also be employed at the UEM Building site to minimize the velocity and volume of stormwater that drains to a highly eroded stream approximately 280 feet from the UEM site. If LID measures cannot be implemented at the UEM site due to soil characteristics, restoration of the stream may be an alternative mitigation measure.

LID measures that could be incorporated into the design of the primary nodal plants and UEM Building include bioretention basins, grassed swales, pervious pavement, vegetated buffers, constructed wetlands, and green roofs. Overall, these LID measures would reduce runoff volume and rate, disperse flow, remove pollutants, and facilitate infiltration into the soil providing groundwater recharge. The nodal plant project sites are believed to contain low permeability soil that does not provide for efficient infiltration of stormwater. In areas with low permeability soil, multiple LID measures could be implemented in series to ensure effective stormwater mitigation.

The existing impervious area of the Primary Nodal Plant #2 and UEM Building project sites could exceed 40 percent, which would qualify them as redevelopment projects. The MDE requirement for redevelopment projects to reduce existing impervious areas by a minimum of 50 percent within the project LOD may be difficult to comply with at these sites. If the project and site designs cannot meet this requirement, then it might be necessary to use accumulated stormwater credits from the MDE water quality banking system for these projects.

Demolition activities under the Proposed Action would decrease the amount of TIA within Subwatershed 207 by restoring currently developed areas, including Goddard Power Plant and the associated coal yard, to vegetated condition. This reduction in impervious surfaces would be expected to reduce the quantity of stormwater generated, increase infiltration, eliminate sources of stormwater pollution (e.g., the coal yard, and oily roads and parking lots), and reduce sediment and erosion transport due to erosion during heavy precipitation events, resulting in improvement to the quality of stormwater discharge to nearby streams and the Mattawoman Creek. The proposed

demolition is also consistent with the intent of the SWPPP and would supplement the BMPs described in the IMP by allowing for increased stormwater infiltration in the affected areas after they are revegetated. Construction and demolition activities associated with the primary nodal plants, secondary nodal plants, and the Steam B Plant performed within the 1,000-foot shoreline buffer may require tree replanting to mitigate for vegetation removal and the increase in impervious surface (Sections 4.4.4 and 4.7).

The Proposed Action would disturb more than 5,000 SF, requiring the Navy to prepare sediment and erosion control (SEC) and stormwater management plans for review and approval by MDE. The SEC plans would identify measures to be employed at the construction and demolition sites to reduce sediment transport to surface water bodies, while the stormwater management plans would establish measures to control runoff from the newly developed areas. As part of the submittal package, the Navy would include a Water Quality Banking Summary Sheet, if applicable, for State/Federal Applicants requesting bank credit for future use on projects that may fall short of meeting stormwater requirements.

Alternative Action

In comparison to the Proposed Action, the Alternative Action would construct larger primary nodal plants, resulting in more stormwater runoff and management requirements within Subwatersheds 154, 162, 191, and 209. However, the Alternative Action would not construct secondary nodal plants and thus would not increase stormwater runoff in Subwatersheds 207 and 209. Table 4-10 summarizes the changes in TIA for each subwatershed affected by the Alternative Action.

Overall, construction and demolition activities under the Alternative Action would have comparable impacts to base-wide TIA and stormwater quality and quantity, and would require similar stormwater management measures to those discussed under the Proposed Action.

Table 4-10. Net Changes in TIA within Subwatersheds under the Alternative Action

	Subwatershed						NSF Indian Head
	154	162	191	207	209	231	
Total Area (acres)	3.74	168	4.5	176	643	181	1,977
Current TIA (acres and percent)	1.1 29.4%	12.3 7.3%	2 44.0%	34.9 19.9%	107.7 16.7%	37.2 20.6%	301 15.2%
Primary Nodal Plant #1 new impervious area (acres)	—	—	0.29	—	0.12	—	0.41
Primary Nodal Plant #2 new impervious area (acres)	0.10	0.14	—	—	—	—	-0.06
UEM Building new impervious area (acres)	—	—	—	—	—	0.20	0.20
Demolition (Goddard Power Plant, Steam B Plant, excess steam lines) of impervious area (acres)	—	—	—	-2.77	—	—	-2.77
Net Changes in TIA (acres and percent)	0.10 2.7%	0.14 0.08%	0.29 6.36%	-2.77 -1.57%	0.12 0.02%	0.20 0.11%	-1.92 -0.10%
Future TIA (acres and percent)	1.18 31.6%	12.42 7.4%	2.29 50.8%	32.13 18.3%	107.82 16.8%	37.40 20.7%	299.08 15.1%

No-Action Alternative

The No-Action Alternative would not implement any of the construction or demolition actions discussed under the Proposed Action and Alternative Action sections and therefore would not impact stormwater quantity or quality. The No-Action Alternative would not improve stormwater quality by removing existing impervious surfaces and revegetating areas associated with the Goddard Power Plant. Furthermore, acidic stormwater runoff from the coal pile at the Goddard Power Plant would continue to be generated and require treatment in the neutralization ponds.

4.4.2 Surface Waters

Proposed Action

Construction, renovation, and demolition activities under the Proposed Action have the potential to impact surface water bodies in and around NSF Indian Head. In addition, daily operations of the primary and secondary nodal plants would consume river water from the Potomac River.

Proximity to Existing Surface Water Bodies

Construction of the primary nodal plants, secondary nodal plants, and UEM Building is not expected to directly alter or disturb surface waters at NSF Indian Head. As discussed in Section 4.4.1, SEC and stormwater management plans would be developed and implemented to prevent water quality impacts from construction activities and the resulting increase in impervious surface at the primary nodal plants, secondary nodal plants, and UEM Building sites.

Natural gas lines within NSF Indian Head would cross up to three streams and come within 100 feet of four additional streams. The gas transmission line from Bryans Road to NSF Indian Head may cross up to thirteen streams and come within 100 feet of one additional stream. As discussed in Section 4.4.1, SEC measures would be employed during gas line installation to protect the water quality of the affected streams. Stream crossings would be avoided to the greatest extent possible. If stream crossings could not be avoided, Washington Gas would use directional drilling techniques to avoid direct impacts to streams. However, in the event that directional drilling is not feasible and excavation crossings are required at each of the potentially affected streams, the effects would be temporary and would not significantly impact the streams or aquatic habitat. Any natural gas lines that cross stream channels would be constructed in accordance with the requirements of a Joint Federal/State Waterways/Floodplain/Wetland Permit and COMAR 26.17.04. would be obtained for construction of all natural gas transmission and distribution lines that cross stream channels. In the event stream crossings cannot be avoided, the lines would be buried at a sufficient depth so as not to impact the stream, in compliance with COMAR 26.17.04. These regulations require that the lines be buried at a sufficient depth so as not to impact a stream and ensure that installation of the lines does not cause any permanent damage to the course, current, or cross section of a stream or body of water.

Demolition and renovation of existing steam lines that cross streams and wetlands could impact these surface water features. As discussed in Section 4.4.1, SEC measures would be employed during these activities to protect the water quality of the affected surface waters. If disturbance of streams or wetlands is required, a Joint Federal/State Waterways/Floodplain/Wetland Permit would need to be obtained from MDE.

Demolition and revegetation of the Goddard Power Plant and coal pile is expected to improve stormwater quality by removing existing pollutant sources (Section 4.4.1), and thus contribute to improvements in surface water quality in nearby streams.

River Water Use

The primary nodal plants, as well as Secondary Nodal Plants #2, 3, 4, and 7 would use river water to generate steam and for fire protection. The plants would tie into the nearest river water main and would require periodic flushing of the river water pipes. Secondary Nodal Plants #1, 5, 6, 8, and 9 would also use river water to generate steam if the connection of these plants to the river water system is determined to be financially feasible under a future project.

Under the Proposed Action, river water use through operation of the nodal plants would replace the 375,000 gpd river water use associated with the existing steam generation system, including the Goddard Power Plant and Steam B Plant. River water consumption associated with steam generation under the Proposed Action is expected to be 124,000 gpd, which represents a 251,000 gpd reduction as compared to existing conditions. If it is financially feasible under a future project for Secondary Nodal Plants #1, 5, 6, 8, and 9 to use river water instead of potable water, river water consumption would be 166,000 gpd, representing a 209,000 gpd reduction from existing conditions. This decreased river water consumption is due to the reduction in the number of buildings supported by the steam plants and an increase in efficiency of both the steam generation and distribution systems. This is expected to contribute to improvements in surface water quality in the Potomac River.

Alternative Action

The Alternative Action would construct and demolish impervious surfaces near some surface water bodies located throughout the base, which would require implementation of stormwater management and SEC plans, as well as LID to minimize impacts to surface waters.

The primary nodal plants would be slightly larger under the Alternative Action and would therefore use a greater volume of river water, although still less than under existing conditions due to the smaller capacity of the steam boilers and the improved efficiency of steam distribution upgrades. On the other hand, the natural gas distribution lines for the secondary nodal plants would not be installed; therefore, fewer stream crossings would be required and potential impacts to surface water would be reduced.

No-Action Alternative

The No-Action Alternative would result in the continuation of operations at the existing Goddard Power Plant and Steam B Plant, which are located near various surface water bodies. The No-Action Alternative would not involve any earth disturbance or create any new impervious surface and would not impact local streams or surface water bodies. However, under the No-Action Alternative, the Goddard Power Plant would continue to withdraw large quantities of water from the Potomac River.

4.4.3 Industrial Wastewater

Proposed Action

Under the Proposed Action, daily operations of the primary nodal plants would discharge process wastewater and NCCW to the Potomac River or sewage treatment plant. Sanitary wastewater would also be generated by the operation of the nodal plants and UEM Building and discharged to the sewage treatment plant. However, overall, the Proposed Action would generate less process wastewater and therefore reduce the amount of wastewater and associated pollutants discharged from NSF Indian Head. Specifically, removal of the Goddard coal pile would reduce discharges of

nitrogen, phosphorous, and sediment to the Mattawoman Creek, a tributary to the Chesapeake Bay that has been identified by MDE as impaired by excess nitrogen and phosphorous. These pollutants cause algae blooms that consume oxygen and create "dead zones" where fish and shellfish cannot survive. Therefore, reducing discharges of these pollutants would improve surface water quality in the Mattawoman Creek.

NCCW from steam generation operations would be discharged directly to the Potomac River via new outfalls, which would require modifications to the NPDES permit. However, NCCW discharges would not contain pollutants and thus would not adversely impact surface water quality in the Potomac River. The NPDES permit would also need to be modified to reflect the removal of discharges and associated pollutants to existing outfalls, including IW-40, IW-80, MP-140, and potentially IW-107. By removing outfalls (IW-40, IW-80) to the Mattawoman Creek, pollutant discharges to this impaired waterway would be reduced. In addition, any new outfalls required for industrial wastewater discharge from the primary nodal plants or UEM Building would need to be added to the NPDES permit and approved by MDE prior to the commencement of discharge.

Wastewater generated by the operation of the nodal plants under the Proposed Action would likely be treated at the sewage treatment plant prior to discharge. This would replace the wastewater discharge associated with the existing steam generation system, including the Goddard Power Plant and Steam B Plant. However, wastewater discharge associated with steam generation under the Proposed Action is expected to be reduced as compared to existing conditions due to the reduction in the number of buildings supported by the steam plants and an increase in efficiency of both the steam generation and distribution systems. As discussed above, the elimination of wastewater discharge from the Goddard Power Plant and coal pile is expected to reduce pollutant loading to the Mattawoman Creek and contribute to improvements in surface water quality in the Mattawoman Creek. This would also help NSF Indian Head comply with the new Mattawoman Creek TMDLs for phosphorous, nitrogen, and TSS (Shaffer, 2011).

Operation of the UEM Building would discharge sanitary wastewater and equipment wash-down water to the sewage treatment plant. Personnel and operations are being relocated to the UEM Building from existing facilities; therefore, the amount of sanitary wastewater and equipment wash-down water generated by the UEM Building would be consistent with the amount generated by existing operations or would be decreased due to improved water efficiency at the new facility.

Before process water from the UEM Building or primary nodal plants is discharged to the sewage treatment plant, it would be tested to ensure that any pollutants it contains can be treated at the sewage treatment plant. If test results indicate that the wastewater is not compatible with the sewage treatment plant, the wastewater would be drummed (or trucked) and disposed of offsite.

Alternative Action

The Alternative Action would conduct similar operations as the Proposed Action and would therefore result in similar discharges of sanitary and process wastewater. The primary nodal plants would be slightly larger under the Alternative Action and would therefore discharge a greater volume of wastewater to the Potomac River, although still less than under existing conditions due to the smaller capacity of the steam boilers and the improved efficiency of steam distribution upgrades.

No-Action Alternative

The No-Action Alternative would result in the continuation of operations at the existing Goddard Power Plant and Steam B Plant. Under the No-Action Alternative, the Goddard Power Plant would

continue to discharge large quantities of process and non-contact wastewater back into the Potomac River and Mattawoman Creek, limiting the Navy's ability to comply with Mattawoman Creek TMDL requirements for nitrogen, phosphorous, and TSS.

4.4.4 Coastal Zone Management

Proposed and Alternative Actions

The activities associated with the Proposed and Alternative Actions would occur mainly in developed areas and are not expected to significantly affect water quality, aquatic areas of significant resource value, tidal or non-tidal wetlands, or significant wildlife habitat areas. In addition, these actions are not likely to increase flooding or erosion risks. Overall, the Proposed and Alternative Actions may improve stormwater runoff quality and reduce wastewater discharges to the Potomac River and Mattawoman Creek; thus improving the water quality of Maryland's coastal resources.

With the exception of the natural gas line from Bryans Road to NSF Indian Head, none of the activities associated with the Proposed and Alternative Actions would occur within the coastal zone because NSF Indian Head is on federally-owned land. However, the Proposed and Alternative Actions would conduct construction and demolition activities within 1,000 feet of the shoreline. The following project elements are within the 1,000-foot shoreline buffer under the Proposed Action:

- Primary Nodal Plants #1 and 2;
- Electric line to substation (2,230 LF);
- Secondary Nodal Plants #5, 6, and 9;
- Natural gas transmission line within NSF Indian Head (3,150 LF);
- Natural gas distribution lines (4,770 LF);
- Goddard coal pile; and
- Goddard Power Plant Buildings 768 and 899.

Vegetation clearing within the 1,000-foot shoreline buffer would be required for the construction of the primary nodal plants and supporting infrastructure (steam and gas lines), as well as Secondary Nodal Plants #5, 6, and 9 under the Proposed Action. The extent of vegetation clearing and potential mitigation are discussed in Section 4.7.

Due to the construction activities within 1,000 feet of the NSF Indian Head shoreline and within the coastal zone outside of the installation's boundaries, the Navy submitted a federal consistency determination (Appendix E) to MDE's Wetlands and Waterways Program Coastal Consistency Division. The intent of the consistency determination was to demonstrate that the action is consistent to the maximum extent practicable with the enforceable policies of the state's CZM program. To ensure consistency with these policies, the Navy proposed implementation of stormwater and SEC plans, including LID measures, and mitigation of disturbance by planting trees and revegetating impervious surfaces. The Proposed Action would mitigate tree removal at a 1:1 ratio by planting up to 61,750 SF (1.42 acres) of trees and utilizing the installation's 63,250 SF (1.45 acres) of banked credit as needed to meet the potential clearing of up to 125,000 SF (2.87 acres) of trees. The Critical Area Commission responded on 24 February 2012 (Appendix E), providing concurrence that the project will be consistent with the Maryland CZM program and the goals and objectives of the Critical Area Law and Criteria, provided that the project ESD meets certain requirements for stormwater reduction. MDE did not respond to the Navy's consistency determination notification within 60 days.

No-Action Alternative

The No-Action Alternative would not impact coastal use or resources or result in changes to the water quality outside of the boundary of NSF Indian Head. Consequently, the Navy would not need to consult with MDE regarding consistency with the Maryland CZM Program. The No-Action Alternative would result in the continued operations of existing facilities within the property boundaries of NSF Indian Head. The No-Action Alternative would not involve any development activities or vegetation removal within the Critical Area.

4.4.5 Groundwater

Proposed Action

The Proposed Action is expected to reduce groundwater usage at NSF Indian Head by installing new equipment and operations, demolishing existing buildings and operations, and relocating existing operations to new water-efficient facilities. Certain project elements of the Proposed Action could be located in areas with potential surficial groundwater contamination, which may require restrictions during construction. With appropriate restrictions, construction would not adversely affect groundwater.

Groundwater Usage

Under the Proposed Action, the primary nodal plants would be connected to the potable water utility distribution system for domestic purposes. Similar to the existing Goddard Power Plant, the primary nodal plants would use potable water as a backup for steam and cogeneration operations if the river water filtration system is not operational.

Secondary Nodal Plants #1, 5, 6, 8, and 9 would use approximately 42,000 gpd of groundwater to generate steam. This represents a significant reduction in maximum daily groundwater use in comparison to the 375,000 gpd that is used by the Goddard Power Plant when the plant uses groundwater for its operations. Secondary Nodal Plants #2, 3, 4, and 7 would primarily use river water with dedicated RO filtration. However, potable water would be used at these secondary nodal plants as an emergency backup. Water meters would be installed on the potable water lines in order to ensure only small amounts of potable water are used for these purposes. As stated above, Secondary Nodal Plants #1, 5, 6, 8, and 9 would use river water instead of groundwater to generate steam if the connection of these plants to the river water system is determined to be financially feasible under a future project.

Under the Proposed Action, the UEM Building would relocate existing personnel into more efficient facilities, resulting in a reduction in groundwater consumption.

Overall, the Proposed Action would likely reduce the demand for groundwater in support of steam generation due to a reduction in the number of buildings supported by the steam plants, an increase in efficiency of both the steam generation and distribution systems, and discontinuation of steam generation and water-consuming maintenance activities at the Goddard Power Plant.

Groundwater Contamination

Under the Proposed Action, renovating and demolishing/capping and leaving in place existing steam lines, as well as installing new natural gas lines could occur within or near several MRP and IR sites that could have potentially contaminated surficial groundwater. As discussed in Section 3.10, each IR and MRP site has specific requirements and restrictions for work to occur within their

boundaries. Demolition of the Goddard Power Plant and construction of the primary nodal steam plants and the UEM Building would not occur within any IR or MRP sites. The removal of the coal pile could reduce the potential for future surficial groundwater contamination.

Alternative Action

In comparison to the Proposed Action, the Alternative Action would construct larger primary nodal plants; therefore, the backup potable water usage when the river water filtration system is not operational would be greater. Under the Alternative Action, secondary nodal plants would not be installed and therefore would not impact groundwater. Similar to the Proposed Action, the increased efficiency of the steam generation and distribution system under the Alternative Action, which allows smaller boilers to be utilized, would likely reduce emergency (i.e., back-up) groundwater consumption in comparison to the existing steam generation and distribution system.

Under the Alternative Action, surficial groundwater contamination concerns would be the same as discussed under the Proposed Action.

No-Action Alternative

The No-Action Alternative would not decrease groundwater usage at NSF Indian Head as the Goddard Power Plant and Steam B Plant would remain operational. The No-Action Alternative would also not involve potential exposure of workers to any contaminated surficial groundwater. However, it may increase the potential for future surficial groundwater contamination due to the continued presence of the coal pile and decay of buildings and steam lines that are contaminated with lead-based paint and asbestos.

4.4.6 Wetlands

Proposed Action

The construction and demolition sites of the primary nodal plants, secondary nodal plants, UEM Building, and Goddard Power Plant are not located within 100 feet of any tidal wetlands or 25 feet of any non-tidal wetlands; therefore, a Joint Federal/State Waterways/ Floodplain/Wetland Permit would not be required. However, the natural gas distribution lines near Secondary Nodal Plant #8 may be constructed along an existing road adjacent to wetlands. In addition, the natural gas transmission line outside of NSF Indian Head may be constructed within up to 0.1 acres of nontidal wetlands and within 100 feet of up to 5.9 acres of nontidal wetlands. To the greatest extent possible, Washington Gas would avoid wetlands or utilize directional drilling to avoid impacts to wetlands. However, if impacts to wetlands cannot be avoided, Washington Gas would comply with all permit and mitigation requirements, as applicable. The installation of utility lines disturbing less than ½ acre of wetlands is considered a Category I activity under USACE's Maryland State Programmatic General Permit-3 (MDSPGP-3), provided there is no change in preconstruction contours. A Joint Federal/State Permit for the Alteration of a Floodplain, Waterway, Tidal, or Nontidal Wetland must be submitted to MDE and USACE to determine if the construction of the natural gas lines meets the applicable conditions in MDSPGP-3.

Excess steam lines that cross over wetlands would be demolished or capped and left in place at various locations throughout NSF Indian Head. In addition, upgrades to existing steam lines that are located within or near wetlands would likely occur at multiple locations throughout the base. These activities would not result in significant adverse impacts to wetlands. Steam lines running through wetlands would be cut at the foundation to reduce impacts associated with demolition and excavation within the wetlands.

All construction and demolition activities under the Proposed Action would need to be performed in accordance with MDE-approved stormwater management and SEC plans to regulate sediment transport into streams and wetlands. In addition, construction projects under the Proposed Action would not result in any wastewater discharges to wetlands. Therefore, it is anticipated that these construction projects would not result in significant adverse impacts to wetlands. In addition, the Navy would avoid removal of trees within riparian buffers of tidal wetlands to the maximum extent feasible.

Alternative Action

Potential impacts to wetlands associated with construction of the primary nodal plants, UEM Building, and natural gas transmission line would be similar in scale and scope to the Proposed Action. However, the secondary nodal plants and associated natural gas distribution lines would not be installed under the Alternative Action, resulting in fewer construction activities near wetlands and reduced potential to impacts wetlands. Similar to the Proposed Action, a Joint Federal/State Waterways/Floodplain/Wetland Permit would be obtained for any activity that disturbs or occurs within a non-tidal wetland or its 25-foot buffer, and all work would be performed in accordance with the MDE-approved stormwater management and SEC plans to minimize impacts to wetlands.

No-Action Alternative

The No-Action Alternative would not disturb or discharge any wastewater to non-tidal or tidal wetlands, and would therefore not result in any impacts to wetlands.

4.4.7 Floodplains

Proposed Action and Alternative Action

The construction and demolition sites for the primary nodal steam plants, UEM Building and Goddard Power Plant under the Proposed and Alternative Actions are not located within the 100-year floodplain at NSF Indian Head. However, construction of the natural gas distribution lines near Secondary Nodal Plants #5 and 8 and upgrading and demolishing/capping and leaving in place existing steam lines within the 100-year floodplain may be necessary due to explosives safety constraints and to minimize impacts to natural resources. Construction of gas distribution lines would occur within existing rights-of-way along roadways to minimize disturbance to the 100-year floodplain. Utility upgrades would not modify the floodplain and work would be performed in such a way as to minimize harm to and disturbance within the floodplain. Potential impacts to the 100-year floodplain due to the construction, upgrade, or demolition of utility lines under the Proposed and Alternative Actions are expected to be temporary and minor in nature and no permanent floodplain impacts are anticipated.

No-Action Alternative

The No-Action Alternative would not impact the 100-year floodplains.

4.5 Land Use

The Proposed Action would further the goals of the Master Plan to upgrade ageing utility structures and relocate personnel from the restricted area to the non-restricted area of NSF Indian Head. The Proposed Action would not considerably affect general land use patterns as identified in the Master Plan (NSASP, 2010a). The Master Plan is a general land use guide for NSF Indian Head, but alternative land uses may be approved by the commanding officer.

Proposed Action

The proposed locations for the primary nodal plants are consistent with future land use designations as identified in the Master Plan.

Installation of the natural gas transmission line would have minimal impact on the vision of the Bryans Road- Indian Head Sub- Area Plan due to its installation primarily within the Route 210 right-of-way. Similarly, installation of the natural gas distribution lines would have minimal impact on future land use at NSF Indian Head due to proposed installation alongside existing roadways and utility corridors. Although the proposed location of the regulator station is in an area designated for administration, utility infrastructure is necessary throughout all land use areas and therefore is compatible with the goals set forth in the Master Plan.

The secondary nodal plants are located within land use areas designated for administration, energetic RDT&E, inert industrial, inert RDT&E, and energetic processing, requiring utility infrastructure for operations. The secondary nodal plants would be part of the utilities that support the other facilities in these areas.

The proposed location for the UEM Building is compatible with the office and administrative land use area designated by the Master Plan by relocating personnel from the restricted area at the Goddard Power Plant to the non-restricted area of the installation.

Under the Proposed Action, demolition of the Goddard Power Plant and its supporting infrastructure and facilities would not directly result in any land use changes, but may facilitate future redevelopment of the affected areas in a manner that is consistent with the proposed land uses identified in the Master Plan.

Alternative Action

The impacts of the Alternative Action are similar to those of the Proposed Action except that the existing steam infrastructure would not be removed under the Alternative Action. Thus gas distribution lines would not be installed to supply secondary nodal plants as called for in the Proposed Action. This may limit accessibility to gas by future new developments in these areas.

No-Action Alternative

The No-Action Alternative would not implement any of the construction or demolition actions discussed under the Proposed and Alternative Actions. However, the No-Action Alternative would not align with the utility and sustainability goals of the Master Plan (Section 3.5).

4.6 Socioeconomics

Proposed Action and Alternative Action

Most socioeconomic impacts on the local community would be limited to the duration of demolition and construction. The Proposed and Alternative Actions would not cause substantial recreation or environmental justice impacts on minority or low income populations; result in the creation of any new permanent jobs; or have a permanent impact on population, housing, employment or income in Charles County. The Proposed and Alternative Actions would help sustain NSWC IHD as an energetics supplier for DoD and U.S. Allied Forces, maintaining an ongoing economic role in the community.

Population, Housing, Employment and Income

Construction and demolition work would provide temporary employment opportunities. However, due to the relatively short duration of these activities, construction workers not already residing in the local area would likely commute to the area for the duration of the project rather than relocate. Construction workers desiring to be in the local area would likely seek temporary housing, such as motels, apartments, or other rental units, resulting in minimal impact to the local population and housing. Construction workers commuting or temporarily residing in the local area during these activities would likely spend money on food and other incidentals in the Town of Indian Head and surrounding areas, creating some additional income for local businesses. Installation of the gas transmission line along Mattingly Avenue would require obtaining easements and could impact private property along this road. However, this work would be performed in accordance with all applicable regulations and permits, as discussed further in Sections 4.13 and 4.15, to minimize impacts on the local community.

Fishing and Recreation

Due to the offsetting stormwater and vegetation impacts associated with construction and demolition, neither the Proposed Action nor the Alternative Action would negatively impact fishing or recreational activities in or around the Potomac River or Mattawoman Creek (Section 4.4.1). Demolition and subsequent revegetation of the Goddard Power Plant and coal pile would be beneficial for the quality of the Mattawoman Creek (Section 4.7). Decreased water withdrawals and discharges to surface water bodies would also contribute to improvements in the quality of surface water bodies, the Potomac River, and the Mattawoman Creek. Construction of the gas transmission line along Mattingly Avenue could delay access to Mattingly Park, which provides an area for picnicking, boating, and fishing. However, traffic could be rerouted to ensure continual access to the park, resulting in minimal delays.

Environmental Justice

The Town of Indian Head contains a higher distribution of children, minorities, and persons of low income compared to Charles County as a whole. Therefore, any impacts on the town would disproportionately affect these sensitive groups. The Proposed and Alternative Actions would involve extensive construction and demolition activities, which would be restricted to certain hours of the day to reduce noise impacts. The natural gas lines would be installed alongside existing roadways and primarily within the Route 210 right-of-way outside NSF Indian Head, resulting in minimal impacts to the surrounding community. As stated above, installation of the gas transmission line along Mattingly Avenue could impact private property.

No-Action Alternative

The No-Action Alternative would not disrupt any community or recreational activities in Charles County or adversely affect human health or sensitive populations in the area immediately surrounding NSF Indian Head. However, this action would not provide temporary construction employment opportunities or temporarily increase income for some local businesses. In addition, the No-Action Alternative would not provide the facilities and equipment necessary to support mission requirements and ensure that NSF Indian Head remains a stable source of employment and a viable hub for business activities in the Town of Indian Head.

4.7 Vegetation

Proposed Action

The activities associated with the Proposed Action would occur mostly within and adjacent to developed areas, resulting in relatively limited impacts to vegetation. Vegetation removal would be required in some areas and result in impacts to urban landscape as well as small areas of forest vegetation (Table 4-11). Any trees removed by the Proposed Action would be managed in accordance with the Maryland Department of Agriculture (MDA) Quarantine Order #08-01, issued August 26, 2008 to prevent the spread of the emerald ash borer (EAB). The EAB is an invasive beetle that can significantly affect the health of ash trees. Firewood of all hardwood species and any material living, dead, cut, or fallen (e.g., logs, stumps, roots, branches) of the ash genus (*Fraxinus* spp.) would not be transported outside of Charles County (MDA, 2008). Small trees and branches of any hardwood species would be chipped on site. Large felled trees would be left on site or chopped and transported to the NSF Indian Head firewood lot, depending upon the location.

For actions requiring tree removal within the 1,000-foot shoreline buffer, the Navy consulted with MDE through the CZMA federal consistency determination process (Section 4.4.4). Additionally, areas disturbed during installation of utility lines would be replanted/reestablished as urban landscape vegetation after installation is complete, thus resulting in no net loss of urban vegetation.

Primary Nodal Plants

The construction of Primary Nodal Plant #1 would require the removal of up to 1.12 acres of urban landscape and 2.03 acres of deciduous forest that is part of a small forest fragment (Table 4-11). Mitigation would include 0.38 acres of reforestation consisting of a minimum of three species of hardwood seedlings native to the site. Landscaping and bioretention at the site would include a variety of native plants consistent with the INRMP. Primary Nodal Plant #2 would be located in the current location of the Steam B Plant, reducing impacts to vegetation. Construction of the new plant would require vegetation clearing resulting in the removal of up to 0.51 acres of urban landscape and 0.84 acres of deciduous forest. New landscaping would be consistent with the INRMP.

Construction of the two primary nodal plants would require the removal of deciduous forest and urban landscape within the 1,000-foot shoreline buffer. Vegetation clearing within the 1,000-foot shoreline buffer would be mitigated as discussed in Section 4.4.4.

Installation of the new electrical line from Primary Nodal Plant #1 to the substation near the Goddard Power Plant could temporarily disturb urban landscape through trimming and tree removal to provide access for construction equipment, but this is not considered an adverse effect. Similarly, repair and demolition of existing steam lines would result in temporary impacts to vegetation.

Upgrades or repairs to the steam line north of the existing Steam B Plant could impact the small cluster of primrose willow found within its right-of way. Prior to construction, the NSF Indian Head Natural Resource Office would mark this location and impacts would be avoided to the maximum extent possible.

Secondary Nodal Plants

Construction of the secondary nodal plants would generally occur in close proximity to existing development and thus, in most cases, affect only urban vegetation. However, the construction of

Secondary Nodal Plants #6 and 9 would require the removal of a total of 0.29 acres of isolated forest fragments (Table 4-11). The affected forest fragments are small, isolated fragments created by the construction of the surrounding roadways, buildings, and parking areas. As such, the clearing of these areas would result in minor impacts to forest vegetation.

Table 4-11. Existing Vegetation Identified for Removal in the Proposed Locations of the Secondary Nodal Plants

Secondary Nodal Plant	Existing Vegetation	
	Urban Landscape (acres)	Forest (acres)
#1	0.19	-
#2	0.21	0.05[a]
#3	-	-
#4	-	-
#5	0.26	-
#6	0.14	0.07
#7	0.19	-
#8	0.12	-
#9	0.08	0.22
Total	**1.19**	**0.34**

[a] – Forest removal is associated with RO connection.

Construction of Secondary Nodal Plants #5, 6, and 9 would result in vegetation clearing within the 1,000-foot shoreline buffer and would be mitigated as discussed in Section 4.4.4.

Construction of utility connections for the secondary nodal plants, with the exception of RO water and natural gas distribution lines, would have *de minimis* effects on vegetation. The necessary utility services are located within the proposed location of the plants or across adjacent roadways. Installation of RO connections for Secondary Nodal Plants #3, 4, and 7 would occur within highly developed areas or within existing rights-of-way. The RO connection for Secondary Nodal Plant #2 could require tree removal of less than 0.05 acres of forested area. The demolition of excess steam lines may require limited tree removal and vegetation clearing in some areas to provide access for demolition equipment. Mitigation may occur within the rights-of-way of demolished steam lines to meet mitigation requirements and follow the INRMP. Overall, approximately 16.6 acres of existing steam line rights-of-way would be allowed to return to early succession.

Natural Gas Lines

Installation of the natural gas transmission line would result in the temporary disturbance of urban landscape along Route 210, Mattingly Avenue, and Farnum Road. In addition, installation of the transmission line and establishment of the required 20-foot right-of-way between the main gate of NSF Indian Head and Primary Nodal Plant #1 would require the clearing of approximately 0.51 acres of deciduous forest located along Farnum Road. However, tree removal would be limited to the edge of the affected forested fragments.

The installation of the natural gas distribution lines within NSF Indian Head would also temporarily disturb urban landscape found along the existing roads and rights-of-way. In some areas the proposed locations of the distribution lines also run through small forest fragments or the edge of forested areas found along the roadways and rights-of-way. As such, installation of the distribution lines would require the removal of approximately 0.50 acres of forested area. In most cases, the tree removal would be limited to the edge of the forested areas or would impact only small isolated forest fragments. Vegetated areas disturbed by the installation of the new gas distribution lines

would be replanted with native urban landscape in accordance with the INRMP, resulting in no permanent adverse effect to urban landscape.

UEM Building

The proposed location for the UEM Building is currently developed with only minimal urban landscape. Removal of some urban landscape could be necessary for the construction of the new building and associated parking accommodations. Any urban landscape trees removed from the site would be replaced at a 2:1 ratio per the INRMP. In addition, new urban landscaping would be provided in the parking areas, bioretention areas, and along the eastern boundary of the site and follow the INRMP.

Goddard Power Plant

Demolition of the Goddard Power Plant and the associated coal pile would only impact scattered urban landscape, consisting of grass, shrubs, and a few trees. The footprint of the Goddard Power Plant and the adjacent coal pile would be revegetated after the existing structures are demolished, providing up to 2.77 acres of new vegetation. Approximately 55% of this revegetated area would be located within the 1,000-foot shoreline buffer.

Alternative Action

Impacts to vegetation under the Alternative Action would be similar to the Proposed Action. However, the larger footprints of the primary nodal plants under the Alternative Action would require the removal of an additional 1.54 acres of urban landscape and 1.84 acres of deciduous forest. For actions requiring tree removal within the 1,000-foot shoreline buffer under the Alternative Action, the Navy would consult with MDE through the CZMA federal consistency determination process. If the tree clearing is determined to be detrimental to coastal resources, MDE would request the Critical Area Commission to provide mitigation requirements for tree removal within the 1,000-foot shoreline buffer.

The Alternative Action would not provide any secondary nodal plants or associated natural gas lines as under the Proposed Action and would not have the related impacts to vegetation. The Alternative Action would also not demolish any of the existing steam lines and would not allow for the potential revegetation or natural succession of the associated rights-of-way (Table 4-12).

Table 4-12. Potential Impacts to Existing Vegetation under the Proposed and Alternative Actions

Project Element	Potential Impacts to Existing Vegetation			
	Proposed Action (acres)		Alternative Action (acres)	
	Forest	Urban Landscape	Forest	Urban Landscape
Primary Nodal Plants	2.87	1.63	4.71	3.17
Secondary Nodal Plants	0.34	1.19	—	—
Natural Gas Transmission Line	0.51	—	0.51	—
Natural Gas Distribution Lines	0.50	—	0.39	—
UEM Building	—	—	—	—
Goddard Power Plant and Coal Pile	—	—	—	—
Total Impacts to Vegetation	**4.22**	**2.82**	**5.61**	**3.17**

No-Action Alternative

The No-Action Alternative would not implement any of the construction or demolition actions discussed under the Proposed and Alternative Actions and therefore would not impact existing vegetation. However, the No-Action Alternative would not remove any existing impervious surface or revegetate any currently developed areas, such as the Goddard Power Plant and the associated coal pile. In addition, the No-Action Alternative would not revegetate any existing steam line rights-of-way. As such, the existing steam lines would continue to fragment vegetated areas in the northern portion of Cornwallis Neck.

4.8 Fish and Wildlife

Proposed Action

The activities associated with the Proposed Action would occur mostly within or adjacent to currently developed areas and would have only minor impacts to fish and wildlife. The Proposed Action would require the removal of small fragmented forest areas that provide habitat for wildlife species; involve construction and demolition activities within eagle protections zones; generate new stormwater and wastewater discharges to the Potomac River; and result in a temporary increase in noise from the construction and demolition activities. The impacts to fish and wildlife would not be significant and the remaining 1,290 acres of deciduous forest on Cornwallis Neck and an additional 1,090 acres of deciduous forest at Stump Neck, which is located across the Mattawoman Creek from Cornwallis Neck, would continue to provide habitat for wildlife species. For activities requiring tree removal within the 1,000-foot shoreline buffer, the Navy consulted with MDE through the CZMA federal consistency determination process to determine the necessary mitigation measures (Section 4.4.4). Bald eagle protection zones that would potentially be affected by the Proposed and Alternative Actions are identified in Table 4-13.

Primary Nodal Plants

Construction of the two primary nodal plants would require the removal of a total of up to 3.48 acres of deciduous forest that currently provide non-breeding habitat for forest-dwelling species, but may be used for foraging and migratory routes. Impacts would be limited to the forest edge, which would prevent forest fragmentation and reduce impacts to the habitat quality of the remaining portions of the forest fragments. Mitigation would be provided as identified in Section 4.7. The electric line from Primary Nodal Plant #1 to the substation near the Goddard Power Plant would not result in permanent impacts to any wildlife habitat and would follow the REPS and the BEMP to reduce the potential for bald eagle and raptor mortalities.

Construction and operation of the new nodal steam plants would have the potential to impact the aquatic habitat of the Potomac River. However, implementation of MDE stormwater regulations and the Navy's LID Policy would minimize any impacts and ensure no adverse effect on endangered or threatened aquatic species. Operation of the primary nodal plants would result in new wastewater discharges and RO backwash to the Potomac River if it cannot be discharged to the sanitary sewer system at NSF Indian Head. Overall, wastewater discharges and RO backwash from the new plants would represent a reduction in wastewater volume and pollutant loadings when compared to the existing wastewater discharges from the Goddard Power Plant and Steam B Plant, both of which would be eliminated under the Proposed Action, resulting in no adverse effect. The proposed upgrades to the existing steam distribution lines in the southern half of Cornwallis Neck would have minimal impacts to wildlife as none of the rights-of-way contain significant wildlife habitat.

Secondary Nodal Plants

Construction of the new secondary nodal plants would generally occur in close proximity to existing development and thus, in most cases, have minimal impacts to wildlife habitat. Construction of Secondary Nodal Plants #6 and 9 would require the removal of a total of up to 0.29 acres of isolated fragmented forest and would not be considered a significant adverse effect. The necessary utility services for the secondary nodal plants are located within the proposed location of the plants or across adjacent roadways. Connections to these utilities would have minimal impacts to wildlife habitat. New overhead electrical lines and poles would follow the REPS and the BEMP to reduce the potential for bald eagle and raptor mortalities.

Installation of the RO connections for Secondary Nodal Plants # 3, 4, and 7 would not impact any areas of high value wildlife habitat. The RO connection for Secondary Nodal Plant #2 could require tree removal along the edge of two small forested fragments, likely impacting less than 0.05 acres of poor quality edge habitat and would not be considered an adverse effect.

The construction of Secondary Nodal Plant #5 and the installation of the associated utility connections would occur within the protection zone for the Building 436 eagle nest. Due to the potential for these activities to impact eagles, the Navy initiated consultation with USFWS. On October 14, 2011, USFWS concurred with the Navy's determination of "No Adverse Effect" to eagle nests if work is completed outside of the nesting season. The Navy would adhere to the mitigation measures included in this consultation (Appendix E).

Upgrades to existing steam lines supporting the Secondary Nodal Plants and demolition of excess steam lines would have minimal impacts to wildlife since the majority of rights-of-way contain limited wildlife habitat. In addition, some of the rights-of-way of the demolished steam lines may be used as mitigation sites for associated vegetation impacts or left to natural succession. Per the consultation with USFWS, upgrades and demolition of steam lines within the protection zones for the Building 436, Extrusion, Biazzi, Greenslade, Burnpoint, and Large Motor Test eagle nests would be performed outside of the nesting season to avoid impacts to eagles.

Natural Gas Lines

Installation of the natural gas transmission line from Bryans Road to NSF Indian Head would only temporarily disturb urban landscape within the Route 210 right-of-way and along Mattingly Avenue, and thus would have minimal impact to wildlife. Installation of the transmission line and establishment of the required 20-foot right-of-way between the main gate of NSF Indian Head and Primary Nodal Plant #1 would require the clearing of approximately 0.51 acres along the edge of deciduous forest habitat. However, tree removal would be limited to the edge of the affected forested communities, and would not cause forest fragmentation. Installation of the natural gas distribution lines within NSF Indian Head would require the removal of approximately 0.50 acres of mainly deciduous forest edge habitat or small isolated forest fragments, which provide minimal benefit to wildlife. Vegetated areas disturbed by the installation of the new gas transmission and distribution lines within NSF Indian Head would be replanted with native urban landscape in accordance with the INRMP, resulting in no net loss of urban landscape and allowing for the continued use of the areas by some wildlife species.

Installation of the natural gas distribution line for Secondary Nodal Plant # 5 would occur within the protection zone for the Building 436 eagle nest and would be performed outside of the nesting season, as determined through consultation with USFWS, to avoid impacts to eagles. Construction of the new gas regulator station would occur in a highly developed area containing only urban landscape and would not have significant impacts to wildlife.

UEM Building

The proposed location for the UEM Building is currently developed with mainly impervious surface and minimal urban landscape. Therefore, construction of the UEM Building would not result in significant impacts to wildlife.

Goddard Power Plant

Demolition of the Goddard Power Plant and the associated coal pile would not result in adverse impacts to fish and wildlife. Instead, it would reduce the discharge of contaminated stormwater into

receiving surface waters at NSF Indian Head, potentially contributing to improvements in water quality in the nearby streams and the Mattawoman Creek. In addition, the footprint of the power plant and coal pile would be revegetated after demolition in accordance with the INRMP, providing additional wildlife habitat, improving stormwater infiltration and filtering, and benefiting nearby aquatic habitats.

Alternative Action

The Alternative Action would have similar impacts to fish and wildlife as the Proposed Action. The larger footprints of the Primary Nodal Plants under the Alternative Action would require an additional 1.26 acres of deciduous forest edge to be removed. These forest fragments are too small to support breeding of FIDs or other sensitive forest-dwelling species, but may be used for migratory routes or foraging areas.

The Alternative Action would require the installation of fewer natural gas distribution lines, reducing the impact to 0.39 acres of forest habitat versus 0.50 acres under the Proposed Action.

The larger capacity of the plants would also result in a greater quantity of wastewater discharge to the Potomac River, though the wastewater discharges from the primary nodal plants under the Alternative Action would still represent a reduction in wastewater volume and pollutant loadings as compared to the existing wastewater discharges from the Goddard Power Plant and the Steam B Plant.

The Alternative Action would result in fewer impacts within eagle protection zones because it would not provide any secondary nodal plants or associated natural gas distribution lines. The steam lines to be demolished or capped and left in place under the Proposed Action would instead be upgraded under the Alternative Action, thus both actions will affect the same steam lines. However, because the Alternative Action would not demolish any of the existing steam distribution lines at NSF Indian Head it would not provide the benefits to wildlife associated with the potential revegetation or natural succession of the associated rights-of-way.

The proposed locations for the natural gas transmission lines under the Alternative Action are the same as under the Proposed Action. Thus, the installation of these lines would have the same impacts to fish and wildlife as under the Proposed Action. Impacts to fish and wildlife from construction of the UEM Building and demolition of the Goddard Power Plant under the Alternative Action would also be the same as under the Proposed Action.

Table 4-13. Bald Eagle Protection Zones Potentially Affected by the Proposed and Alternative Actions

Nest Name	Status During 2009-2010 Nesting Season	Activity within 750 Feet of Nest (PZ1)	
		Proposed Action	Alternative Action
Biazzi Nest	Active	✓	
Building 436 Nest	Inactive	✓	
Burn Point Nest	Active	✓	
Extrusion Plant Nest	Inactive	✓	
Greenslade Nest	Inactive	✓	
Large Motor Test Nest	Inactive	✓	

No-Action Alternative

The No-Action Alternative would not implement any of the construction, renovation, or demolition projects discussed under the Proposed Action and therefore would not directly impact fish and wildlife at NSF Indian Head. However, the No-Action Alternative would not provide for the potential revegetation of steam line rights-of-way or the Goddard Power Plant and coal pile footprints, and thus would not create any new or improved wildlife habitat at NSF Indian Head.

4.9 Cultural and Historic Resources

4.9.1 Architectural Resources

Proposed Action

As further discussed below, the Proposed Action would result in adverse effects to the Indian Head Railroad, the four eligible historic districts, the proposed Polaris Propellant Test Facility Historic District, and the Goddard Power Plant and Steam Lines at NSF Indian Head, all of which are eligible or potentially eligible for listing on the National Register.

As required by Section 106 of the NHPA, the Navy consulted with SHPO, ACHP, and Charles County regarding the adverse effects to historic properties associated with the Proposed Action. In addition, in accordance with Executive Order 13007, the Navy invited federally recognized tribes to participate in the consultation. Of the tribes that were invited, only the Delaware Nation elected to participate in the consultation. The Navy provided the requested information to the Delaware Nation on 11 June 2012, but did not receive a response. Correspondence pertaining to these consultations is included in Appendix E. The Navy worked with SHPO, ACHP, Charles County, and the Delaware Nation to develop and execute two MOAs (one for MILCON P222 and one for the removal and disposal of excess railroad tracks associated with NSF Indian Head) with appropriate stipulations to alleviate the adverse effects to historic resources. The MOAs include standard administrative stipulations, propose specific mitigation measures appropriate to the undertaking, and address the ongoing identification and evaluation of historic resources. Mitigation measures include documentation of the historic resources to satisfy the requirements of NHPA Section 110(b).

Impacts to historic properties associated with the construction, demolition, and renovation activities under the Proposed Action are discussed below. While the Proposed Action would adversely impact historic properties, these impacts are not considered significant.

Primary Nodal Plants

The proposed location for Primary Nodal Plant #1 is located approximately 3,200 feet from the Indian Head Residential Historic District and approximately 1,500 feet from the proposed Polaris Propellant Test Facility Historic District. Both districts are outside the area of potential visual and audible effects of the plant and the Navy has determined that no adverse effects would occur as a result of the construction and operation of Primary Nodal Plant #1 and associated steam line upgrades.

The construction of Primary Nodal Plant #2 would adversely affect historic resources by removing approximately 250 LF of track from the Indian Head Railroad. The Navy will mitigate this adverse effect through stipulations identified in the MOA with SHPO regarding the removal and disposal of excess railroad tracks associated with NSF Indian Head.

The primary nodal plants would support Building 786, a nitration house that is individually eligible for the National Register (Goodwin, 2005); however, the Navy has determined in consultation with SHPO that the construction and operation of the nodal plants and associated steam lines would not have an adverse impact on Building 786.

Secondary Nodal Plants

The secondary nodal plants and their associated utility connections would be located in the Indian Head Residential, Naval Powder Factory and Naval Extrusion Plant Historic Districts, as well as the proposed Polaris Propellant Test Facility Historic District. These secondary nodal plants would serve 77 contributing elements (CEs) to existing historic districts and 21 that are pending eligibility determinations as part of the proposed Polaris Historic District.

Installation of the new secondary nodal plants could alter the existing viewscape of the historic districts and may require modifications to the CEs that could adversely affect the associated district. In addition, changing the heat source for these buildings may alter their interior climate, potentially resulting in detrimental impacts to structural and decorative elements within the buildings.

Demolishing or capping and leaving in place excess steam lines under the Proposed Action would leave 21 eligible or potentially eligible buildings without access to heat. Fourteen of these buildings (Buildings 101, 102, 108A, 175, 180, 181, 183, 201, 311, 453, 507, 508, 596, and 943) are CEs to the Naval Powder Factory Historic District, two (Buildings 534 and 595) are CEs to the Naval Extrusion Plant Historic District, and five (Buildings 1019, 1030, 1032, 1034, 1038) are considered CEs to the proposed Polaris Propellant Test Facility Historic District. Four of these 21 buildings are currently or were previously scoped for demolition under separate projects and have been or would be addressed under separate consultations and MOAs with SHPO. Per an MOA with SHPO, Building 181 must be maintained such that demolition by neglect does not occur. Building 181 must be made weather tight and periodically inspected to ensure the architectural character of the building remains intact. The steam lines were determined to be eligible for the national register and their removal would result in an adverse effect. The Navy will mitigate these adverse effects through stipulations identified in the MOA with SHPO regarding MILCON P222.

HAER documentation is currently underway to document the Naval Powder Factory and the Naval Extrusion Plant Historic District, which would be adversely affected by the Proposed Action. This documentation will mitigate the adverse effects to these historic districts under the Proposed Action.

Natural Gas Lines

The area of potential effect related to the installation of the natural gas transmission line is not likely to include Mount Aventine or any of the seven Maryland Register properties in the vicinity of Route 210. Because the transmission line would be underground, it would not have any visual impacts on any of these historic properties. While construction noise may be a temporary concern, none of the properties are closer than approximately 500 feet to Route 210. Washington Gas would be responsible for consultation with SHPO for these areas.

Installation of natural gas distribution lines for the primary and secondary nodal plants would likely occur within the Indian Head Residential Historic District, the Naval Powder Factory Historic District, the Naval Extrusion Plant Historic District, and the proposed Polaris Propellant Test Facility Historic District. The gas lines would be installed underground and would involve only temporary construction noise; therefore, they would not result in adverse effects to these historic districts. However, installation of the gas distribution lines would adversely affect historic resources by removing up to 4,750 linear feet of railroad tracks. The Navy will mitigate this adverse effect through stipulations identified in the MOA with SHPO regarding the removal and disposal of excess railroad tracks associated with NSF Indian Head.

UEM Building

Construction of the UEM Building would require the demolition of Buildings D2 and D2D, historic buildings within the Indian Head Residential Historic District. These buildings would be demolished under a separate effort and the impacts are addressed in the Programmatic Agreement (PA) between the Navy, SHPO, and the Mid-Atlantic Family Communities, LLC, signed on 1 August 2005. Mitigation for demolition of these two facilities has been identified and is currently being addressed by Mid-Atlantic Family Communities (NDW, 2005).

The Navy determined that the Proposed Action would not adversely affect the Indian Head Residential Historic District, Naval Proving Ground Historic District, or the three other historic residences along Pickens Lane (Buildings D6, D7, and D8). SHPO concurred with this determination through the Navy's Section 106 consultation. The final design of the UEM Building and future uses of the three brick Pickens Lane Residences will be determined through ongoing consultation with SHPO.

Goddard Power Plant

Demolition of the Goddard Power Plant would result in adverse effects to Buildings 770, 873, and 1364, which were determined to be eligible for listing on the National Register. Demolition of the Goddard Power Plant would not result in the demolition of any contributing elements to current historic districts. However, Building 899, which would be demolished under the Proposed Action, is a non-contributing element within the Naval Powder Factory Historic District. Demolition activities would not exceed the current noise levels generated by the Goddard Power Plant and would permanently alter the viewscape by demolishing non-contributing and ineligible buildings, which would be considered a no adverse effect.

The Navy will mitigate adverse effects to Buildings 770, 873, and 1364 through stipulations identified in the MOA with SHPO regarding MILCON P222. SHPO concurred with the determination that demolition of Building 899 and the rest of the Goddard Power Plant would not adversely affect the Naval Powder Factory Historic District.

Alternative Action

The Alternative Action would have similar impacts to historic resources as the Proposed Action. Under the Alternative Action, construction of the primary nodal plants and UEM Building, and demolition of the Goddard Power Plant would take place in the same areas as under the Proposed Action, thus the consequences are discussed above. However, under the Alternative Action, the primary nodal plants would support all of the facilities currently connected to the steam distribution system, including the 77 historic buildings that would be supported by secondary nodal plants under the Proposed Action. The Alternative Action would upgrade and repair the existing steam lines serving these buildings. These steam line repairs are not expected to adversely affect historic buildings or districts. Therefore, the Alternative Action would likely result in fewer impacts to these resources than demolishing or capping and leaving in place the same steam lines and installing secondary nodal plants as discussed under the Proposed Action.

Under the Alternative Action, the gas lines to Primary Nodal Plant #1 and Primary Nodal Plant #2 would be installed in the same location as under the Proposed Action and, therefore would have no adverse impacts to historic buildings or districts. No distribution lines for secondary nodal plants would be constructed under the Alternative Action and, therefore would not affect the Naval Extrusion Plant and proposed Polaris Propellant Test Facility Historic Districts.

As with the Proposed Action, the activities under the Alternative Action would require Section 106 consultation with SHPO and ACHP to address potential adverse effects to historic resources. The adverse effects of the Alternative Action are also adverse effects that have been identified for the Proposed Action. Therefore, adverse effects of the Alternative Action would be mitigated according to the recommendations and requirements provided by SHPO and ACHP per the MOAs for the Proposed Action.

No-Action Alternative

The No-Action Alternative would not involve modifications to historic buildings or new construction within or near historic districts at NSF Indian Head and would not require consultation with SHPO under Section 106 of the NHPA.

4.9.2 Archeological Resources

Proposed Action

Construction and renovation activities under the Proposed Action would not take place within any known archeological sites eligible for the National Register, as confirmed by Phase I surveys performed in 2010 and 2012. Repairing and demolishing/capping and leaving in place steam lines throughout Cornwallis Neck would require work within three archeological sites determined eligible for the National Register. Activities would be limited within these identified archeological sites. Measures to prevent ground disturbance within these sites would be implemented as identified during consultation with SHPO. Therefore, these activities are not expected to result in adverse impacts to these archeological resources. As stated under Section 4.9.1 above, the Navy consulted with SHPO, ACHP, and Charles County regarding potential adverse effects to archeological resources associated with the Proposed Action. SHPO concurred with the Navy's determination that the Proposed Action would not result in adverse effects to archeological resources.

If any unexpected archeological resources are discovered during construction or demolition (e.g., projectile points, pottery, funerary remains, and building foundations), all activities involving soil disturbance in the area of the discovered resource would be suspended, and the Navy would consult with SHPO to develop and implement any necessary avoidance, protection, or treatment measures. An MOA between the Navy and SHPO would be established to mitigate any potential impacts to archeological resources associated with the Proposed Action, which would include any required Phase I and Phase II surveys. Elements that have sites identified by predictive models as having a high potential for archeological resources would require a Phase I survey. If the Phase I survey determines that no archeological sites are present, no further action is required. If significant resources are identified, additional consultation with SHPO and potentially Phase II surveys would be required. If the Phase II surveys determine the site(s) to be ineligible for listing on the National Register, then no further action is required. Construction of proposed elements would not be permitted to be located within archeological sites that have been determined to be eligible for the National Register. However, if an archeological site(s) is determined to be eligible for listing, the Navy would either avoid impacts to the site or mitigate adverse effects in consultation with SHPO and ACHP.

<u>Primary Nodal Steam Plants</u>

The proposed locations for the primary nodal plants have been identified as having a high potential to contain archeological resources; however, Phase I surveys performed in February 2012 resulted in a recommendation that no further archeological surveys are warranted in these areas. The

existing steam lines that would be used by the primary nodal plants are located within several areas requiring further Phase I or Phase II surveys to determine eligibility for the National Register (Table 3-12), but any archeological resources present within the footprints of the steam lines were likely disturbed during the construction of the lines. The Navy would minimize earth disturbance in these areas by reusing existing support posts wherever possible and limiting disturbance to previously-disturbed areas. Therefore, the upgrades to these lines under the Proposed Action are unlikely to result in adverse effects to archeological resources.

Secondary Nodal Plants

The secondary nodal plants would require installation of buried utilities and aboveground steam and electric lines, requiring earthwork that would have the potential to disturb existing archeological resources. Secondary Nodal Plant #9 would be located within 30 feet of 18CH672, a site that requires a Phase II survey to determine eligibility for the National Register. The proposed locations of Secondary Nodal Plants #1, 2, 5, 7, and 8 would be located in areas identified as having a high potential for containing archeological resources. Demolishing/capping and leaving in place existing steam lines that would not be utilized by the secondary nodal plants would require work within three previously identified archeological sites. Per consultation with SHPO, the Navy will utilize both avoidance and protective measures to avoid adverse effects to these sites.

Natural Gas Lines

The proposed route of the natural gas transmission line would not impact any identified cultural resources or eligible archeological sites along Route 210 or Mattingly Avenue. The proposed natural gas transmission line would potentially disturb archeological sites 18CH674, 18CH675 and 18CH676 within NSF Indian Head, which have been determined not eligible for the National Register, resulting in no adverse effect on these archeological resources. There are no other previously identified archeological sites located within 50 feet of the proposed location of the transmission line along Route 210 or Mattingly Avenue, or within NSF Indian Head.

The natural gas transmission line and the regulator station near the entrance to NSF Indian Head would be located in an area with high potential to contain archeological resources; however, Phase I surveys performed in February 2012 resulted in a recommendation that no further archeological surveys are warranted in these areas. The installation of natural gas distribution lines for the secondary nodal plants would require earthwork and have the potential to disturb five existing archeological resources (18CH274, 18CH276, 18CH672, 18CH675 and 18CH676). Archeological sites 18CH274, 18CH675, and 18CH676 within NSF Indian Head were determined not eligible for the National Register, resulting in no further action. Sites 18CH276 and 18CH672 would require Phase II surveys to determine eligibility. Per consultation with SHPO, the Navy will utilize both avoidance and protective measures to avoid adverse effects to these sites.

UEM Building

Per the Programmatic Agreement between the Navy, SHPO, and Lincoln Housing, no archeological surveys are required for the UEM Building due to previous disturbance at the proposed location.

Goddard Power Plant

Demolition of the Goddard Power Plant would not result in potential adverse effects to archeological resources and no further action is required.

Alternative Action

Under the Alternative Action, impacts to archeological resources associated with the primary nodal plants, UEM Building, and natural gas lines for the primary nodal plants, as well the Goddard Power Plant demolition and steam distribution line repairs would be the same as described under the Proposed Action. Although the footprint of the primary nodal plants would be larger under the Alternative Action, secondary nodal plants and the associated natural gas distribution lines would not be installed, and existing steam lines would be repaired rather than demolished/capped and left in place, resulting in less earth disturbance and less potential for archeological impacts.

No-Action Alternative

The No-Action Alternative would not involve any earthwork and thus would not affect any potential archeological resources.

4.10 Geology and Soils

Proposed Action

The Proposed Action would disturb soils through construction, demolition, and renovation activities in both undisturbed and developed sites. To minimize the alteration or loss of topsoil associated with activities at these locations, the Navy would implement SECs in accordance with MDE regulations (MDE, 1994). These SECs would be developed based on site characteristics and level of project activity and would be submitted to MDE for approval.

Soil Characteristics

In general, construction projects under the Proposed Action are located in areas with soil types suitable for development. However, certain soil characteristics may require that specific soil management procedures be implemented during earth disturbance activities.

The UEM Building and Primary Nodal Plant #2 would be constructed in soils that are potentially highly erodible. Installation of natural gas lines and demolishing/capping and leaving in place excess steam lines would occur in soils that are highly erodible or potentially highly erodible (Table D-1 in Appendix D). The two primary nodal plants would be almost entirely on soil that is considered moderately susceptible to windthrow hazards. Installation of natural gas lines, demolishing/capping and leaving in place excess steam lines, and renovations to buildings supported by secondary nodal plants would occur within areas containing soil phases that are prone to windthrow hazards. To minimize windthrow hazards during construction activities that include earth disturbance, the following practices would be implemented:

- Use existing pavement for equipment staging;
- Water down exposed areas to reduce fugitive dust emissions;
- Stabilize exposed or graded areas as soon as possible upon completion of grading;
- Properly cover trucks with fill material or maintain at least two feet of free-board;
- Limit truck speeds on unpaved areas of the site to 15 miles per hour or less; and
- Temporarily halt land moving activities when winds exceed 25 miles per hour.

Of the 16 facilities supporting the Goddard Power Plant that would be demolished, none are within soils that are susceptible to windthrow hazards and only Building 899 is located within a soil phase that is highly erodible. The Navy would implement SECs to reduce the loss or alteration of topsoil.

Contaminated Soils

Facilities that would be supported by the primary and secondary nodal plants are located near or within IR and MRP site boundaries. Each IR and MRP site has specific requirements and restrictions for work to occur within their boundaries (Table 4-14). Restrictions associated with each IR and MRP site only apply for earth disturbance within the boundaries of the respective contaminated site. Demolishing/capping and leaving in place excess steam lines and installing natural gas lines would occur within IR sites 5, 9, 20, 39, and 40, which have been remediated and have been assigned No Further Action, so they are not included in Table 4-14. Primary Nodal Plant #1 would be located within IR Site 47, which is contaminated with trichloroethylene (TCE) and poses health and safety risks (Section 3.10). Any soil removed from the site must be deposited in an approved landfill.

Installation of the natural gas transmission line could require earth disturbance within the two sites along Route 210 with motor/lube oil contamination concerns. Washington gas would be notified of

the locations of these sites and would implement appropriate health and safety protocols during construction to prevent any hazards associated with the contamination.

Demolition of the Goddard Power Plant and construction of the UEM Building, Primary Nodal Plant #2, and secondary nodal plants would not occur within any IR or MRP sites. The area of the existing coal pile associated with the Goddard Power Plant would be closed in accordance with all applicable regulations and revegetated.

Alternative Action

As with the Proposed Action, certain soil characteristics and contamination concerns are present at the construction and demolition locations to be impacted under the Alternative Action. Soil properties at these locations determine the types of soil management or remediation practices that would need to be implemented during earth disturbance activities.

Soil Characteristics

Under the Alternative Action, the proposed locations of the primary nodal plants and UEM Building, as well as the natural gas transmission line and distribution line to Primary Nodal Plant #2 would be the same as under the Proposed Action. Therefore, the impacts and restrictions associated with these aspects of the Proposed Action would remain the same. Instead of demolishing much of the existing steam distribution system, it would be repaired. Some earthwork within soils that are subject to erosion and windthrow hazards would be required. The Navy would implement SECs and precautionary measures to control erosion and minimize windthrow hazards during soil disturbance activities. Under the Alternative Action, the same soil management methods to minimize erosion during demolition would be implemented as identified for the Proposed Action.

Contaminated Soil

The proposed locations of the primary nodal plants, UEM Building, natural gas transmission line and distribution line to Primary Nodal Plant #2, and demolition of the Goddard Power Plant would remain the same, resulting in the same impacts and restrictions identified for the Proposed Action. The Alternative Action would have steam provided to facilities by the primary nodal plants. Steam lines would be repaired rather than demolished/capped and left in place. IR and MRP sites that currently include any parts of the steam distribution system would continue to be utilized under the Alternative Action with specific work restrictions (Table 4-14). The Alternative Action would not have any impacts to IR or MRP sites due to secondary nodal plants or associated natural gas lines.

No-Action Alternative

The No-Action Alternative would not result in any impacts to geology or soils.

Table 4-14. IR and MRP Site Work Restrictions and Requirements

Site Number	Site Name	Site Description	Restrictions and Requirements	Affected Project Elements near MRP/IR Sites
MRP Sites				
UXO-9	Single Base Propellant Grains	The Single Base Propellant Grains Spill Area is approximately 52 acres in area and was utilized in the transportation of propellant from the former production area. Began between 1927 and 1942 and terminated in the 1980s.	No soil disturbance is allowed from this site without an ESS-DR or ESS. No soil removal is allowed from this site. The 14-acre site near the Powder Dry Houses has the potential presence of Single Base Propellant Grains.	Steam lines to be demolished/capped and left in place
IR Sites				
6	Building 1349 Hypo Spill	Spill of x-ray fixer during a transfer of storage tank contents south of Buildings 1349 and 1140.	Drainage swales south of Buildings 1349 and 1140 were contaminated with silver from spent fixer. Following a removal action, the site was assigned No Further Action in 2010. The drainage way must not be extensively disturbed during ground disturbance activities.	Steam lines to be demolished/capped and left in place
19	Catch Basin at Chip Collection House (785)	Wastewater in catch basins at the Chip Collection (Buildings 785 and 1051) are contaminated with lead and copper salts.	No soil removal is allowed from this site. The site has surface soil contamination of nitroglycerin, lead, copper and zinc.	Steam lines to be demolished/capped and left in place
24	Abandoned Drain Lines	Discharge of neutralized acid water and Nitrocellulose white water to Mattawoman Creek from abandoned nitrocellulose production facilities.	The site contains abandoned drain lines potentially contaminated with acid water and nitrocellulose (NC) white water. An ESS-DR is required if soil is to be disturbed.	Steam lines to be demolished/capped and left in place, electric transmission line installation

Table 4-14. IR and MRP Site Work Restrictions and Requirements

Site Number	Site Name	Site Description	Restrictions and Requirements	Affected Project Elements near MRP/IR Sites
42	Olson Road Landfill	Landfill of various wastes from all over the Station, the landfill is located near Building 1728.	No intrusive activities, including soil disturbance or removal, are allowed at this site. The site is a landfill with an engineered cover. The site is protected by Institutional Controls included in a Record Of Decision that was signed in 2005. Subsurface materials excavated from the site during steam line demolition must be disposed of at a RCRA approved landfill. Backfill of the site must be done in accordance with the final remedial design, which can be obtained from the NSF Indian Head IR and MRP Program Manager.	Steam lines to be demolished/capped and left in place
47	Mercuric Nitrate Disposal Area	Mercuric nitrate was used to produce hydrazinium nitroformate. The spent solution, one ounce of mercuric nitrate dissolved in 98 percent nitric acid, was poured onto a 6'x4' bed of limestone chips behind Building 856.	No soil removal is allowed from this site. The site is contaminated with TCE, CT, and other breakdown products. The site is currently in the design phase for the final remedial action.	Primary Nodal Plant #1 construction, potential steam line construction
53	Mercury Contamination of the Sewage System	Mercury was discovered in both sanitary and sewer manholes; both of these drain lines are linked to Building 102 where tests that involved mercury were conducted.	No soil removal is allowed from this site. The site is part of the Lab Area, which has Mercury contaminated soil, as well as abandoned drain lines potentially containing Mercury. The upper 12 inches of backfill for any excavation must be topsoil from on site or clean topsoil from off site.	Steam lines to be demolished/capped and left in place, electric transmission line installation

Table 4-14. IR and MRP Site Work Restrictions and Requirements

Site Number	Site Name	Site Description	Restrictions and Requirements	Affected Project Elements near MRP/IR Sites
54	Building 101, Dry Well	Laboratory equipment and experiments contained/involved mercury and was spilled into the sink. It is believed that the pipes leak.	No soil removal is allowed from this site. The site is part of the Lab Area, which has Mercury contaminated soil, as well as abandoned drain lines potentially containing Mercury. The upper 12 inches of backfill for any excavation must be topsoil from on site or clean topsoil from off site.	Steam lines to be demolished/capped and left in place
55	Building 102, Dry Well/Building 102	In Building 102 laboratory equipment contained mercury; the laboratory equipment often broke and the mercury spilled into the sinks.	No soil removal is allowed from this site. The site is part of the Lab Area, which has Mercury contaminated soil, as well as abandoned drain lines potentially containing Mercury. The upper 12 inches of backfill for any excavation must be topsoil from on site or clean topsoil from off site.	Steam lines to be demolished/capped and left in place
66	Turkey Run Disposal Area	Disposal of various items, including lead flooring, clinker from Powerhouse, glass bottles, etc., based on visual inspection of area.	No soil removal is allowed from this site. The site is contaminated with various items, including lead flooring, clinker from Powerhouse, glass bottles, etc., based on visual inspection of the area. The site is currently planned for further investigation.	Steam lines to be demolished/capped and left in place

4.11 Topography

Construction and demolition activities associated with the Proposed and Alternative Actions would have the potential to impact topography. Construction activities would require minimal grading to provide more suitable topography for the new buildings and related infrastructure to control surface water runoff and minimize soil erosion and sedimentation during and after construction. Trenches dug for the removal of underground utilities, foundations, and/or footers would be backfilled and graded to match the surrounding topography. SEC plans would be developed for construction, demolition, and repair activities in accordance with MDE, Navy, and EISA requirements. These plans may include site grading to blend with existing topography; implementation of stormwater controls in accordance with COMAR 26.17.02.01-26.17.02.11; and construction of new buildings or transportation system segments to follow existing topography.

Proposed Action

Construction of the two primary nodal plants would occur almost entirely on gentle slopes, requiring minimal grading, and would not significantly impact topography. A small area of rolling terrain is within the northeast and southwest boundaries of the proposed location of Primary Nodal Plant #1 and would require moderate grading and control measures during construction.

Gentle and rolling slopes would be disturbed during construction of the secondary nodal plants and require minimal regrading to blend with existing topography. The northern portion of the proposed location for Secondary Nodal Plant #7 would disturb steep slopes, requiring specific control measures specified in the SEC plans. Steam line demolition would involve minimal earth disturbance if support post footers are removed and would follow any required SEC measures. On steep slopes, footers could be left in place to reduce earth disturbance if significant erosion concerns are anticipated.

Installation of the natural gas lines would occur in some areas with steep slopes, but proper SEC measures would be implemented to prevent any adverse impacts.

Construction of the UEM Building would occur on gentle slopes and follow proper SEC measures to prevent erosion and siltation from the northern boundary of the site. No grading actions would be performed at the Pickens Lane site due to existing SEC plans.

Demolition of the Goddard Power Plant, buildings, infrastructure, and utilities, and regrading of the affected areas would have minimal impact to topography. Demolition of Buildings 770, 899, and 1896, and removal of the coal yard would occur within rolling terrain and a small area of steep slope. Removal actions within these sites would require more extensive soil removal, regrading, or backfilling to restore stable conditions. For most of these buildings, the building foundation would be removed or filled in with soil to match the existing topography.

Alternative Action

The Alternative Action would result in less disturbance to topography than the Proposed Action because no secondary nodal plants or associated natural gas lines would be installed.

No-Action Alternative

The No-Action Alternative would not result in any impacts to topography. However, none of the previously disturbed topography would be restored to its original state because no demolition would be performed.

4.12 Solid and Hazardous Waste

Proposed Action

Construction, demolition, and renovation activities under the Proposed Action would generate building material waste; however, efforts would be made to keep waste to a minimum. Construction of the new facilities would integrate sustainable strategies and goals such as the incorporation of reused, recycled, or refurbished materials in the building design and the minimization of construction and demolition wastes through material source reduction or recycling of wastes.

Demolition and renovation of buildings and steam lines would generate material waste that may contain asbestos-containing materials, lead-based paint, PCBs and/or mercury. All demolition, renovation, and repair activities suspected of involving asbestos-containing materials would be performed in accordance with federal and state requirements for proper management of asbestos for renovation and disposal included in 40 CFR 61, Subpart M, as well as COMAR 26.11.21. Asbestos-containing waste would be handled and disposed of offsite in accordance with TSCA labeling and disposal procedures. Any materials known to contain asbestos, mercury, and PCBs would be removed from the affected buildings and steam lines prior to the start of construction and demolition activities. These materials would be kept separate from general demolition debris and disposed of offsite in accordance with applicable regulations. PCBs and mercury-containing items would be handled and disposed of offsite in accordance with RCRA and Maryland hazardous waste regulations.

The presence of lead-containing materials in these buildings is expected to be limited to lead-based paint. Lead paint in the demolition debris would not be substantial and would not be removed from the structures prior to demolition. The demolition debris would be sampled to verify that lead levels are below the RCRA hazardous waste threshold and if exceeded, the contaminated debris would be separated and disposed of in accordance with RCRA regulations. Otherwise, the material would be transported offsite to a non-hazardous waste disposal facility, landfill, or incinerator. All lead paint abatement would comply with COMAR 26.16.01. All abatement would be performed by licensed contractors. Any non-hazardous solid waste, including demolition and land clearing debris from roads, parking lots, and sidewalks would be properly disposed of at a permitted solid waste acceptance facility, or recycled if possible.

Operation of the facilities constructed under the Proposed Action would significantly decrease the amount of solid waste currently generated by the steam generation and heating systems at NSF Indian Head. The natural gas-fired nodal plants would not produce any substantial amounts of solid waste (USEPA, 2011d). The Goddard Power Plant, which produced approximately 4,700 tons of fly ash in 2009, would no longer produce this industrial process waste, resulting in a substantial environmental benefit.

Primary Nodal Steam Plants

The only significant waste associated with the operation of the two primary nodal plants is expected to be spent lubricating oils, which would be disposed of as industrial waste. No increase in general trash or waste is anticipated with the primary nodal plants. There would be no impact to the satellite accumulation sites or less-than-90-day accumulation sites (Davidson, 2010).

Demolition of the Steam B Plant would generate building material waste that may contain asbestos-containing materials, lead-based paint, PCBs and/or mercury. Explosive contamination is not expected to be present within any of the buildings to be demolished under the Proposed Action

(Caris, 2011). Building inspections would be required prior to demolition to certify that they are free from explosive contamination.

Secondary Nodal Plants

Construction and operation of the secondary nodal plants would not produce substantial amounts of solid waste nor any hazardous waste. Minimal waste can be anticipated from general maintenance and repairs to these systems. The secondary nodal plants would support 87 buildings that are designated as hazardous waste satellite accumulation sites and 10 less-than-90-day accumulation sites, and provide heat to the two active hazardous waste storage sites listed on the controlled hazardous substance (CHS) permit. The Proposed Action would not affect the accumulation or storage of hazardous waste (Davidson, 2010). Asbestos-containing material waste associated with demolition of steam lines would be handled as discussed above.

Upon acceptance of the work plan, the contractor would develop the appropriate regulatory notifications. Notification to MDE would be required if more than 10 SF (or 20 linear feet) of asbestos would be disturbed. Appropriate notification to both MDE and EPA would be made if more than 160 SF, 260 linear feet, or 35 cubic feet of asbestos would be disturbed. Records for the asbestos project must be maintained for at least 6 years. Records must include the location and description of the project, the estimated amount of asbestos removed, the start and completion dates, a summary of procedures used to comply with regulations, and the name and address of the disposal site. The contractor would also follow the Unified Facilities Guide Specifications, Section 13281N "Engineering Control of Asbestos Containing Materials."

Natural Gas Lines

Construction of natural gas lines would likely not affect the generation, storage, or disposal of solid or hazardous waste. Soils removed during installation of the lines would be returned to their original location to cover the underground pipelines. The routes of the natural gas lines would avoid disturbance of IR and MRP sites that require further remediation. However, if disturbance is required, site-specific restrictions would apply and the soil would remain on site.

UEM Building

The same personnel and operations currently located at the Goddard Power Plant would be relocated to the UEM Building, resulting in the generation, recycling, and disposal of the same types of general office and shop wastes. Demolition of Buildings D2, D2D, 546A, and 624 would be conducted by Lincoln Housing following appropriate handling and disposal procedures.

Goddard Power Plant

Demolition of the Goddard Power Plant would eliminate the wastes associated with its operation, including the generation of fly ash. Spent GAC generated by energetic production would no longer be disposed of at the Goddard Power Plant or used for fuel at any of the new primary or secondary nodal plants. This would result in a maximum of 100 55-gallon barrels of additional hazardous or non-hazardous waste (depending on whether the GAC shows reactive characteristics) that would be required to be disposed of offsite each month. DLA Disposition Services would coordinate the transport and disposal of the additional spent GAC in accordance with the applicable federal, state, and local rules and regulations (Davidson, 2010). This is not expected to create a significant hazard to the public or the environment.

The existing coal pile associated with the Goddard Power Plant would be closed in accordance with all applicable regulations. Because coal is naturally occurring, there is not expected to be any contamination concerns associated with its storage. Demolition of the buildings associated with the Goddard Power Plant would not be considered a significant impact and solid and hazardous wastes would be handled and disposed of as discussed above. Building inspections would be required prior to demolition to determine the presence of explosive contamination.

Alternative Action

Wastes generated by construction and operation of the primary nodal plants under the Alternative Action would be similar to those generated under the Proposed Action. However, due to the larger size and capacity of the primary nodal plants under the Alternative Action, the quantity of waste generated by the construction and operation of the plants would be greater. The primary nodal plants would generate less solid waste than the existing Goddard Power Plant. Repairs to the steam lines under the Alternative Action have the potential to generate asbestos-contaminated waste, though the quantity of contaminated waste is expected to be less than under the Proposed Action.

Solid and hazardous waste generated by construction of the natural gas lines, construction and operation of the UEM Building, and demolition of the Goddard Power Plant would be the same as under the Proposed Action.

No-Action Alternative

The No-Action Alternative would not generate construction or demolition waste, perform lead or asbestos abatement, or perform explosive decontamination. The No-Action Alternative would not affect the generation, treatment, or disposal of existing solid and hazardous wastes at NSF Indian Head. Specifically, the Goddard Power Plant would continue to generate significant amounts of fly ash and dispose of it as industrial waste. GAC would continue to be mixed with coal and burned at the Goddard Power Plant at a maximum rate of 100 55-gallon barrels per month.

4.13 Health and Safety

Proposed Action

Construction, renovation, and demolition activities associated with the Proposed Action would expose contractors and Navy personnel to health and safety hazards associated with heavy-materials handling, potential construction equipment mishandling and malfunction, electrical hazards, and other accidents. However, all project-related activities would be executed in accordance with criteria from OPNAVINST 5100.23. Adherence to a safety plan developed in accordance with these criteria would be expected to reduce all associated hazards to an acceptable level during construction, renovation, decontamination and demolition activities. Traffic increases would also accompany this work, as personnel would have to travel to and from work sites every day. The introduction of natural gas within NSF Indian Head, as well as along Route 210 and Mattingly Avenue would also present health and safety concerns by the introduction of flammable natural gas and potential leaks or rupture of the gas lines during maintenance or other actions. These concerns would be augmented within NSF Indian Head by the presence of explosives. Placement of gas lines along existing roads, rather than adjacent to buildings or houses, would minimize risks to human safety. Adherence to guidelines set forth in OP 5 would reduce, but not eliminate, these hazards within the installation. To further increase safety, NSF Indian Head would obtain explosives site approvals from NOSSA to ensure that the Proposed Action adheres to OP 5 explosives safety requirements. In addition, Washington Gas would perform all construction and maintenance work in accordance with applicable safety guidelines and standards, including its own Washington Gas Safety Handbook, to minimize safety risks to workers and the community. Adherence to the guidelines and standards discussed above would result in minimal impacts to human health and safety.

The Proposed Action would improve occupational health conditions for personnel at NSF Indian Head by demolishing buildings containing hazardous construction materials, such as asbestos insulation and lead-based paint. All buildings to be demolished would be evaluated for the presence of lead and asbestos, in accordance with OSHA 29 CFR 1926 and requirements in Section 3.12. For construction activities within explosive arcs, Standard Operating Procedures (SOPs) would be created and implemented when necessary. Hazard Control Briefings would also be given when required and safety meetings would be held regularly for workers to discuss any potential safety concerns.

Primary Nodal Steam Plants

The use of natural gas-powered steam plants is accompanied by general worker safety concerns. These include the potential for burns due to contact with the steam itself or related equipment; falls while working in the facility; explosives safety concerns due to their location within explosives safety arcs; and hazards associated with boiler maintenance, including potential exposure to fuel vapors (Jenkins, 2011). The primary nodal plants would be remotely operated, reducing the frequency of personnel exposure to those associated hazards.

The installation of overhead electrical lines in conjunction with the cogeneration plant would result in various safety concerns. These would include a risk of falling during installation and maintenance, as well as ongoing risks of burns and electrocution (OSHA, 2011). Additionally, portions of these lines would be located within the boundaries of IR Sites 24 and 53. The electric lines would be installed overhead, but if any work resulted in soil disturbance within IR Site 24, an ESS or ESS-DR would be required. Upgrades to existing steam lines would reduce the risk of burns from repairing existing leaks. The upgraded system would also require less maintenance, reducing

worker exposure to explosives safety arcs or areas of soil contamination to complete maintenance tasks.

Steam line repairs would require measures to contain asbestos to minimize the risk of it becoming airborne and potentially inhaled. This may include the use of personal protective equipment (PPE) and adherence to specific instructions for performing the task, including COMAR 26.11.21. The contractor would also follow the Unified Facilities Guide Specifications, Section 02 82 16.00 20, "Engineering Control of Asbestos Containing Materials."

Secondary Nodal Plants

Personnel would face hazards associated with boiler maintenance, potential contact with steam or related equipment, and their presence within explosives safety arcs when performing maintenance at Secondary Nodal Plants #2, 6, 7, 8 and 9.

Any steam lines that are cut, capped, and left in place, may deteriorate over time if not maintained. The deterioration of insulation on the steam lines has the potential to release airborne asbestos, resulting in potential inhalation hazards.

Natural Gas Lines

The installation of natural gas lines would be performed in accordance with all OSHA standards and 49 CFR Part 192. With the exception of a short distance along Mattingly Avenue, the natural gas transmission line outside of the base would be constructed within the Route 210 right-of-way, away from private residences. During construction, barriers would be put in place to protect the public from dangers associated with the work area. Some additional hazards, as well as some safety measures that would be employed to minimize hazards, are included below.

Trenching necessary to install the gas transmission and distribution lines would involve hazards including the potential for collapse of the trench and the proximity of workers to traffic, especially when the gas lines run along the roadway (OSHA, 2008). Trenching would also be accompanied by the hazard of potential contact with other underground utilities. Excavation of the trench for the natural gas line would require adherence to the requirements specified in 29 CFR 1926.651.

After construction, there would be ongoing hazards associated with the potential for unintentional contact with the gas line during earth disturbing activities. To decrease this hazard, visual markers and standard utility location equipment would be used to identify the location of the line. Other safety measures would include regular inspections and the use of critical valves to control the flow of natural gas.

While a portion of the gas line within NSF Indian Head would run through IR Site 9, no associated restrictions are placed upon work done within this site (Table 4-14). The presence of natural gas would present a safety concern both within and outside of the base after construction is complete, but only if there is a rupture in the line. This would also pose a safety hazard to any personnel in the vicinity at the time of the incident, especially in areas near explosive materials. An SOP associated with maintenance of the natural gas line would be created to minimize related hazards.

UEM Building

The UEM Building would improve the health and safety of personnel currently working at the Goddard Power Plant. The UEM Building would use newer construction materials, eliminating the health hazards associated with the potential presence of lead-based paint and asbestos that were

used in the Goddard Power Plant buildings. Worker safety would increase by eliminating any explosives safety hazards associated with unnecessary travel along explosives transport routes and exposure from IR or MRP sites.

Goddard Power Plant

Demolition of the Goddard Power Plant would reduce the number of workers within the restricted area of the base who do not directly support explosives operations. Additionally, it would eliminate hazards that could be associated with the use of a potentially inadequate fire protection system.

Air emissions from coal-fired boilers at the Goddard Power Plant may also contain mercury, a toxic pollutant. By eliminating the use of the Goddard Power Plant, less airborne mercury would be released at NSF Indian Head, decreasing exposure to personnel and wildlife.

Alternative Action

Health and safety impacts associated with construction of the primary nodal steam plants, natural gas transmission line, natural gas distribution line to Primary Nodal Plant #2, and UEM Building, as well as demolition of the Goddard Power Plant and Steam B Plant would be the same as the Proposed Action. The secondary nodal plants and additional natural gas distribution lines would not be constructed under the Alternative Action, resulting in reduced exposure to asbestos and explosive arcs. No steam lines would be demolished, resulting in greater maintenance needs following project completion. However, the steam lines would be repaired and would be in better condition upon project completion.

No-Action Alternative

The No-Action Alternative would not implement any of the construction, renovation, or demolition actions discussed under the Proposed and Alternative Actions. Therefore, there would be no changes to the current health and safety of personnel at NSF Indian Head.

4.14 Noise

Proposed Action

None of the new facilities constructed under the Proposed Action would generate any increase in operational noise hazards. Repairing existing steam lines and demolishing/capping and leaving in place excess steam lines would result in an overall reduction of noise due to the decrease in number of leaks producing sustained noise.

Construction, renovation, and demolition activities associated with the Proposed Action would temporarily increase environmental noise levels at NSF Indian Head. These activities would require the use of heavy equipment, such as backhoes, bulldozers, and excavators. These vehicles typically generate noise levels of 85 to 100 dBA at the source (The Center to Protect Workers' Rights, 2003). Multiple vehicles would not operate at the same location for a constant 8-hour period. Construction personnel would take the necessary precautions (e.g., hearing protection) to ensure that they would not be exposed to noise louder than the Navy workplace standard of 84 dBA over an 8-hour period. Most of the construction noise would be temporary and would dissipate as the distance from the source increases. Thus, it is not expected that residents in the Town of Indian Head would experience noise louder than the Charles County and MDE construction noise limits of 90 dBA as a result of the construction activities. Work to install the gas transmission line would occur outside the installation, along Route 210 and Mattingly Avenue in Charles County, and would be subject to Charles County and MDE noise limits.

Primary Nodal Steam Plants

Existing mission operations would remain in the areas surrounding the proposed location for Primary Nodal Plant #1. No building demolition would be required to accommodate the construction of Primary Nodal Plant #1; however, temporary noise would be generated from the clearing of trees prior to construction.

The primary nodal plants would not generate outdoor noise beyond established limits and would have less impact to the surrounding community than Goddard operations. Operational noise from Nodal Plant #1 would be expected to be below regulatory thresholds. The proposed plants would only be occupied during routine monitoring, repair, and maintenance. Noise associated with vehicular traffic should remain the same because roving vehicles currently inspecting the steam line distribution system would also be used for this effort (Jenkins, 2011). Personnel who are required to enter the primary nodal plants would follow posted hearing protection guidelines and attend required safety training. Demolishing/capping and leaving in place excess steam lines, as well as repair activities associated with the Proposed Action would temporarily increase environmental noise levels at NSF Indian Head, but result in a reduction over the long-term.

Secondary Nodal Plants

The secondary nodal plants to be installed under the Proposed Action use gas-fired boilers. These systems produce intermittent noise, but are not considered noise hazards. The systems would be serviced as needed by the same roving patrol vehicle currently being utilized to service the steam lines and would not result in an increase of noise. Temporary environmental noise increases would occur from construction of these systems. All construction activities would adhere to requirements previously mentioned.

Natural Gas Lines

Under the Proposed Action, the natural gas transmission line and gas distribution lines would be constructed along existing roads or utility rights-of-way. Noise associated with the construction would be temporary. As stated previously, construction activities would require the use of heavy equipment, such as backhoes and excavators. As these construction activities would occur throughout commercial and residential areas of the Town of Indian Head and Charles County, construction activities would have to adhere to the Town of Indian Head Noise Code and the Charles County Noise Ordinance (Section 3.14).

UEM Building

Existing facilities adjacent to the proposed location of the UEM Building under the Proposed Action include office space, storage, a maintenance garage (Building 290) and a maintenance shop (Building 525), and the Pickens Lane residences. Both maintenance facilities generate noise associated with vehicle maintenance and repair. However, both facilities comply with OSHA, U.S. Navy, MDE, and Charles County noise guidelines and standards and only operate during regular working hours from 7:00 a.m. to 5:00 p.m.

The UEM Building would replace several shops and offices that are currently scattered throughout NSF Indian Head. These shops produce noise, but comply with all applicable noise regulations and would only operate during regular working hours from 7:00 a.m. to 5:00 p.m. The same equipment currently installed at the various shops would be moved to the UEM Building. All current noise management procedures would be implemented at the UEM Building and personnel working within the building would be required to participate in safety training (Jenkins, 2011).

Goddard Power Plant

Demolition of the Goddard Power Plant would generate temporary noise. Proper noise mitigation procedures would be implemented as discussed above for the construction and demolition activities. Additionally, discontinuation of daily coal deliveries would result in a decrease in noise.

Alternative Action

The Alternative Action would have similar impacts to noise as the Proposed Action. The primary nodal plants would be constructed in the same location under both actions; however, the primary nodal plants would be larger under the Alternative Action than under the Proposed Action. There would not be an increase in operational noise; however, temporary noise associated with construction of the primary nodal plants would be present for a longer period of time. Repairs and upgrades to the lines would be performed as under the Proposed Action. No steam lines would be demolished/capped and left in place under the Alternative Action; however; additional repairs and upgrades would be performed on the lines not being demolished, reducing noise. No secondary nodal plants or associated natural gas distribution lines would be installed under the Alternative Action. Installation of the natural gas lines to NSF Indian Head and to the primary nodal plants, construction of the UEM Building, and demolition of the Goddard Power Plant would result in the same impacts to noise as the Proposed Action.

No-Action Alternative

The No-Action Alternative would not generate any temporary noise associated with construction, renovation, and demolition activities. Current noise levels associated with the existing steam lines, Goddard Power Plant and shops would remain. There would be no reduction in noise impacts to the

surrounding community due to the demolition of the Goddard Power Plant and the construction of the primary nodal plants farther from the installation boundary.

4.15 Transportation

Proposed Action and Alternative Action

Construction, renovation, and demolition activities associated with the Proposed and Alternative Actions would temporarily increase the traffic volume to, from, and within NSF Indian Head. Daily traffic through the main gate and Post 2 would increase throughout the construction period due to the presence of privately owned vehicles transporting the construction crew, delivery vehicles for equipment and construction materials, and waste handling and disposal vehicles. This temporary increase in traffic at NSF Indian Head would be managed with queuing, if necessary, to ensure smooth traffic flow on base. Temporary traffic control planning would provide for continued traffic flow and access to property off base during construction of the natural gas transmission line along Route 210 and Mattingly Avenue. Appropriate road closure and detour signs would be posted as needed for traffic management, and a road closure plan showing the location of signage would be prepared. In the event of an emergency, emergency routes would follow posted detours for the most efficient egress. Due to the timeframe for construction and demolition activities, multiple road closures would likely not occur concurrently or greatly impede traffic flow. Traffic impacts within the Town of Indian Head would be minimal and temporary. Other construction vehicles, such as bulldozers, backhoes, cranes, and excavators would remain at construction sites for the duration of construction and would not affect traffic on a daily basis. Washington Gas representatives would read the meters at each of the primary and secondary nodal plants on a monthly basis, requiring them to pass through ESQD arcs.

Primary Nodal Plants

Under the Proposed and Alternative Actions, parking lots and access roads would be constructed to support the primary nodal plants. During construction of the primary nodal plants, traffic routes within the installation would be temporarily affected, but alternate routes would be established. Roads outside of the installation would not be impacted by this construction. No long-term transportation impacts would be expected following construction of the primary nodal plants. Access to the primary nodal plants would be limited to routine monitoring, repair and maintenance. Steam line repairs would result in temporary closures of one or both lanes along roads within the installation and would be comparable to current repairs performed along these steam lines.

Secondary Nodal Plants

Construction of secondary nodal plants under the Proposed Action would result in temporary and minor transportation impacts. Paving and site improvements would create better traffic patterns and provide more parking for associated personnel. Construction of natural gas distribution lines and other utilities to support these systems may result in temporary road closures. Steam line demolition may result in temporary road closures. Under the Alternative Action, secondary nodal plants would not be installed and there would be no temporary impacts due to the construction of these systems.

Natural Gas Lines

Installation of the natural gas transmission line would occur within the Route 210 right-of-way and along Mattingly Avenue, resulting in temporary traffic impacts. Washington Gas would perform all work in accordance with their Washington Gas Safety Handbook, which requires that temporary traffic control planning provide for continuity of function, such as movement of traffic and pedestrians, and access to property and utilities.

UEM Building

The Proposed and Alternative Actions would relocate vehicular traffic associated with existing operations from the Goddard Power Plant and its supporting facilities to the UEM Building. Parking areas and access roads would be constructed to accommodate the consolidation of personnel, resulting in minimal impacts to parking and transportation at the proposed UEM Building site. The UEM Building would reduce available parking that is currently used by the NAVFACWASH transportation fleet. Overflow parking for the fleet would be made available behind Building 551.Temporary road closures may occur during construction, but personnel would have building access throughout construction. Construction of the UEM Building would reduce vehicular traffic through Post 2 and ESQD arcs to only those personnel performing maintenance on the utility lines and infrastructure.

Goddard Power Plant

Demolition of the Goddard Power Plant could require temporary road closures within the base, but would not result in any long-term transportation impacts. The delivery of up to 25 daily tractor trailer loads of coal would no longer be required, resulting in a minor transportation improvement.

No-Action Alternative

The No-Action Alternative would not result in any transportation impacts or improvements within NSF Indian Head or the surrounding area. Plant workers would still be required to travel through Post 2 and ESQD arcs to access the Goddard Power Plant and tractor trailers would continue to deliver coal to the plant.

4.16 Unavoidable Adverse Impacts

Unavoidable adverse impacts are irreversible or irretrievable commitments of natural or cultural resources that would occur if the Proposed Action or Alternative Action were implemented. The modifications to 77 buildings listed as contributing elements to historic districts, modifications to the 21 potentially eligible buildings, and the removal of 20 historic properties from the steam distribution system may constitute an adverse impact to historic properties under the Proposed Action. Adverse impacts would also result from demolishing/capping and leaving in place excess steam lines in the Naval Powder Factory Historic District, Naval Extrusion Plant Historic District, Polaris Plant Historic District (proposed and under evaluation), Indian Head Railroad, and the Goddard Power Plant and Steam Lines, all of which are eligible or potentially eligible for listing on the National Register. The Navy is consulting with SHPO to identify any unavoidable adverse impacts to cultural and historic resources.

The No-Action Alternative would not result in any unavoidable adverse impacts.

4.17 Mitigation Measures

Mitigation measures can include actions such as avoiding an impact altogether by not taking a certain action or parts of an action; minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments (Reinke & Swartz, 1999).

The existing work approval process at NSF Indian Head requires the review of proposed site preparation, construction, and other work-related activities (e.g., landscaping) prior to the commencement of work. Therefore, the activities associated with the Proposed Action in this EA would be subject to work review and approval. Any environmental, cultural, or health and safety issues would be addressed prior to action and mitigation measures would be tracked until completion.

Through the analysis in this EA and consultation with various agencies, the Navy has identified the mitigation measures below to alleviate adverse impacts. However, none of these mitigation measures are required to make a finding of no significant impact.

Architectural Resources

Both the Proposed and Alternative Actions would result in the demolition of Buildings D2 and D2D, and the removal of 20 historic properties from the steam distribution system. Per the PA between the Navy, SHPO, and Mid-Atlantic Family Communities, demolition of Buildings D2 and D2D would be mitigated through photographic and written documentation. Documentation requirements must be performed by Mid-Atlantic Family Communities. The Navy will ensure all mitigation requirements are completed before the demolition of these two facilities.

The Proposed Action would also result in impacts to 27 historic or potentially historic properties by demolishing/capping and leaving in place existing steam lines. These facilities are located within the Naval Powder Factory, Naval Extrusion Plant, and proposed Polaris Propellant Test Facility Historic Districts. HAER documentation is currently being prepared for historic buildings within the Naval Powder Factory and Naval Extrusion Plant Historic Districts. Adverse effects would also occur to the Indian Head Railroad and Goddard Power Plant and Steam Lines. The Navy will mitigate these adverse impacts through stipulations identified in the MOAs with SHPO regarding MILCON P222 and the disposal of excess railroad tracks associated with NSF Indian head.

Bald Eagles

The Navy consulted with USFWS to determine appropriate mitigation measures for activities that have the potential to affect bald eagles. On October 14, 2011, USFWS concurred with the Navy's determination of "No Adverse Effect" to eagle nests if work within the 750-foot protection buffers is completed outside of the nesting season. The Navy would adhere to the mitigation measures discussed in this consultation to avoid adverse impacts to eagles.

Coastal Resources

The Navy submitted a CZMA federal consistency determination (Appendix E) to MDE for activities that have the potential to affect Maryland's coastal resources. Through this process, it was determined that the Navy would implement stormwater and SEC plans, including LID measures, and mitigate tree removal at a 1:1 ratio by planting up to 61,750 SF (1.42 acres) of trees and

utilizing the installation's 63,250 SF (1.45 acres) of banked credit as needed to meet the potential clearing of up to 125,000 SF (2.87 acres) of trees.

Wetlands

Installation of the natural gas transmission line has the potential to directly impact 0.1 acres of nontidal wetlands and indirectly impact an additional 5.9 acres of nontidal wetlands between Bryans Road and NSF Indian Head. To the greatest extent possible, Washington Gas would avoid wetlands or utilize directional drilling to avoid impacts. However, if impacts to wetlands cannot be avoided, Washington Gas would comply with all permit and mitigation requirements, as applicable.

4.18 Summary

The Proposed and Alternative Actions would result in temporary impacts from construction, renovation, and demolition activities and long-term benefits from reductions in utility consumption. In several areas, the Proposed and Alternative Actions would result in different types and extents of impacts, with the Proposed Action resulting in greater long-term benefits. The extent of impacts of the Proposed and Alternative Actions differ in the following environmental areas:

- Explosives Safety;
- Infrastructure and utilities;
- Air quality;
- Stormwater;
- Surface waters;
- Coastal zone management;
- Wetlands;
- Groundwater;
- Land Use;
- Vegetation;
- Fish and wildlife;
- Architectural resources;
- Archeological resources;
- Geology and soils;
- Topography;
- Solid and hazardous waste;
- Health and safety; and
- Noise.

The environmental consequences of the Proposed Action, Alternative Action, and No-Action Alternative are summarized in Table 4-15.

Table 4-15. Summary of Environmental Consequences

Environmental Area	Proposed Action	Alternative Action	No-Action Alternative
Explosives Safety	**Temporary exposure** to explosives safety hazards associated with construction, demolition, and repair activities within ESQD arcs. Explosives safety site approval would be required under certain conditions. An approved ESS or ESS-DR would be required for any activity involving soil disturbance within the boundary of an IR or MRP site with associated explosives safety concerns.	**Same** as the Proposed Action, **except** that the level of exposure to personnel and overall risk of damage from an accidental detonation would be lower due to a decrease in the number of nodal plants and length of natural gas lines constructed within ESQD arcs.	**No exposure** to explosives safety hazards.
	Long-term exposure to explosives safety hazards associated with operation and maintenance of the nodal plants, and maintenance of gas lines that are located within ESQD arcs.	**Same** as the Proposed Action, **except** that the level of exposure to personnel and overall risk of damage from an accidental detonation would be lower due to a decrease in the number of nodal plants and length of natural gas lines constructed within ESQD arcs.	**No exposure** to explosives safety hazards.
	Improvement due to the construction of the UEM Building and subsequent relocation of personnel out of the restricted area, which would reduce exposure of personnel to explosives hazards.	**Same** as the Proposed Action.	**No improvement** to explosives safety.
Infrastructure and Utilities	**Improvement** to energy efficiency due to reduction of the length of steam lines and replacement of the Goddard Power Plant with a new, more efficient system.	**Same** as the Proposed Action, **except** that there would be less of an improvement due to maintaining centralized greater length of steam lines.	**No improvement** to energy efficiency and would continue to experience losses in steam production and high utility costs.
	Minor decrease in power pulled from the grid due to increased power from the cogeneration plant.	**Same** as the Proposed Action, **except** that there would be a greater decrease in power pulled from the grid due to greater power generation by the cogeneration plant.	**No decrease** in power pulled from the grid.
	Minimal impact to the utility infrastructure due to necessary extensions, relocations, and modifications.	**Same** as the Proposed Action.	**No impact** to utilities or infrastructure.
	Moderate decrease in utility infrastructure due to demolition of the Goddard Power Plant and the demolition of 10 miles of steam distribution lines.	**Same** as the Proposed Action, **except** that there would be less of a decrease due to retention of existing steam infrastructure.	**No impact** to utility infrastructure.

Table 4-15. Summary of Environmental Consequences

Environmental Area	Proposed Action	Alternative Action	No-Action Alternative
Air Quality	**Temporary** air emissions during construction and demolition (below Clean Air Act *de minimis* thresholds).	**Same** as the Proposed Action. Emissions due to construction of the primary nodal plants would be slightly greater due to the larger building sizes; however, this would be offset by the avoided construction of secondary nodal plants.	**No impact** to air emissions associated with construction or demolition activities.
	Minor to significant reductions in operational air emissions of CO_2, HCl, NOx, PM_{10}, SO_2, and VOC due to the replacement of the coal-fired Goddard Power Plant with cleaner natural gas-fired nodal plants. **Moderate increase** in the operational air emissions of CO.	**Same** as the Proposed Action. Emissions associated with emergency generators would be similar, while emissions from steam production may be slightly greater and emissions from electricity consumption may be slightly reduced.	**No reduction** in air emissions. The Goddard Power Plant will not be able to comply with more stringent air emission limits.
Stormwater	**Moderate impact** to stormwater by the disturbance of more than 5,000 SF of land. Minor increase in the amount of TIA within at least three subwatersheds, which would impact stormwater runoff, and minor decrease in the amount of TIA within three subwatersheds. Stormwater and SEC plans would be followed to prevent stormwater runoff and sediment transport during construction and demolition activities. LID would be implemented and may result in an **improvement** to the quality of stormwater runoff.	**Same** as the proposed action, **except** larger primary nodal plants would result in more stormwater runoff; however, the lack of construction of secondary nodal plants would decrease stormwater runoff as compared with the Proposed Action.	**No impact** to stormwater.
Surface Waters	**Minor to moderate impact** to surface waters due to stream crossings at up to 16 streams and disturbance within 100 feet of five additional streams for installation of the natural gas lines.	**Same** as the Proposed Action, **except** that the impact to surface water bodies would be less than the Proposed Action due to fewer steam crossings associated with natural gas distribution line installation.	**No impact** to surface water bodies.

Table 4-15. Summary of Environmental Consequences

Environmental Area	Proposed Action	Alternative Action	No-Action Alternative
Industrial Wastewater	**Net decrease** in wastewater discharged from NSF Indian Head and subsequent **improvement** in surface water quality.	**Same** as the Proposed Action, **except** that the primary nodal plants would be larger and would therefore use a greater volume of river water and discharge a greater volume of wastewater to the Potomac River as compared to the Proposed Action, but still less than the No-Action Alternative.	**No decrease** in process wastewater discharges, which may limit the Navy's ability to comply with TMDL requirements.
Coastal Zone Management	**Moderate improvement** to coastal use or resources. Improvement in stormwater runoff quality and reduction of wastewater discharges to the Potomac River and Mattawoman Creek, thus improving the water quality of Maryland's coastal resources.	**Same** as the Proposed Action.	**No improvement** to coastal use or resources.
	Potential impact to Maryland's coastal resources due to construction, demolition, and vegetation clearing within the 1,000-foot shoreline buffer. The Navy submitted a federal consistency determination and would implement stormwater and SEC plans, including LID measures, and mitigate tree removal at a 1:1 ratio by planting up to 61,750 SF (1.42 acres) of trees and utilizing the installation's 63,250 SF (1.45 acres) of banked credit as needed.	**Same** as the Proposed Action **except** there would be slightly more vegetation clearing within the 1,000-foot shoreline buffer due to the larger footprints of the primary nodal plants, and no vegetation clearing within the 1,000-foot shoreline buffer associated with secondary nodal plants or gas distribution lines.	**No vegetation removal** within the 1,000-foot shoreline buffer.

Table 4-15. Summary of Environmental Consequences

Environmental Area	Proposed Action	Alternative Action	No-Action Alternative
Wetlands	**Potential impact** to wetlands due to the installation of natural gas lines and other utilities within up to 0.1 acres of non-tidal wetlands and within 100 feet of up to 5.9 acres of non-tidal wetlands. To the greatest extent possible, wetlands would be avoided or directional boring would be used to avoid impacts to wetlands. Washington Gas would comply with all permit and mitigation requirements, as applicable. A Joint Federal/State Waterways/Floodplains/Wetlands Permit would be obtained for any activity that disturbs or occurs within a non-tidal wetland or its 25-foot buffer. Stormwater and SEC plans would be followed to prevent sediment transport into wetlands.	**Same** as the Proposed Action, **except** that secondary nodal plants and associated natural gas distribution lines would not be constructed, thereby reducing the potential impacts to wetlands.	**No impact** to wetlands.
Groundwater	**Net reduction** in groundwater usage due to the use of river water for the primary nodal plants and at least four of the secondary nodal plants; demolition of existing buildings; and relocation of operations to new more water-efficient facilities.	**Same** as the Proposed Action, **except** that the primary nodal plants would be larger and would require greater usage of backup potable water when the river water filtration system is not operational. However, secondary nodal plants would not be installed and therefore would not impact groundwater.	**No reduction** in groundwater usage.
	Potential exposure to surficially contaminated groundwater due to construction locations.	**Same** as the Proposed Action.	**Potential increase** in future surficial groundwater contamination due to the continued presence of the coal pile and decaying lead- and asbestos-contaminated buildings and steam lines.
Floodplains	**Minimal impact** to the 100-year floodplain. Impacts to the floodplain due to the upgrade or demolition of utility lines would be temporary and minor in nature.	**Same** as the Proposed Action.	**No impact** to Floodplains.

Table 4-15. Summary of Environmental Consequences

Environmental Area	Proposed Action	Alternative Action	No-Action Alternative
Land Use	**Consistent** with the Master Plan and would upgrade aging utility infrastructure and relocate personnel from the restricted area to the non-restricted area of NSF Indian Head.	**Same** as the Proposed Action, **except** fewer gas distribution lines would be installed, which may limit the future ability to provide gas to other facilities at NSF Indian Head.	**Not consistent** with the Master Plan because it would not promote the utility and sustainability goals of the Master Plan.
Socioeconomic Issues	**Potential minor impact** to sensitive populations due to the potential need for easements on private property for installation of the gas transmission line.	**Same** as the Proposed Action.	**No impact** to sensitive populations.
	No impact to fishing or recreation.	**Same** as the Proposed Action.	**Same** as the Proposed Action.
	Minor temporary improvement to employment and income due to presence of workers for construction and demolition activities.	**Same** as the Proposed Action.	**No improvement** to employment or income.
Vegetation	**Minimal impact** due to removal of urban landscape and small areas of forest associated with construction and demolition. The Navy would adhere to the mitigation measures determined through its federal consistency determination. Any trees removed would be managed in accordance with the MDA Quarantine Order #08-01 to prevent the spread of the EAB.	**Same** as the Proposed Action, **except** there would be slightly more tree removal due to the larger footprints of the primary nodal plants, and no tree removal associated with secondary nodal plants or gas distribution lines.	**No impact** to vegetation.
	Moderate improvement to urban landscape due to the return to early succession for rights-of-way of demolished steam lines.	**No improvement** to urban landscape.	**No improvement** to urban landscape.
Fish and Wildlife	**Minor disturbance** of habitat associated with tree removal activities.	**Same** as the Proposed Action, **except** there would be slightly more tree removal due to the larger footprints of the primary nodal plants, and no tree removal associated with secondary nodal plants or gas distribution lines.	**No impact** to habitat.

Table 4-15. Summary of Environmental Consequences

Environmental Area	Proposed Action	Alternative Action	No-Action Alternative
Fish and Wildlife (continued)	**Potential minor disturbance** of wildlife due to noise from construction and demolition activities**. Potential minor disturbance** of bald eagles due to construction and demolition within protection areas.	**Same** as the Proposed Action, **except** there would be no disturbance of bald eagles because secondary nodal plants and the associated natural gas distribution lines would not be installed in eagle protection areas.	**No disturbance** of wildlife.
	Minor improvement in aquatic habitat due to a decrease in wastewater discharge.	**Same** as the Proposed Action, **except** that a greater quantity of wastewater would be discharged to the Potomac River due to the larger capacity of the nodal plants under the Alternative Action. However, the Alternative Action would still represent an overall reduction in wastewater volume and pollutant loadings as compared to the No-Action Alternative.	**No improvement** in habitat.
Architectural Resources	**Adverse effect** to architectural resources, due to heating system modifications to 77 historic buildings within the Naval Powder Factory and Naval Extrusion Plant Historic Districts, and 21 potentially eligible buildings within the proposed Polaris Propellant Test Facility Historic District. Two historic buildings (D2 and D2D) would be demolished to facilitate construction of the UEM Building. Twenty-seven historic buildings would have steam lines demolished/capped and left in place and have no access to secondary heating systems. Three Goddard buildings (770, 873, and 1364) that are eligible for the National Register would be demolished. Sections of railroad tracks that are part of the Indian Head Railroad would be removed to facilitate some construction and utility installation activities. The Navy would implement appropriate mitigation measures, as defined in the MOA prepared in consultation with SHPO, to alleviate adverse effects to the historic districts and properties.	**Adverse effect** to architectural resources, due to the removal of sections of railroad tracks that are part of the Indian Head Railroad to facilitate some construction and utility installation activities. The Navy would implement the appropriate mitigation measures, as defined in the MOA prepared in consultation with SHPO, to alleviate adverse effects to the historic properties. In addition, there would be an adverse effect due to the demolition of three Goddard buildings (770, 873, and 1364), which are eligible for the National Register.	**No immediate effect** to historic buildings; **however,** buildings would experience continued deterioration and would not be documented through consultation with SHPO and ACHP.

Table 4-15. Summary of Environmental Consequences

Environmental Area	Proposed Action	Alternative Action	No-Action Alternative
Archeological Resources	**No adverse effect** to archeological resources is expected. However, if any unexpected archeological resources are discovered during construction or demotion, all activities involving soil disturbance in the area of the discovered resource would be suspended and the Navy would consult with SHPO to develop and implement any necessary avoidance, protection, or treatment measures.	**Same** as the Proposed Action, **except** that there would be less earth disturbance under the Alternative Action, which would result in a lower potential of impacting unexpected archeological resources.	**No adverse effect** to archeological resources.
Geology and Soils	**Moderate disturbance** associated with construction, demolition, and renovation projects would impact both previously developed and undisturbed soils. SEC controls would be implemented to prevent soil erosion.	**Same** as the Proposed Action, **except** that there would be less earth disturbance under the Alternative Action.	**No impact** to geology and soils.
	Moderate disturbance by construction and demolition activities would have the potential to impact IR and MRP sites. Site-specific restrictions would be implemented.	**Same** as the Proposed Action, **except** that there would be less earth disturbance under the Alternative Action.	**No impact** to contaminated soils.
Topography	**Minimal impact** due to construction activities, which would require grading to provide more suitable topography for the new buildings and related infrastructure in order to control surface water runoff and minimize soil erosion and sedimentation.	**Same** as the Proposed Action, **except** that the impact to topography would be less than the Proposed Action because grading associated with construction of secondary nodal plants would not occur.	**No impact** to topography.
	Minimal improvement may occur due to regrading and backfilling to restore pre-development conditions at demolition and utility installation sites.	**Same** as the Proposed Action.	**No improvement** to topography.
Solid and Hazardous Waste	**Major decrease** in the amount of solid waste that is generated by the steam generation and heating systems at NSF Indian Head. Demolition of the Goddard Power Plant would eliminate the generation of fly ash waste (4,700 lbs in 2009).	**Same** as the Proposed Action, **except** that the quantity of waste generated by the operation of the nodal plants under the Alternative Action would likely be greater than under the Proposed Action due to the increased size of the plants.	**No decrease** in the amount of solid waste produced.

Table 4-15. Summary of Environmental Consequences

Environmental Area	Proposed Action	Alternative Action	No-Action Alternative
Solid and Hazardous Waste (continued)	**Temporary generation** of building material waste, which may be contaminated by lead and asbestos, but would be reduced through incorporation of material source reduction or recycling. Construction of new facilities would incorporate the use of reused, recycled, or refurbished materials in the building design.	**Same** as the Proposed Action, **except** that the generation of contaminated building material waste would be less than the Proposed Action because excess steam lines would not be demolished under the Alternative Action.	**No impact** to solid or hazardous waste generation.
Health and Safety	**Temporary increase** in health and safety risks associated with construction, renovation, and demolition due to decontamination hazards, the location of some project elements within ESQD arcs, transportation increases, and inherent risks associated with these actions. A safety plan would be developed in accordance with OPNAVINST 5100.23 to reduce risk of injury or illness to workers.	**Same** as the Proposed Action, **except** that the secondary nodal plants and supporting natural gas distribution lines would not be constructed and thus there would be no health and safety impacts associated with those project elements.	**No increase** in health and safety risks associated with construction, renovation, and demolition activities.
	Minor long-term improvement to the health and safety of workers in that fewer repairs and maintenance of asbestos-contaminated steam lines are expected to be needed due to demolition of existing infrastructure.	**Same** as the proposed action, **except** all of the existing steam lines would remain and be upgraded and are thus expected to require less frequent repairs and associated exposure to asbestos.	**No long-term improvement** to the health and safety of workers associated with steam line repair.
	Moderate increase in health and safety risks associated with maintenance of nodal steam plants and potential release of asbestos if abandoned steam lines are left to deteriorate. Risks are associated with the presence of steam, as well as explosives safety concerns and general workplace safety hazards. The use of SOPs, Hazard Control Briefings, and/or maintenance procedures would be implemented as necessary to reduce risks.	**Same** as the proposed action, **except** the secondary nodal plants would not be constructed and steam lines would not be abandoned; therefore, there would be no health and safety concerns associated with these project elements.	**No increase** in health and safety risks associated with maintenance of nodal steam plants.

Table 4-15. Summary of Environmental Consequences

Environmental Area	Proposed Action	Alternative Action	No-Action Alternative
Health and Safety (continued)	**Moderate increase** in safety risks due to the installation of natural gas lines. The flammability of natural gas would introduce concerns associated with potential leaks or rupture of the natural gas lines. Within the installation, guidelines set forth in OP 5 would be followed and an explosives safety site approval would be obtained from NOSSA to ensure minimization of associated risks. 49 CFR Part 192 and all OSHA standards would be adhered to during construction, and various measures would be implemented to decrease health and safety risks throughout the life of the gas lines.	**Same** as the Proposed Action, **except** the secondary nodal plants and supporting natural gas distribution lines would not be constructed and therefore there would be less chance of line leaks or rupture.	**No increase** in safety risks associated with the installation of natural gas lines.
	Improvement due to the construction of the UEM Building and subsequent relocation of personnel outside of the restricted area of the installation. This would decrease health risks associated with exposure of personnel to hazardous construction materials, and would also reduce exposure of personnel to explosives hazards.	**Same** as the Proposed Action.	**No improvement** to health and safety associated with the relocation of personnel outside of the restricted area.
Noise	**Minor reduction** in noise due to repairs to existing steam lines and demolishing/capping and leaving in place 10 miles of excess steam lines, resulting in a decrease in leaks producing sustained noise.	**Same** as the Proposed Action, e**xcept** existing steam lines would not be demolished/capped and left in place.	**No impact** to noise.
	Temporary increase in noise associated with the construction, renovation, and demolition activities. Noise levels off the base are not expected to be louder than the Charles County and MDE construction noise limits of 90 dBA. Construction personnel would use appropriate PPE.	**Same** as the Proposed Action, e**xcept** the duration of temporary noise associated with construction of the larger nodal plants would be slightly longer and temporary noise associated with gas and secondary nodal plant installation would not be generated.	**No impact** to noise.
Transportation	**Temporary increase** in traffic volume to, from, and within NSF Indian Head due to construction, renovation, and demolition activities. In addition, temporary road closures and associated detours may be necessary.	**Same** as the Proposed Action.	**No impact** to transportation.

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5. CUMULATIVE IMPACTS

A cumulative impact is an effect on the environment that results from the incremental effects of an action when added to other past, present, and reasonably foreseeable actions, regardless of what agency or person undertakes such actions. A cumulative impact can result from individually minor, but collectively significant actions taking place over a period of time (Reinke & Swartz, 1999).

5.1 Other Past, Present, and Reasonably Foreseeable Actions

The following past, present, and reasonably foreseeable actions at NSF Indian Head and at the regional level were considered in the development of this cumulative impacts analysis:

- **Public Private Venture (PPV).** Privatization of family housing at NSF Indian Head involving the rehabilitation, documentation, and demolition of certain historic buildings at NSF Indian Head, and the construction of new family housing. Demolition and construction activities began in 2007.

- **MILCON Project P154: Joint Aircrew Escape Component Center.** Construction of three new facilities to support Cartridge Actuated Device/Propellant Actuated Device receiving, segregation, storage, issue, and related functions. Construction activities were completed in 2009.

- **MILCON P161/P162: Agile Chemical Facility.** Construction of an Agile Chemical Facility to consolidate the manufacture of nitrate esters at NSF Indian Head. Construction and demolition activities began in 2008.

- **BRACON P002V: Relocation of Operations from Yorktown to Indian Head.** Construction of three new facilities, renovation of six facilities, and demolition of one facility to support the relocation of the Explosives Engineering Detachment and Quality Evaluation Division from Naval Weapons Station Yorktown to NSF Indian Head in accordance with Base Realignment and Closure (BRAC) 2005. Construction activities began in 2009 and were completed in early 2012. All facilities and equipment are expected to be operational by the end of 2012.

- **MILCON P166/P191: Energetics Systems and Technology Laboratory Complex.** Construction of a new facility providing weapons and engineering laboratory, inert laboratory, and secure workspaces in support of existing and future Fleet needs for rapid development of new weapons technologies. Construction activities began in 2011.

- **MILCON P167/P190: Advanced Energetics Research Laboratory Complex.** Construction of a new facility to enable the NSWC IHD RDT&E Directorate to discover and exploit new and advanced explosive materials for high-energy applications. Construction of first phase began in 2010.

- **MILCON P200: Sewage Treatment Plant Upgrades.** Improvements to the sewage treatment plant at NSF Indian Head to enable the plant to remove adequate amounts of biological phosphorus and nitrogen in order to meet the NPDES permit limits. Construction activities were completed in September 2011.

- **MILCON P205: Hazardous Materials Storage Facility.** Construction of a new hazardous/flammable materials storage facility. Construction activities were completed in 2010.

- **Shoreline Stabilization at NSF Indian Head.** Installation of shoreline stabilization structures along the Potomac River and Mattawoman Creek shorelines at NSF Indian Head to protect mission-critical Navy infrastructure and facilities, prevent disruption of operations, and prevent future adverse environmental effects associated with erosion and subsequent deposit of sediment into the surrounding water bodies. Stabilization activities began in 2007and are expected to be completed in 2012.

- **Navy Infrastructure Reduction Program.** Lay-up, decontamination, and demolition of 160 excess buildings and building foundations at NSF Indian Head. Demolition began in 2010 and will continue through 2013.

- **Caffee Road Thermal Decontamination Area (CRTDA) Relocation.** Relocation of the existing CRTDA at NSF Indian Head to a site immediately east of the existing pad. Construction will likely begin in summer 2012.

- **BUMED Facility Replacement.** Potential replacement of the existing BUMED facility in order to provide improved and adequate medical care and support services to NSF Indian Head. Construction would likely occur between 2012 and 2014.

- **NSF Indian Head EUL.** Potential opportunity to maximize underutilized land at NSF Indian Head through out-leasing and to receive in-kind services and/or facilities for the Navy and public. Project would involve out-leasing of the 35-acre area surrounding the existing Goddard Power Plant for development of a privately owned and operated natural gas-fired power plant and a separate 15-acre parcel north of the main gate for development of a privately owned and operated commercial or light industrial facility. This endeavor would include demolition of existing facilities, as well as new construction.

- **Natural Gas Distribution.** Potential addition of natural gas distribution lines to additional facilities at NSF Indian Head following the implementation of the Proposed Action. Construction would likely occur after 2015.

- **CBIRF and JITC Facility Improvements.** Potential expansion of current CBIRF and JITC facilities in order to consolidate personnel and vehicle maintenance, mission support equipment, and storage functions. Construction activities could begin as early as 2015.

5.2 Relationship between Proposed Action and EUL

The Navy began exploring the possibility of an EUL at NSF Indian Head prior to the funding of MILCON P222. The Navy's initial goals for the EUL included the possibility of obtaining steam and power as in-kind consideration for lease. The Navy believes the Proposed Action provides a better solution for the steam needs at NSF Indian Head and therefore, an EUL is not required to meet the need for power and steam generation of NSF Indian Head or its supported commands. Additionally, the Navy believes it can meet its foreseeable power requirements with the Proposed Action and the

electricity it obtains from the grid through a power purchase agreement with the Southern Maryland Electric Cooperative (SMECO).

Following funding of MILCON P222, the need for the potential EUL was revised as a strictly independent effort to maximize the use of underutilized land at the installation. The final Request for Qualifications for the EUL required the developer to create a financing and marketing plan that does not depend on the Navy as an off-taker of electricity.

5.3 Identification of Resource Areas for Analysis

The Proposed Action, in combination with other past, present, and reasonably foreseeable actions at NSF Indian Head and at the regional level, could potentially contribute to cumulative impacts to certain environmental and cultural resources. As shown in Section 4.18, certain resources would either be improved or not adversely affected by the Proposed Action. These resources are not evaluated in this cumulative impacts analysis because the Proposed Action would either partially offset or not contribute to potential cumulative impacts of other past, present, or reasonably foreseeable actions[9]:

- Infrastructure and utilities;
- Air quality;
- Surface waters (water quality);
- Groundwater;
- Fish and wildlife (aquatic habitat);
- Land use;
- Socioeconomic issues; and
- Archeological resources.

The Proposed Action would have temporary, minor impacts to other resources. However, these resources are not evaluated in this cumulative impacts analysis because the impacts under the Proposed Action would cease upon the completion of construction, renovation, and demolition, would be minor, and would not contribute to issues of significant regional concern:

- Surface waters (stream channels);
- Wetlands;
- Floodplains;
- Solid and hazardous waste;
- Noise; and
- Transportation.

The Proposed Action would have minor impacts to other resources. However, these resources are not evaluated in this cumulative impacts analysis because the minor impacts would be confined to the boundaries of NSF Indian Head, would not affect the community and environment around NSF Indian Head, and would not contribute to issues of significant regional concern:

- Explosives safety;

[9] The Navy acknowledges the public's concerns pertaining to surface water quality and fish habitat; however, the Proposed Action would contribute to improvements in surface water quality through a net reduction in impervious surfaces, water withdrawals from groundwater aquifers and the Potomac River, and water discharges at NSF Indian Head. Therefore, MILCON P222 would not contribute to negative cumulative impacts on these resources.

- Stormwater;
- Vegetation;
- Fish and wildlife (terrestrial habitat);
- Geology and soils;
- Topography; and
- Health and safety.

The Proposed Action would have the potential to affect architectural and coastal resources within the 1,000-foot shoreline buffer. Section 5.4 below evaluates the potential cumulative impacts of the Proposed Action to these resources when viewed in combination with the impacts of other past, present, and reasonably foreseeable actions.

5.4 Cumulative Impacts Analysis

Architectural Resources

The Proposed Action, along with other past, present or reasonably foreseeable actions (specifically the Navy Infrastructure Reduction Program; PPV; MILCONs P154, P162, P190, P191; and construction of a new BUMED facility) would result in modifications to or demolition of 78 historic structures. In addition, these projects would result in modifications to or demolition of 8 buildings that are part of the proposed Polaris Propellant Test Facility Historic District currently pending determination of eligibility by SHPO. As required by Section 106 of the NHPA, the Navy has notified SHPO and ACHP of these adverse effects and has worked with SHPO to develop and execute MOAs for the FY 2009 and FY 2010 infrastructure reduction projects and MILCONs P154 and P162. The Navy will work with SHPO to execute these MOAs and develop appropriate mitigation strategies for the impacts caused by the Proposed Action and other past, present, or reasonably foreseeable actions.

Construction and demolition activities under these past, present, and reasonably foreseeable actions would present an adverse affect to historic resources at NSF Indian Head. However, many of the buildings that would be affected by these actions are located in a restricted area of the base that supports explosives operations. These buildings are not accessible to the general public and are restricted to government employees and contractors who must follow health, general safety, and explosives safety policies set forth by the Navy. The historic value of these buildings is associated with manufacturing processes, testing activities, and other industrial activities previously housed in these structures, dating as far back as 1899 (as opposed to the architectural significance of these structures). However, the use of these buildings has changed with the needs and mission of the Navy and the advent of new technologies. For most of these industrial buildings, several cycles of process and activity changes have occurred within the buildings since their construction. To the extent possible, the Navy has already maintained historical records (e.g., process drawings and descriptions) of the significant industrial processes that occurred within these buildings.

In addition, many of the potential adverse effects resulting from these actions are to historic buildings within the Naval Powder Factory and Naval Extrusion Plant Historic Districts. Per the terms of a recent MOA with SHPO, the Navy is developing HAER documentation for these historic districts. HAER documentation will include building photographs, site plans, and a written history of the processes that took place within these historic districts. The intent of this documentation is to provide a comprehensive mitigation strategy that addresses cumulative impacts throughout these districts, as opposed to mitigating impacts to individual buildings through separate consultations and documentation efforts.

The Proposed Action and multiple other projects, including the Infrastructure Reduction Program, MILCONs P166 and P190, and other general road and utility work, would impact the Indian Head Railroad. Over the years, sections of the railroad, particularly within the Naval Proving Grounds, have been removed to support new infrastructure and construction projects. In addition, road development has paved over the railroad system in many areas. These actions would have cumulative adverse effects to the historic properties that make up the Indian Head railroad system. Based on ongoing Section 106 consultation with SHPO regarding impacts to the Indian Head Railroad, the Navy is in the process of documenting the remainder of the railroad system at NSF Indian Head, as well as its historic use and importance prior to its decommissioning.

As required by Section 106 of the NHPA, the Navy has notified SHPO and ACHP of these adverse effects. The Navy will work with SHPO to develop and execute MOAs and develop appropriate mitigation strategies for the impacts caused by the Proposed Action and other past, present, or reasonably foreseeable actions that have not yet been mitigated or are not covered under existing PAs or MOAs. While these activities present an adverse effect to the historic resources at NSF Indian Head, they should not contribute to any regional or national cumulative impacts to historic resources.

Coastal Zone Management

The Proposed Action, along with other past, present or reasonably foreseeable actions may result in impacts to Maryland's Coastal Zone. As discussed in Section 4.4.1, the Proposed Action would result in construction of approximately 28,750 SF of impervious surfaces within the 1,000-foot shoreline buffer, which would be offset by the removal of 73,000 SF in association with demolition of the Goddard Power Plant, coal yard, and existing facilities at the site of Primary Nodal Plant #2, resulting in a reduction in impervious surfaces within the 1,000-foot shoreline buffer. In addition, the incorporation of LID, stormwater management, and sediment and erosion control practices would offset many of the negative impacts to the shoreline that would otherwise be associated with construction within the 1,000-foot shoreline buffer. The Proposed Action would also impact the coastal zone by removing up to 125,000 SF (2.87 acres) of trees within the 1,000-foot shoreline buffer. Impacts from this tree removal would be mitigated at a 1:1 ratio by replanting trees within the 1,000-foot shoreline buffer and using the Navy's 63,250 SF (1.45 acres) of banking credits. The Navy consulted with MDE and the Critical Area Commission regarding these potential impacts through the CZMA federal consistency determination process. MDE's concurrence is included in Appendix E.

Implementation of MILCONS P154, P161, P162, P167, and P190; BRACON P002V; the CRTDA Relocation Project; and the potential CBIRF and JITC Facility Improvements Project would result in the construction of approximately 521,000 SF of impervious surfaces in the form of buildings, parking areas, roads, and sidewalks within the 1,000-foot shoreline buffer. Stormwater draining from the potential CBIRF and JITC Facility Improvements Project site, which makes up the majority of this new construction (350,000 SF), flows to the interior of the installation and would not be expected to negatively impact the coastal zone. These projects, the Navy Infrastructure Reduction Program, and the potential BUMED Facility Replacement Project would result in the demolition of 154,000 SF of impervious surfaces within the 1,000-foot shoreline buffer, which would partially offset the impacts of construction. The incorporation of LID, stormwater management, and sediment and erosion control practices on all Navy funded projects will offset many of the negative impacts to the shoreline that would otherwise be associated with construction within the 1,000-foot shoreline buffer.

Additionally, the PPV project resulted in construction of approximately 68,000 SF of new impervious surfaces and demolition of approximately 84,000 SF of impervious surfaces within the 1,000-foot shoreline buffer. However, the net decrease of approximately 16,000 SF of impervious surfaces within the 1,000-foot shoreline buffer may result in long-term improvements to the coastal zone. MDE concurred with the Navy's negative determination pursuant to 15 CFR 930.35, stating that the PPV project would not have an effect on the enforceable policies of the State's Coastal Zone Management Program.

MILCONs P162, P167, and P190 could have further impacts on Maryland's coastal zone by removing approximately 31,000 SF (0.71 acres) of trees within the 1,000-foot shoreline buffer. However, the impacts of tree removal were offset by replanting approximately 166,000 SF (3.81 acres) of trees within the 1,000-foot shoreline buffer associated with BRACON P002V, and MILCONs P167 and P190. Additionally, the shoreline restoration project helped to offset negative impacts to the coastal zone by planting 670 two-inch diameter trees within the 1,000-foot shoreline buffer and planting intertidal wetland vegetation behind sill and breakwater structures, thereby reducing sediment and erosion loading into the Potomac River and Mattawoman Creek. The Navy is currently investigating potential areas on the installation for future tree replanting mitigation within the 1,000-foot shoreline buffer.

The potential EUL project would involve activities that have the potential to impact Maryland's Coastal Zone. These activities may include construction, demolition, and tree clearing, some of which may occur within the 1,000-foot shoreline buffer. Additional coastal zone impacts may include changes in water use and wastewater discharges. Detailed information about the proposed EUL project has not been provided to the Navy at this time; however, as previously noted, the impacts of the potential EUL project would be further analyzed in the NEPA document for that project.

The Proposed Action, in combination with other past, present, or reasonably foreseeable projects (except the potential EUL project), would result in a net increase of approximately 309,000 SF of impervious surfaces and a net increase of approximately 71,650 SF (1.64 acres) of trees within the 1,000-foot shoreline buffer. In order to offset effects to the coastal zone, impacts to vegetation within the shoreline buffer are mitigated through replanting in consultation with MDE and the Critical Area Commission as part of the federal consistency determination process and impacts to stormwater are mitigated through implementation of LID. In addition, these projects may result in a decrease to the quantity and increases in the quality of wastewater discharge to the coastal zone due to the relocation of personnel to more efficient facilities associated with the Proposed Action; the reduction of process wastewater streams associated with MILCON P161 and P162; and upgrades to the NSF Indian Head Sewage Treatment Plant associated with MILCON P200. Implementation of MILCON P200 and the shoreline stabilization project should have positive effects on coastal resources. Overall, the projects analyzed in this discussion are not expected to result in cumulative adverse effects to coastal resources.

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8. REFERENCES

1. Barse, W. 1985. Archeological Reconnaissance Survey of the Naval Ordnance Station, Indian Head, Maryland. Volume 1: Cornwallis Neck, Bullitt Neck, and Thoroughfare Island. Preliminary Draft prepared under the auspices of the Maryland Historical Trust for the Department of the Navy, Chesapeake Division, Naval Ordnance Station, Indian Head, Maryland.

2. Berry, Lydia. Personal communication (telephone) with Lydia Berry, Safety Office, Naval Surface Warfare Center, Indian Head Division, May 11, 2010

3. Berry, S. 2008. Personal communication (email) with Seth Berry, Natural Resources Manager, Naval Support Facility Indian Head, 12 November 2008.

4. Bossart, J. 2002. Personal communication with Jeff Bossart, Environmental Division Director, NSA South Potomac Public Works Department, Naval Facilities Engineering Command (NAVFAC), 1 March 2002.

5. Bragunier, D. and Jenkins, D. Personal communication (meeting) with Dan Bragunier and Dave Jenkins.17 November 2010.

6. Caris, A. 2011. Personal communication (meeting) with Anne Caris, Applied Technology Department, Indian Head Division, Naval Surface Warfare Center, January 2011.

7. CH2MHill. 2003. Remedial Investigation Report, Site 47 – Mercuric Nitrate Disposal Area, Indian Head Division, Naval Surface Warfare Center, Indian Head, Maryland. December 2003.

8. Center to Protect Workers' Rights. 2003. Construction Noise Hazard Alert. Silver Spring, Maryland.

9. Charles County Department of Planning and Growth Management. 2010. Mattawoman Creek Watershed. http://www.charlescounty.org/pgm/planning/plans/environmental/mattawoman/characteristics.html. Date Accessed: 17 May 2010.

10. Charles County Department of Planning and Growth Management. 2001. Charles County Chesapeake Bay Critical Area Program. June 2001.

11. Charles County Department of Planning and Growth Management. 2001. Bryans Road-Indian Head Sub-Area Plan. Charles County, Maryland. October 2001.

12. Charles County Planning Commission. 2006. Charles County Comprehensive Plan. Charles County, Maryland. http://www.charlescounty.org/pgm/planning/plans/commplanning/compplan/index.html. Date Accessed: 22 October 2008.

13. Charles County Water Resources Advisory Committee. 2006. Report to the Charles County Commissioners. http://www.charlescounty.org/pgm/planning/plans/default.htm. Date Accessed: 16 June 2008.

14. Charles County, Maryland. 2007. Code of Charles County, Maryland. Updated October 25, 2007, Part II, General Legislation, Chapter 260, Noise Control.

http://www.charlescounty.org/webdocs/comm/boardofcommissioners/boarddocs/Nov%2018%2019%2008/Charles%20County%20Noise%20Ordinance.pdf. Accessed December 2010.

15. Chesapeake Bay Commission. 2005. Blue Crab 2005 - Status of the Chesapeake Population and its Fisheries.

16. Chesapeake Bay Program. 1995. Water Quality Functions of Riparian Forest Buffer Systems in the Chesapeake Bay Watershed. U.S. Environmental Protection Agency

17. Chesapeake Division NAVFAC. 1990. Master Plan Update – Naval Ordnance Station, Indian Head, Maryland. Prepared for Chesapeake Division, Naval Facilities Engineering Command.

18. Clinton, William J. 1994. "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." Executive Order 12898 of February 11, 1994. http://www.archives.gov/federal-register/executive-orders/1994.html#128981994. Accessed June 15, 2010.

19. Clinton, William J. 1997. "Protection of Children from Environmental Health Risks and Safety Risks." Executive Order 13045 of April 21, 1997. http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=1997_register&docid=fr23ap97-130.pdf. Accessed January 4, 2011.

20. Critical Area Commission. 2000. A Guide to the Conservation of Forest Interior Dwelling Birds in the Chesapeake Bay Critical Area. June 2000.

21. Critical Area Commission. 2008. Critical Area Commission for the Chesapeake and Atlantic Coastal Bays. http://www.dnr.state.md.us/criticalarea/index.html. Date Accessed: 11 February 2008.

22. Critical Area Commission. 2010a. Critical Area Buffer Local Government Assistance Guide. http://www.dnr.state.md.us/criticalarea/pdfs/LGAG_BR0210.pdf. Date accessed: 26 November 2010.

23. Critical Area Commission. 2010b. Local Government Staff Training, Buffer Regulations: Implementation. http://www.dnr.state.md.us/criticalarea/pdfs/BRT_Impt.pdf. Date accessed: 10 January 2011.

24. Davant, Doug. 2004. 50th Anniversary Celebrated at Biazzi. Flashpoint, June 2004.

25. Davidson, S. 2010. Personal communication (e-mail) with Stacey Davidson, Solid and Hazardous Waste Manager, NAVFACWASH Public Works Department Site Indian Head, 30 December 2010.

26. Energy Facility Site Evaluation Council. 2010. http://www.efsec.wa. gov/. Accessed July 2010.

27. Energy Information Administration (EIA). 1999. Natural Gas 1998: Issues and Trends. http://www.eia.doe.gov/pub/oil_gas/natural_gas/analysis_publications/natural_gas_1998_issues_trends/pdf/it98.pdf

28. ERG. 2008a. Goddard Power Plant Water Balance. Prepared for Naval Support Activity South Potomac Environmental Office, Indian Head, Maryland. August 2008.

29. ERG. 2008b. Vegetative Communities Geodatabase.

30. Fabey, W. 2012. Personal communication (email) with William Fabey, Stormwater Manager, Naval Support Facility Indian Head, 5 January 2012.

31. FedCenter.gov. General Conformity Rule. April 11, 2009. http://www.fedcenter.gov/assistance/facilitytour/air/conformity/ Accessed 9/4/2009

32. Frey, M. 2010. Personal communication (email) with Kathy Frey, Drinking Water, Program Manager, NAVFACWASH Public Works Department, Naval Support, Facility Indian Head. 30 June 2010.

33. Frey, M. 2011. Personal communication (email) with Kathy Frey, Drinking Water, Program Manager, NAVFACWASH Public Works Department, Naval Support, Facility Indian Head. 21 January 2011.

34. Frontanes, J. 2011. Personal communication (email) with Jose Frontanes, Naval Surface Warfare Center, Indian Head Division. 27 June 2011.

35. Harmon, James M. et al. 1999. Jefferson Patterson Park and Museum. Archaeological Investigation at The Posey Site (18CH281) and 18CH282, Indian Head Division, Naval Surface Warfare Center, Charles County, Maryland. March 1999.

36. Hock, R. 2011. Personal communication (telephone) with Ryland Hock, NOTW Supervisor, NSF Indian Head. January 2011.

37. Houghton Mifflin Company. 2006. The American Heritage Dictionary of the English Language, Fourth Edition."

38. Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: Synthesis Report. Summary for Policy Makers (SPM), p. 5. http://www.ipcc.ch/index.htm, http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf Accessed 9/26/09.

39. Jenkins, D. 2011. Personal communication (phone call) with David Jenkins, NAVFACWASH. 5 January 2011.

40. John Milner Associates Inc. 1995. Phase I Archeological and Phase II Historic Architectural Investigations, Naval Surface Warfare Center, Indian Head, Charles County, Maryland. November 1995.

41. Knisley, C. Barry. 2006. A Survey of Tiger Beetles (Family Cicindelidae) at Naval Support Facility Indian Head, 2006 - Final Report.

42. Krouse, D. Email from Daniel Krouse, Naval Surface Warfare Center, Indian Head Division, 15 September 2009.

43. Leonardo Academy. 2010. Leonardo Academy's Guide to Calculating Emissions Including Emission Factors and Energy Prices. 27 May 2010. http://www.cleanerandgreener.org/download/2010-06-

14%20Leonardo%20Academy%20C&G%20Emission%20Factors%20and%20Energy%20Prices_LEO%20format.pdf. Date accessed: 22 January 2011.

44. Maryland Department of Agriculture (MDA). 2008. Quarantine Order of the Secretary of Agriculture, State of Maryland, to Prevent the Spread of the Emerald Ash Borer in this State. Plant Protection Order #08-01, 26 August 2008.

45. Maryland Department of Agriculture (MDA). 2009. Emerald Ash Borer: General Information. Http://www.mda.state.md.us/plants-pests/eab. Date Accessed: 18 June 2009.

46. Maryland Department of the Environment (MDE). 1994. Maryland Standards and Specification for Soil Erosion and Sediment Control. MDE Water Management Administration.

47. Maryland Department of the Environment (MDE). 2001. Maryland Storm Water Management Guidelines for State and Federal Projects. MDE Water Management Administration. Baltimore, Maryland.

48. Maryland Department of the Environment (MDE). 2007a. The Stormwater Management Act of 2007- A State Perspective. www.mde.state.md.us/assets/document/act%20%20a%20state%20perspective.pdf. Date Accessed: 3 October 2007.

49. Maryland Department of the Environment (MDE). 2008a. 2008 MDE Guide to Environmental Permits and Approvals: 1.03 New Source Review Approval. http://www.mde.state.md.us/assets/document/permit/2008permitguide/ARMA/1.03.pdf. Date accessed: 04 January 2011.

50. Maryland Department of the Environment (MDE). 2008b. 2008 MDE Guide to Environmental Permits and Approvals. 1.04 Prevention of Significant Deterioration Approval. http://www.mde.state.md.us/programs/Permits/Documents/2008permitguide/ARMA/1.04.pdf

51. Maryland Department of the Environment (MDE). 2009. 2000 Maryland Stormwater Design Manual, Volumes I & II (2000) Supplement No. 1. http://www.mde.state.md.us/assets/document/IBR%20Package%20Complete%2004%202009.pdf. Date Accessed: 30 June 2009.

52. Maryland Department of the Environment (MDE). 2010a. Maryland Stormwater Management Guidelines for State & Federal Projects. April 15, 2010. http://www.mde.state.md.us/assets/document/State%20and%20Federal%20SWM%20Guidelines%20final.pdf. Date accessed: 07 January 2010.

53. Maryland Department of the Environment (MDE). 2010b. Permitting for Greenhouse Gases Kicks off in 2011. December 2010. http://www.mde.state.md.us/programs/ResearchCenter/ReportsandPublications/eMDE/Pages/researchcenter/publications/general/eMDE/vol4no8/Article5.aspx

54. Maryland Department of Natural Resources (MDNR). 2002. Maryland's Coastal Program. http://www.dnr.state.md.us/bay/czm/.Date Accessed: 12 August 2008.

55. Maryland Department of Natural Resources (MDNR). 2010a. Rare, Threatened, and Endangered Plants of Maryland. http://www.dnr.state.md.us/wildlife/Plants_Wildlife/rte/rteplants.asp"

56. Maryland Department of Natural Resources (MDNR). 2010b. Rare, Threatened, and Endangered Animals of Maryland. http://www.dnr.state.md.us/wildlife/Plants_Wildlife/rte/rteanimals.asp"

57. Maryland Department of Planning. 2008. Maryland Property View: Charles County.

58. Maryland Department of Transportation, 2009. Charles County Traffic Volume Map 2008 Annual Average Daily Traffic. Published March 2, 2009. Accessed at http://apps.roads.maryland.gov/SHAServices/mapsbrochures/maps/oppe/trafficvolumemaps/2008/charles.pdf.

59. Maryland Historical Trust. 2011a. National Register Listing in Maryland: Charles County. http://mht.maryland.gov/nr/NRMapCH.html. Date accessed: 17 January 2011.

60. Maryland Historical Trust. 2011b. Maryland Historical Trust Inventory of Historic Properties. http://www.mdihp.net/index.cfm. Date accessed 17 January 2011.

61. Maryland Natural Heritage Program (MDNHP). 1993. Rare, Threatened and Endangered Species and Natural Area Survey for the Naval Surface Warfare Center, Indian Head Division 1991-1992.

62. Maryland Natural Heritage Program (MDNHP). 1993. Rare, Threatened and Endangered Species and Natural Area Survey for the Naval Surface Warfare Center, Indian Head Division 1991-1992.

63. Maryland Public Service Commission (MPSC). 2008. CPCN Exemptions: Frequently Asked Questions. http://webapp.psc.state.md.us/intranet/ElectricInfo/CPCNExemptions_FAQ_new.cfm. Date accessed: 23 January 2011.

64. Maryland Public Service Commission (MPSC). 2009. Application for Commission Approval to Construct a Generating Station. http://webapp.psc.state.md.us/intranet/SiteSearch/Electric/CPCN%20Exemption%20Application_10_16_2009.doc. Date accessed: 4 June 2010.

65. Miller, G. T. 2000. Living in the Environment. Eleventh Edition. Brooks/Cole Publishing Company, Pacific Grove, California.

66. National Oceanic and Atmospheric Administration Marine Fisheries Service (NOAA Fisheries). 2005. Essential Fish Habitat Assessment Standard Operating Procedures. 2 February 2005.

67. National Park Service. 2011. National Register of Historic Places. http://www.nps.gov/history/nr/national_register_fundamentals.htm/. Date accessed: 18 January 2011.

68. Naval District Washington, 2005. Programmatic Agreement among the US Department of the Navy, the Maryland State Historic Preservation Officer, and Mid-Atlantic Family

Communities, LLC for the Public-Private Venture at Naval Surface Warfare Center, Indian Head, Maryland. August 2005.

69. Naval Facilities Engineering Command (NAVFAC). 2006. Institutional Management Plan. Prepared for Environmental Office, Naval Support Facility Indian Head, Maryland. January 2006.

70. Naval Facilities Engineering Command (NAVFAC). 2009. Internet Navy Facilities, Assets Data Store (iNFADS). Data retrieved 4 November 2009.

71. Naval Facilities Engineering Command (NAVFAC). 2010a. River Water Pipe Repair Work at Buildings 100, 1580 and Adjacent Areas. Naval Support Facility Indian Head, Maryland.

72. Naval Facilities Engineering Command Washington (NAVFAC). 2010b. Compliance with Revised Opacity Rules: Goddard Power Plant. 25 January, 2010.

73. Naval Facilities Engineering Command Washington (NAVFAC). 2011. Criteria and Toxic Air Pollutants Emissions Report Calendar Year 2010. March 2011.

74. Naval Energy and Environmental Support Activity. 1983. Initial Assessment Study of Naval Ordnance Station Indian Head, Maryland. NEESA 13-021, Port Hueneme, California.

75. Naval Energy and Environmental Support Activity. 1992. Preliminary Assessment Report of Naval Ordnance Station Indian Head, Maryland, Addendum to the Initial Assessment Study. NEESA 13-021A, Port Hueneme, California.

76. Naval Health Clinic- Patuxent River, Branch Health Clinic- Indian Head, 2010. 2010 Industrial Hygiene Survey: Chemicals and Extrusion Code T5.

77. Naval Ordnance Safety and Security Activity (NOSSA). 2009. Explosives Safety Review, Oversight, and Verification of Munitions Responses (NOSSA INSTRUCTION 8020.15B).

78. Naval Sea Systems Command (NAVSEA). 2010. Ammunition and Explosives Safety Ashore (NAVSEA OP 5). Volume 1, Seventh Revision, Change 9.

79. Naval Support Activity South Potomac (NSASP). 2008. Naval Support Facility, Indian Head: 2008 Base Guide and Telephone Directory, 2008. Comprint Military Publications, Gaithersburg, Maryland.

80. Naval Support Activity South Potomac (NSASP). 2010a. Draft Master Plan, Naval Support Facility, Indian Head. Indian Head, Maryland. January 2010.

81. Naval Support Activity South Potomac (NSASP). 2010b. Memorandum of Agreement for Disposition of Excess Structures at Naval Support Facility Indian Head, Charles County, Maryland. September 2010.

82. Naval Support Activity South Potomac (NSASP). 2010c. NSF Indian Head Base Guide and Directory, 2010.

83. Naval Support Facility Indian Head. 2005. NSF Indian Head Base Guide and Directory, 2004-05.

84. Naval Support Facility, Indian Head Environmental Office. 2007. NSF Indian Head Stump Neck Annex Forest Interior Dwellers (FIDs) Survey. Prepared for Environmental Office, Naval Surface Warfare Indian Head Division, Indian Head, Maryland.

85. Naval Support Facility, Indian Head Environmental Office. 2010. Bald Eagle Management Plan, Naval Support Facility Indian Head. Indian Head, Maryland.

86. Naval Surface Warfare Center, Indian Head Division (NSWC IHD). 2004. Instruction 5100.22G: Safety Manual, 17 November 2004. Indian Head, Maryland.

87. Naval Surface Warfare Center, Indian Head Division (NSWC IHD). 2009. Hazards of Electromagnetic Radiation to Ordnance (HERO) (IHDIVNAVSURFWARCEN INSTRUCTION 5101.3E).

88. NOAA Fisheries Service. 2010. Marine/Anadromous Fish Species under the Endangered Species Act. Accessed 30 June 2010.

89. Occupational Safety and Health Administration (OSHA), U.S. Department of Labor. 2008. Safety and Health Topics: Trenching and Excavation. http://www.osha.gov/SLTC/trenchingexcavation/index.html

90. Occupational Safety and Health Administration (OSHA), U.S. Department of Labor. 2011 OSHA Fact Sheet: Working Safely with Electricity. http://www.osha.gov/OshDoc/data_Hurricane_Facts/elect_safety.pdf

91. R. Christopher Goodwin & Associates, Inc. 1997. Overview of the Cultural Resources Management Program, Naval Surface Warfare Center, Indian Head, Archeological Resources on Cornwallis Neck. December 1997.

92. R. Christopher Goodwin & Associates, Inc. 1998a. National Register Documentation for Indian Head White Plains Railroad, Indian Head Naval Surface Warfare Center, Charles County, Maryland. February 1998.

93. R. Christopher Goodwin & Associates, Inc. 1998b. Phase I Cultural Resources Survey of Stump Neck Annex and Supplemental Architectural Investigations, Indian Head Naval Surface Warfare Center, Charles County, Maryland. February 1998.

94. R. Christopher Goodwin & Associates, Inc. 2000. Phase I Archeological Survey for the Proposed Parking Lot Off of Strauss Road, NSWC Indian Head, Charles County, Maryland. May 2000.

95. R. Christopher Goodwin & Associates, Inc. 2003. Historical and Architectural Investigation of MILCON P160, Indian Head Division, Naval Surface Warfare Center, Indian Head, Charles County, Maryland. November 2003.

96. R. Christopher Goodwin & Associates, Inc. 2005. Historical and Architectural Investigation of 1950s-Era Industrial Areas and Miscellaneous Buildings, Indian Head Division, Naval Surface Warfare Center, Indian Head, Charles County, MD. March 2005.

97. Reinke, D.C., and L.L. Swartz. 1999. The NEPA Reference Guide. Battelle Press. Columbus, Ohio.

98. Rose, D. 2008. Personal communication (e-mail) with Diana Rose, Environmental Engineer, Water Management Team Leader, NAVFACWASH Public Works Department Site Indian Head, 10 October 2008.

99. Schueler, T. 1994. "The Importance of Imperviousness." Watershed Protection Techniques, 1(3), p. 100-111.

100. Shaffer, B. 2011. Personal communication (telephone and email) with Brooke Shaffer, Physical Scientist, Industrial Wastewater, Naval Support Facility Indian Head. January 2011.

101. Shaffer G. and Cole E. 1994. Standards and Guidelines for Archeological Investigations in Maryland. Office of Archeology and Office of Preservation Services, Maryland Historic Trust.

102. Sikora, Edward J. and Arthur H. Chappelka. 2004. Air Pollution Damage to Plants. Alabama Cooperative Extension System.

103. The Louis Berger Group, Inc. 2009. Update of Archaeological Sensitivity Model, Naval Support Activity South Potomac, Naval Support Facility, Indian Head. June 2009.

104. U.S. Army Corp of Engineers. 2010. NSF Indian Head Draft Architectural Survey.

105. U.S. Census Bureau. 2011. Census 2010.

106. U.S. Department of Agriculture (USDA). 1974. Soil Conservation Service. Soil Survey of Charles County, Maryland. Washington, D.C.

107. U.S. Department of Agriculture (USDA). 1990. Soil Conservation Service. Soil Survey Report Naval Ordnance Station, Indian Head and Stump Neck, Charles County, Maryland.

108. U.S. Department of Agriculture (USDA). 2008. Natural Resources Conservation Service. Soil Survey Geographic (SSURGO) Database for Charles County, Maryland. http://SoilDataMart.nrcs.usda.gov. Date Accessed: 19 January 2011.

109. U.S. Department of Commerce, Bureau of Economic Analysis. 2008. Regional Economic Information System. Regional Economic Accounts: Wage and Salary Disbursements, 2004. www.bea.gov. Date accessed: 10 July 2009.

110. U.S. Department of Energy (USDOE). 2009. Federal Energy Management Program: Greenhouse Gas Basics. http://www1.eere.energy.gov/femp/program/printable_versions/greenhousegases_basics.html. Date accessed: 21 June 2010.

111. U.S. Department of Labor. 2010. Bureau of Labor Statistics Local Area Unemployment Statistics. www.bls.gov. Date accessed: 8 December 2010

112. U.S. Department of the Navy. 2004. Mattawoman Creek Study. Prepared for Naval Surface Warfare Center Indian Head Division (NSWC IHDIV), Indian Head, Maryland.

113. U.S. Department of the Navy. 2005. Chief of Naval Operations (OPNAVINST) 5100.23G.

114. U.S. Department of the Navy. 2006. Rare, Threatened and Endangered Species and Natural Area Surveys. Naval Surface Warfare Center, Indian Head Division (NSWC IHDIV). Indian Head, Maryland.

115. U.S. Department of the Navy. 2008. Integrated Natural Resources Management Plan - Naval Surface Warfare Center, Indian Head Division. Prepared for Natural Resources Management Office, Naval Surface Warfare Indian Head Division, Indian Head, Maryland.

116. U.S. Department of the Navy. 2010. Navy Uses New Technology to Save Energy at Naval District Washington. http://www.navy.mil/search/display.asp?story_id=54241. Date Accessed 12 November 2010.

117. U.S. Environmental Protection Agency (USEPA). 1972. Noise Control Act of 1972.

118. U.S. Environmental Protection Agency (USEPA). 1995. Calculating Potential to Emit (PTE) for Emergency Generators. Memorandum dated: 06 September 1995.

119. U.S. Environmental Protection Agency (USEPA). 1998. AP 42, Fifth Edition, Volume I, Chapter 1: External Combustion Sources, Section 4: Natural Gas Combustion. http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf

120. U.S. Environmental Protection Agency (USEPA). 2004. Office of Research and Development. The Use of Best Management Practices in Urban Watersheds. http://www.epa.gov/ord/NRMRL/pubs/600r04184/600r04184.pdf . Date Accessed: 23 October 2008.

121. U.S. Environmental Protection Agency (USEPA). 2005. Frequent Questions: What are the biggest sources of mercury air emissions in the U.S.? http://publicaccess.supportportal.com/ics/support/default.asp?deptID=23012&task=knowledge&folderID=950. Date accessed: 28 December 2010.

122. U.S. Environmental Protection Agency (USEPA). 2007a. Section 404 of the Clean Water Act: An Overview. http://www.epa.gov/owow/wetlands/facts/fact10.html. Date Accessed: 7 February 2008.

123. U.S. Environmental Protection Agency (USEPA). 2007b. CERCLA Overview. http://www.epa.gov/superfund/policy/cercla.htm. Date Accessed 14 January 2011.

124. U.S. Environmental Protection Agency. (USEPA) 2009a. Six Common Air Pollutants. http://www.epa.gov/air/urbanair/ Accessed 10/27/2009.

125. U.S. Environmental Protection Agency. 2009b. Climate Change Science. http://www.epa.gov/climatechange/science/index.html. Accessed 12/29/09.

126. U.S. Environmental Protection Agency (USEPA). 2009c. AP 42, Fifth Edition, Volume I, Chapter 3.4: Large Stationary Diesel And All Stationary Dual-fuel Engines. http://www.epa.gov/ttn/chief/ap42/ch03/final/c03s04.pdf

127. U.S. Environmental Protection Agency (USEPA). 2009d. Energy CO2 Emissions by State. http://www.epa.gov/climatechange/emissions/state_energyco2inv.html. Date Accessed: 8 July 2009

128. U.S. Environmental Protection Agency (USEPA). 2010a. AP 42, Fifth Edition, Volume I, Chapter 1: External Combustion Sources, Section 3: Fuel Oil Combustion. http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s03.pdf

129. U.S. Environmental Protection Agency (USEPA). 2010b. EPA Webinar Slides: Background on National Emission Standards for Industrial, Commercial, and Institutional Boiler and Process Heaters; and Commercial / Industrial Solid Waste Incineration (CISWI) Units. 09 June 2010. Date accessed: 11 December 2010. http://www.epa.gov/ttn/atw/129/ciwi/20100609combustion.pdf

130. U.S. Environmental Protection Agency (USEPA). 2011a. National Emission Standards for Hazardous Air Pollutants Compliance Monitoring. http://www.epa.gov/oecaerth/monitoring/programs/caa/neshaps.html. Date Accessed: 12 January 2011.

131. U.S. Environmental Protection Agency (USEPA). 2011b. Ground-level Ozone: Regulatory Actions. http://www.epa.gov/glo/actions.html. Date Accessed: 12 January 2011.

132. U.S. Environmental Protection Agency (USEPA). 2011c. Fact Sheet: Final Air Toxics Standards for Industrial, Commercial, and Institutional Boilers and Process Heaters at Major Source Facilities. http://www.epa.gov/airquality/combustion/docs/20110221mboilersfs.pdf

133. U.S. Environmental Protection Agency (USEPA). 2011d. Natural Gas Overview. http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html. Date Accessed 17 January 2011.

134. U.S. Geological Survey (USGS). 2010. Groundwater Resources Program: Saltwater Intrusion. http://water.usgs.gov/ogw/gwrp/saltwater/salt.html. Date accessed: 10 January 2011.

135. Wray, T. 2011. Personal communication (email) with Travis Wray, Environmental Office, NSF Indian Head. 7 January 2011.