

# 5 CUMULATIVE IMPACTS AND NEPA CONSIDERATIONS

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The approach taken in this analysis of cumulative effects follows the objectives of NEPA, Council on Environmental Quality (CEQ) regulations, and CEQ guidance. The CEQ regulations (40 Code of Federal Regulations [CFR] §§ 1500-1508) implementing the procedural provisions of NEPA define cumulative impact as:

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7).

The analysis of cumulative effects may go beyond the scope of project-specific direct and indirect effects to include expanded geographic and time boundaries, and a focus on broad resource sustainability. The true geographic range of an action's effect may not be limited to an arbitrary political or administrative boundary. Similarly, the effects of an action may continue beyond the time the action ceases. This "big picture" approach is becoming increasingly important as growing evidence suggests that the most significant effects to natural and socioeconomic resources result not from the direct effects of a particular action, but from the combination of individual, often minor, effects of multiple actions over time. The underlying issue is whether or not a resource can adequately recover from the effect of a human action before being exposed to subsequent action or actions.

Consistent with CEQ (1997) guidance, this analysis focuses on potential cumulative effects that are "truly meaningful" rather than analyzing the cumulative effects of the Proposed Action "on the universe." In part through the public involvement and scoping process (see Section 1.9), the Navy has identified as truly meaningful, for the purposes of this analysis, the following potential cumulative effects:

- NSWCDD range activities
- Recreational and commercial use of the Potomac River
- Property values, development, and preservation efforts along the Potomac River
- Electric power capacity on NSF Dahlgren
- Noise in the vicinity of NSF Dahlgren and the PRTR
- Health and safety of residents near NSF Dahlgren and the PRTR
- Potomac River surface water quality

- Natural resources on NSF Dahlgren
- Aquatic biological resources of the Potomac River
- Protected species

In this chapter, an effort has been made to identify past and present actions associated with the resources analyzed in Chapter 4, plus those actions that are in the planning phase – limited to future actions that are reasonably foreseeable (not speculative). Additionally, only actions that have the potential to interact with the proposed Navy action are addressed in this cumulative analysis. Specific emphasis was placed on actions in and adjacent to NSF Dahlgren and the PRTR. The cumulative impact analysis evaluates only actions with potential effects on the environment that are fundamentally similar to the anticipated outdoor RDT&E effects of the Proposed Action, in terms of the nature of the effects, the geographical area affected, and the timing of the effects. The past, present, and reasonably foreseeable future actions evaluated in this analysis are shown on Figure 5-1, Contributing Actions.

For the purposes of assessing cumulative impacts, the Navy reviewed all relevant and available environmental documentation pertaining to actions considered in the cumulative effects analysis. The level of information available for the different actions varies. The best available data are used in the analysis.

Ideally, the effects of all actions would be quantifiable, and the cumulative results combined as appropriate. In reality, quantifiable data are available for only a portion of the activities. The cumulative analysis incorporates specific numbers and values for potential effects, where available; descriptive information is used in place of quantitative measures where they are unavailable. This approach provides the decision-maker with the most current information to evaluate the consequences of the Proposed Action.

At this time, environmental impact analyses have not been conducted for several of the past and present, and reasonably foreseeable future actions identified in Sections 5.1 and 5.2. Therefore, assessments of the environmental effects of these projects are not currently available for consideration within the analysis of cumulative effects.

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## 5.1 Past and Present Actions

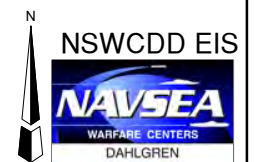
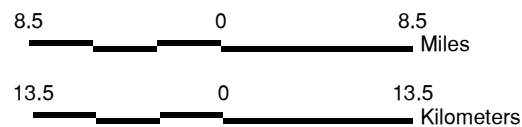
A number of actions unrelated to the Proposed Action, occurring historically and up to the present time, have the potential to influence the resources affected by the Proposed Action, as identified in Chapter 4. Several such actions were identified. The relevant past and present actions identified can be categorized as follows:

- Activities on NSF Dahlgren or at nearby military installations that may constrain NSWCDD activities, affect use of the Potomac River or development along the river, affect the public in the vicinity of NSF Dahlgren or the PRTR, affect the resources of the Potomac River, or affect protected species in the region
- Private development or projects that may encroach on use of the ranges and the Mission Area at NSF Dahlgren, affect use of the Potomac River or development along the river, affect the public in the vicinity of NSF Dahlgren or the PRTR, affect resources of the

# Contributing Actions



- Contributing Action
- Naval Support Facility (NSF) Dahlgren
- Potomac River Test Range (PRTR) Complex



Source: NSWCDD GIS (2008 - 2011)

Figure 5-1

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Potomac River, affect natural resources on NSF Dahlgren, or affect protected species in the region

A brief description of these actions follows, with an emphasis on components of the activity that are relevant to the effects previously identified. When determining whether a particular activity may contribute cumulatively and significantly to the effects identified in Chapter 4, the following attributes are considered: geographical distribution, intensity, duration, and the historical effects of similar activities.

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### **5.1.1 NSF Indian Head Activities**

NSF Indian Head (Indian Head) occupies 3,500 acres (ac) on the eastern shore of the Potomac River, approximately 20 mi northwest of NSF Dahlgren (Figure 3.1-5). As described in Section 3.6.4, the Navy's main gun proving range was located at Indian Head from 1890 until the proving range at Dahlgren, Virginia was commissioned in 1918 as "the lower range."

The installation consists of two parcels: Cornwallis Neck, on the peninsula formed by Mattawoman Creek and the Potomac River, and Stump Neck across the creek's mouth. Cornwallis Neck includes an operational area and a restricted area in the southern part of the peninsula, where munitions explosive testing is performed. Indian Head also conducts open burn activities on Cornwallis Neck. Stump Neck is the primary location for the Naval Explosive Ordnance Disposal Technology Division and Range 3, where the division performs open detonations of foreign ordnance.

Major Indian Head tenants include Indian Head Division, Naval Surface Warfare Center (a sister organization to NSWCDD), the mission of which is to provide primary technical capability in energetics for all warfare centers and secondary technical capability through RDT&E for energetic materials, ordnance devices and components, and related ordnance engineering standards to include chemicals, propellants and their propulsion systems, explosives, pyrotechnics, warheads, and simulators; Naval Explosive Ordnance Disposal Technology Division, whose core functions center on explosive ordnance disposal (EOD) and whose activities include open detonations of up to 60 pounds (lbs); and the Marine Corps Chemical-Biological Incident Response Force, whose mission is to respond to a chemical, biological, radiological, nuclear, or high-yield explosive incident and whose training and deployment activities include landing craft air-cushion activities on the Potomac River, limited helicopter activities, and deployment of truck caravans.

Environmental impact analysis has been conducted for activities on this installation.

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### **5.1.2 Marine Corps Base Quantico Activities**

Marine Corps Base Quantico (MCB Quantico), a major Marine Corps training base, occupies about 59,000 ac, approximately 20 mi northwest of NSF Dahlgren on the western shore of the Potomac River (Figure 3.1-5). The base consists of two major areas on either side of Interstate 95: Mainside, east of the interstate and on the west shore of the Potomac River, and Westside, west of the interstate. Mainside is home to numerous administrative support functions and some training functions. A major tenant, Marine Corps Air Facility Quantico, is located on the eastern

edge of Mainside, by the waterside. The air facility is home to Marine Helicopter Squadron 1 (HMX-1), whose mission is to provide helicopter support for the President and the Vice-President of the United States, Marine Corps Development Command schools, and various government officials in the Washington, DC area. HMX-1 also tests and evaluates helicopter systems and products destined for the Marine Corps Expeditionary Forces. Westside is used primarily for military training. Largely undeveloped, it consists mostly of training areas and ranges used for a wide array of training activities, including small arms and artillery training, demolition training, and air-to-ground training. Besides the Marine Corps, the Federal Bureau of Investigation (FBI) and the Drug Enforcement Administration (DEA) have facilities and train at Quantico (MCB Quantico, 2008).

In April 2008, the US Marine Corps released a final environmental impact statement (FEIS) (MCB Quantico, 2008) that assesses the potential environmental effects of the development of the Westside, including impacts due to the 2005 Base Closure and Realignment (BRAC) action at MCB Quantico. The development evaluated would encompass the construction of new facilities within the Westside to accommodate either the relocation of approximately 3,000 personnel directed to MCB Quantico by the BRAC (Alternative A) or an additional 2,000 personnel plus the 3,000 personnel directed to MCB Quantico under BRAC (Alternative B). Each Alternative considered two locations on the Westside (Option 1: Russell Road and Option 2: MCB-1). The US Marine Corps' preferred alternative is Alternative B, Option 1, under which all 3,000 personnel were relocated to what is referred to as the Russell Road Area and the additional 2,000 personnel would be sited in what is referred to as the MCB-1 Area. The relevant findings of the FEIS for the preferred alternative follow (MCB Quantico, 2008):

- **Electric power capacity** – The preferred alternative would require approximately 17.5 megawatts (MW) or more of electrical power. Dominion Virginia Power would be the primary supplier and there would be adequate regional electric power capacity existing to supply the required power to MCB Quantico.
- **Noise** – Independent of the proposed action, the Charlie Demolition Range and the Weapons Training Battalion, which is located approximately 1,000 feet to the south of the main MCB-1 Area, impact the proposed construction area under the preferred alternative. The noise from the weapons range is expected to increase, by 2009, due to the introduction of new aircraft (MV-22) and increased ordnance use. Noise studies in 2006 indicate that, by 2009, the noise contours would expand and all of the main MCB-1 Area, approximately 50 percent of the Northern MCB-1 Site, and approximately 10 ac in the western portion of the Southern Russell Road Site are projected to be within Noise Zone 2. Noise Zone 2 is where social surveys show between 15 percent and 39 percent of the population are expected to be highly annoyed by noise. The projected use of 50-lb demolition charges would extend these contours. Measures are proposed that are designed to attenuate both noise and impulse levels, resulting in a minimum of 20-decibel (-dB) noise level reduction.

Adverse effects on the noise environment at MCB Quantico due to implementation of the preferred alternative would be limited to temporary increases in noise generated during construction and long-term noise impacts due to increased traffic.

- **Surface water quality** – The preferred alternatives is located in the Chopawamsic Creek and Beaverdam Run watersheds. Both of these watersheds ultimately drain into the Potomac River, and then the Chesapeake Bay. The proposed development would increase the amount of impervious surfaces that could result in an increase in stormwater runoff, which would carry pollutants to streams. In addition, construction activities could result in sediments or fill entering nearby stream flows and being carried downstream into larger water bodies. To mitigate any impact to surface water quality, keep in compliance with state and federal water quality requirements, and have no significant impact to water quality, erosion and sediment control and stormwater management plans would be implemented.
- **Aquatic biological resources** – There are numerous water bodies at MCB Quantico that contain various native non-game fish species. The lower Chopawamsic Creek, in particular, expands into a tidal open water and riverine wetland that is considered an important nursery area for fish in the Potomac River.

Construction activities and the creation of additional impervious surfaces could increase the potential for erosion and transport of pollutants into the surface water at MCB Quantico. Any impact in surface water quality could impact fish habitats. As with surface water mitigation, enacting erosion and sediment control and stormwater management plans would minimize any negative impacts to aquatic biology.

- **Protected species** – Three populations of small whorled pogonia, a federally-listed threatened species, were found during a 1990-1991 survey conducted by the Virginia Department of Conservation and Recreation (VDCR). The proposed road construction within the Russell Road Area could impact this species by encroaching into its protection zone. However, with specific mitigation this potential would be eliminated. There are no other threatened or endangered species within the proposed development areas.

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### 5.1.3 Blossom Point Research Facility Activities

The US Army's Blossom Point Research Facility (BPRF) is a sub-installation to the US Army Garrison Adelphi Laboratory Center (USAG ALC). The approximately 1,600-ac BPRF, located about 7 mi to the north of NSF Dahlgren, is situated on the southern portion of Cedar Point Neck, the peninsula formed by the confluence of Nanjemoy Creek and the Potomac River (Figures 3.1-3a and 3.1-5). The installation is an active ordnance and electronics research and development facility of the US Army Research Laboratory, the Army's corporate basic and applied research laboratory.

Under an operating permit from the Army, the Naval Research Laboratory (NRL), through its satellite control network, manages NRL and Navy satellites at the 265-ac Blossom Point Satellite Tracking and Command Station on BPRF. Potential interference with the sensitive satellite antenna radio receivers is minimized by a 2,000-foot (-ft)-radius buffer zone and sound easement around the NRL site (Federal Laboratory Consortium Mid-Atlantic Region, 2008; Long, pers. comm., June 22, 2010).

From 1942 until 1976, BPRF served as a national defense facility with the mission of testing small, experimental proximity fuzes and fuze components (US Army Environmental Command [USAEC] and United States Army Corps of Engineers [USACE] Baltimore District, 2008). Parts

of the Potomac River and Nanjemoy Creek were used as impact areas for ordnance testing at Blossom Point. A 6.4-square nautical mile (-sq NM) water range comprised 14 distinct range firing fans used for experimental testing of 60-millimeter (mm), 80-mm, and 4.2" mortars; 2.75", 3.25", 3.5", 4.5", and 5" rockets; 20-, 30-, 40-, 75-, and 105-mm projectiles; and 20- and 750-lb bombs (USAEC, 2009b). Results of a review of historical records indicated the potential presence of munitions and explosives of concern, material potentially presenting an explosive hazard, and munitions debris. A magnetometer-assisted visual survey of the historical water range found likely elevated unexploded ordnance densities along the shore at Cedar Point and extending east into the Potomac River, upstream of the UDZ (Nelson, 2009). The US Army implemented a non-time critical removal action that was completed in August 2011 (USAEC, 2013).

BPRF closed from 1976 to 1978 (Long, pers. comm., June 22, 2010). Since reopening, BPRF has conducted explosives research and development studies, conducted acoustic and optical research, developed mine clearing systems, refined target acquisition technology, and developed personnel and equipment detection devices. The installation's current operational range complex comprises eight land ranges – a small-caliber range, an observation tower, an indirect-firing range, an impact area, an acoustic and optical test area, two open burn/open detonation (OB/OD) areas, and a maneuver and training area – encompassing approximately 1,555 ac (USAEC and USACE Baltimore District, 2008). In addition, two non-operational areas total 44 ac.

In September 2008, the Army issued an Operational Range Assessment Program Phase I Qualitative Assessment Report for BPRF (US Army and USACE, 2008). The operational range qualitative assessment evaluated the operational range area at the installation to assess whether further investigation is needed to determine if munitions constituents of potential concern (MCOPCs) are or could be migrating off range at levels that may pose an unacceptable risk to human health or the environment. The relevant findings of the assessment follow (US Army and USACE, 2008):

- **Surface water quality** – Primary MCOPC source areas identified at BPRF are from historical firing activities within the boundaries of all eight current operational ranges; whereas current munitions use, which involves limited use of live-fire munitions, does not constitute a primary source. Historical firing activities impacted surface water and sediment both directly – e.g., by direct deposition of MCOPCs into streams and wetlands – and indirectly through the release of MCOPCs from soil – e.g., by soil erosion and runoff to streams, the Potomac River, and Nanjemoy Creek. However, based on the limited human use of or access to shoreline areas around BPRF, as well as the large volume of water in and the high flow rates of the river and creek relative to the minimal volume and flow of water exiting the installation, it is unlikely that potential MCOPCs would interact with human or ecological receptors located down gradient.

In November 2009, the Army released a Draft EA (USAG ALC, 2009) to assess the potential environmental effects of the implementation of the updated real property master plan (RPMP) for the USAG ALC and the BPRF. The Army's preferred alternative comprised the implementation of the RPMP, in its entirety, at the two installations to provide overall support for certain infrastructure improvements – e.g., maintenance, repair, upgrades, demolition, and construction – that are needed to address issues such as maintenance of aging infrastructure, deficit of space, semi-permanent facilities, and shoreline erosion. Implementation of the RPMP and the component infrastructure improvements are needed to minimize or resolve existing



inefficiencies and incompatibilities, to remain on the cutting edge of science and technology, and to provide an efficient, sound framework to evaluate future development projects. Proposed master plan projects at the BPRF that are pertinent to this cumulative effects analysis include the following (USAG ALC, 2009):

- Construct a travel camp for recreational vehicle and cabin camping
- Lease 15 additional ac by the NRL for four antenna pads
- Construct a 10-lane, 1,000-yd small arms research range
- Construct a boat dock on Nanjemoy Creek
- Reengineer the existing unmanned aerial vehicle (UAV) testing runway
- Pave 2 mi of Blossom Point Road and maintain the road to a minimum width of 20 ft
- Coordinate with multiple agencies on submerged aquatic vegetation (SAV) research
- Construct approximately 800 ft of stone revetment and eight stone offshore breakwaters along 1 mi of Nanjemoy Creek
- Use low-impact, bioengineering approaches to stabilize the shoreline along portions of Nanjemoy Creek and the Potomac River
- Replace the existing Ordnance Loading Building with a new materials transfer facility for receiving and handling hazardous and explosive materials

The proposed boat dock is needed to launch small craft used to keep the safety danger zone on the Potomac River clear as a precaution when firing mortars and for shoreline security and safety during research activities (USAG ALC, 2009; Long, pers. comm., June 22, 2010). As the waterways around the installation are not restricted, during tests BPRF personnel on small craft verbally communicate to boaters that a test is in progress and request that the boaters move elsewhere (Long, pers. comm., June 22, 2010). This occurs approximately twice a year, for the duration of the two- to three-day tests. The UAV testing runway is used for two to three days twice a month (Long, pers. comm., June 22, 2010).

Under the Joint Land Use Study, a component of the RPMP, the ALC also proposes to acquire 1,768 ac on the north and east side of the BPRF. The additional acreage would improve noise buffer zones, sustain safety fans, minimize electromagnetic (EM) interference, enable compliance with Department of Defense (DoD) Directives 3200.15 and 4715.11 (pertaining to sustainment of and environmental and explosives safety management on operational ranges), increase security for low-visibility programs, and increase availability for larger project footprints.

The relevant findings of the Draft EA follow (USAG ALC, 2009):

- **Electrical power capacity** – The preferred alternative would replace the installation’s electrical distribution system, which is disparate, out of date, and out of compliance with rural electrical standards. Any changes in demand for electrical power resulting from the proposed infrastructure improvements would be minimal.
- **Noise** – Ordnance firing activities are a major noise generator on the installation. Firing is performed Monday through Friday between 8 am and 5 pm. Firing is intermittent and includes various numbers of rounds, and some activities require firing high-explosive

projectiles. Noise contours for existing detonation activities indicate that all unacceptable noise levels (Zone III) are confined to the installation and a small portion of levels considered normally unacceptable (Zone II) extend outside the installation boundary, but only into the edge of the Potomac River. All off-installation sensitive receptors are located in areas with noise levels that are acceptable for noise-sensitive land uses (Zone I).

When operating at full power and during enhanced propagation conditions, higher-frequency (10 hertz [Hz] or greater) acoustical testing can generate noise that may be heard across the Potomac River by the residents of the Mathias Point Neck area. However, the sound generation system is not normally operated at full power under enhanced propagation conditions.

Construction projects would temporarily increase the noise levels on the installation and potentially would affect nearby residences without adverse impacts. The new small arms research range would increase noise levels on the installation.

- **Health and safety** – The existing Ordnance Loading Building is in danger of falling into the Potomac River and the building’s existing 670-ft explosive safety quantity distance (ESQD) arc extends over the water. The proposed replacement of the building with a new materials transfer facility would reduce risks to boaters.
- **Surface water quality** – Full implementation of the RPMP and the component infrastructure improvements would increase impervious surface area on the installation; however, the increase would not be substantial and would have little effect on overall stormwater runoff quantity or quality. Implementation of shoreline erosion control along Nanjemoy Creek and the Potomac River would reduce sediment loading and, thereby, would beneficially affect the water quality of both water bodies, as well as that of the Chesapeake Bay.
- **Protected species** – Constructing the small arms research range, boat dock, and travel camp and paving Blossom Point Road would occur in the vicinity of bald eagle nests. These infrastructure improvements would be coordinated with the Maryland Department of Natural Resources (MDNR) and, depending on the actual proximity of the construction activities to the nests, construction may need to be limited to the non-nesting period.

The Army completed and is implementing three of the five components of the RPMP for the USAG ALC and the BPRF, specifically the Long Range Component, Short Range Component, and Installation Design Guide (Sturtz, pers. comm., April 5 and 9, 2012). The two remaining components – the Real Property Digest and the Capital Investment Strategy – are outdated, precluding completing the EA. The Army withdrew the Draft EA in December 2009 (Krake, pers. comm., April 5, 2012).

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#### 5.1.4 Fort A.P. Hill Activities

Fort A.P. Hill is a US Army field training installation located approximately 20 mi to the southwest of NSF Dahlgren (Figure 3.1-5). The installation encompasses 75,794 contiguous ac and leases an additional 111 ac for specialized training along the Rappahannock River (US

Army, 2004; USACE, Mobile District, 2007). The primary mission of Fort A.P. Hill is to provide firing ranges and maneuver areas for training Active Army and Reserve Component units. The vast majority of the installation's training load comes from units or organizations stationed elsewhere that come to Fort A.P. Hill for certain aspects of their training. It is also used for training by other military services, law enforcement agencies, and civilian organizations.

The southern portion of the installation is used for live-fire munitions training; whereas the primary use of the northern portion is for non live-fire troop and vehicle training in a variety of wartime maneuver simulations (USAEC, 2009c). The range complex is primarily for small arms, direct-fire weapons, anti-tank missiles, artillery, and aerial gunnery (US Army, 2004; USACE, Mobile District, 2007). In addition, ample tactical landing zones, parking areas, and refueling facilities for rotary-wing aircraft are available. The Fort A.P. Hill Airfield is located on the southeast side of US Route 301 and is used by rotary-wing aircraft. In addition, C-130 aircraft originating at other airfields train two or three times a year at the assault airstrip in the installation's drop zone (US Army, 2004).

In February 2007, the Army released an FEIS (USACE, Mobile District, 2007) to assess the potential environmental effects of the implementation of the BRAC recommendations at Fort A.P. Hill and at Fort Lee, Virginia and a Record of Decision (ROD) was signed on May 11, 2007 (US Army, 2007). The FEIS identifies, evaluates, and documents the effects of facility construction, maintenance, management, and renovation on the environment, and economic and social conditions at the installations that would result from the implementation of the realignment actions mandated by the BRAC Commission. The Army's preferred alternative comprised the following major components: relocation of approximately 7,700 additional personnel to Fort Lee; construction of additional facilities at Fort Lee and Fort A.P. Hill to accommodate relocated personnel and functions; and conducting of training and other activities at the two installations. The relevant findings of the FEIS follow (USACE, Mobile District, 2007):

- **Noise** – The noise generated by industrial-type activities and the movement of heavy military vehicles does not have a considerable effect on the surrounding civilian communities or military housing areas at Fort A.P. Hill. The noise from military aircraft and weapons at Fort A.P. Hill extends to areas outside the installation boundary. Effects associated with aircraft noise are due to single, intrusive events of the installation and not the overall noise environment. The places where residents are most likely to be exposed to aircraft noise from Fort A.P. Hill training activities are along the installation boundary. The existing small-caliber weapons noise zone II (87-104 peak decibels [dBP]) extends beyond the eastern boundary approximately 1,203 yards (yds), beyond the southern boundary a maximum of 1,859 yds, and beyond the western boundary less than 328 yds. Large-caliber weapons noise zone II (62-70 C-weighted decibels [dBC]) extends beyond the southern boundary less than 328 yds. The existing large-caliber weapons 115-dBP contour extends beyond the northeastern and eastern boundary less than 2,625 yds and beyond the southern boundary less than 3,500 yds.

Adverse effects on the noise environment at Fort A.P. Hill due to implementation of the preferred alternative would be due primarily to heavy equipment noise during construction and the operation of the proposed EOD range. Implementation of the preferred alternative would extend existing noise contours approximately 328 yds farther beyond the southern boundary and approximately 656 yds farther beyond both the

northern and eastern boundaries. Individuals within these areas would be exposed to a louder acoustical environment and more frequent noise, when compared to existing conditions.

- **Surface water quality** – Under the preferred alternative, long-term minor adverse effects on surface water quality of the streams, ponds, and lakes within Fort A.P. Hill are expected. Construction of facilities and infrastructure could increase runoff due to an increase in impervious surface area, increased soil erosion, and increases in sediment and pollutant loads.
- **Aquatic biological resources** – Surveys at Fort A.P. Hill have identified a total of 37 species of fish that inhabit the installation's streams, lakes, and ponds. Ecosystem-level impacts of the preferred alternative are expected to be negligible.
- **Protected species** – A comprehensive biological diversity inventory undertaken in 1992 and 1993 identified the state-listed threatened Bachman's sparrow (*Aimophila aestivalis*) on Fort A.P. Hill. According to the VDCR, recent studies at Fort A.P. Hill indicated the presence of three rare species – the rainbow snake (*Farancia erythrogramma*), carpenter frog (*Rana virgatipes*), and lesser siren salamander (*Siren intermedia*). As all three species identified by the VDCR are water and wetland dependent and impacts to wetlands and streams, including adjacent 100-ft-wide upland buffers, would be avoided, impacts to these species are not anticipated. Twelve active bald eagle nest sites have been documented on the installation; however, potential impacts to bald eagles would be precluded through avoidance of the primary (250-yd) and secondary (440-yd) protection zones around the nests.

From 2005 through 2008, the VDCR Division of Natural Heritage conducted a re-inventory of the natural heritage resources of Fort A.P. Hill (VDCR, 2010a). During the re-inventory, division personnel observed 71 occurrences of natural heritage resources involving 24 natural heritage resource elements comprising 6 natural community types, 11 rare plant taxa, and 7 rare animal taxa. Both the number of occurrences and the number of elements observed during the 2005-2008 re-inventory were reduced compared to those observed during the 1992-1993 inventory discussed in the February 2007 FEIS. The Division of Natural Heritage attributed this reduction to a variety of factors, including habitat alteration, revised definitions of occurrences, and changes in the elements tracked—e.g., data for American ginseng (*Panax quinquefolius*) and bald eagle nest sites were included in the 1992-1993 total, but were not included in the 2005-2008 tally (VDCR, 2010a).

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### 5.1.5 Naval Air Station Patuxent River and Webster Field Annex Activities

The Patuxent River Complex supports naval aviation activities by researching, developing, testing, and evaluating aircraft, aircraft components, and related products. The complex includes Naval Air Station (NAS) Patuxent River with its flight and ground test facilities, runways, and associated airspace; Webster Field Annex with its flight test facilities, runways, and associated airspace; and the Chesapeake Test Range (CTR). NAS Patuxent River, with Webster Field Annex, hosts about 50 tenant commands and most components of the Naval Air Warfare Center, Aircraft Division (NAWCAD). NAWCAD is the Navy's principal RDT&E, engineering, and

fleet support activity for Navy and Marine Corps air vehicle systems and trainers. NAS Patuxent River occupies approximately 6,400 ac along 25 mi of shoreline on the broad headland at the confluence of the Patuxent River and the Chesapeake Bay, in the northeast corner of St. Mary's County – approximately 34 mi from NSF Dahlgren (Figure 3.1-5). Webster Field Annex is an 850-ac dependence located on the eastern shore of the St. Mary's River – approximately 35 mi to the southeast of NSF Dahlgren (Figures 3.1-3b and 3.1-5).

The CTR comprises restricted airspace, aerial and surface firing ranges, and Hooper, Hannibal, and Tangier Island targets. The airspace comprising the CTR overlies about 1,800 square miles (sq mi). About half of the CTR overlies the waters of the middle portion of the Chesapeake Bay and portions of its tributaries – including approximately the lower half of the LDZ in the Potomac River – and half overlies land in Maryland, Delaware, and Virginia.

In December 1998, the Navy released an FEIS (NAWCAD, 1998) to evaluate potential environmental impacts of increasing flight and related activities in test areas under the exclusive control and scheduling authority of NAWCAD. A ROD was signed on May 27, 1999 (Department of the Navy [DoN], 1999). The increases in flight and related activities would occur predominantly at NAS Patuxent River, Webster Field Annex, and in the CTR. The preferred alternative (Operational Alternative III) encompasses the largest amount of increased operational hours for both flight and ground activities. The relevant findings of the FEIS for the preferred alternative, and where applicable the no action alternative, follow (NAWCAD, 1998):

- **Use of the Potomac River** – Under the no action alternative, commercial fishing in small portions of the Chesapeake Bay would be prohibited during times of testing. The frequency and duration of target clearance under the no action alternative, which involves between 0.1 and 0.3 percent of the surface water areas underlying the CTR, would average 36 hours per month and about 13 percent of weekly daylight hours from June through September. Under the preferred alternative, the amount of hours that portions of the surface water underlying the CTR would be closed would increase by 22 to 36 hours. During June through September, implementation of the preferred alternative would result in the closure of segments of the Chesapeake Bay to commercial fishing for about 18 to 24 percent of weekly daylight hours.

Recreational fishing and boating in the Chesapeake Bay are permitted within the aerial and surface firing range of the CTR and the non-prohibited sections of the Tangier Island target danger zone, when not in use. When in use, non-participating boats are cleared from the area. It has been estimated that closures total about 36 hours per month under the no action alternative. Under the preferred alternative, closure time would increase to approximately 13 to 16 hours a week.

Due to federal regulations and the distance the shipping routes are from the targets within the CTR, there would be no significant impacts to commercial shipping within the Chesapeake.

- **Electric power capacity** – For the preferred alternative, 198,400 megawatt-hours (MWH) per year would be required. It is anticipated that the existing utility network would be adequate to accommodate the increased demand.
- **Noise** – The results of noise models for activities over the CTR indicate that there would be no significant noise impacts due to the no action and preferred alternatives. The

average noise levels produced by subsonic and supersonic flights would be below 55 dB (onset rate-adjusted monthly day-night average sound level). For subsonic flights, noise levels would be highest near the target areas and on the east side of the CTR. For supersonic flights, the highest level noise contour covers an area of approximately 46 sq mi, though impact at ground level would be negligible.

In general, for both the no action alternative and the preferred alternative, for locations within the CTR, 4 to 5 locations out of 20 locations studied would experience noise levels that would result in potential speech interference and 8 out of 20 locations would experience noise levels that would result in sleep disturbance. In addition, all measured noise levels at specific sensitive receptors within the CTR would be at or below 65 dB.

Over NAS Patuxent River, the total area within the 60 dB day-night average sound level (DNL) contour would be approximately 1,918 ac for the no action alternative and 2,527 ac for the preferred alternative. The estimated off-base population within the 60 dB contour would be approximately 2,750 for the no action alternative and 3,439 for the preferred alternative. The 75 dB DNL contour would not extend outside the property line under either alternative.

Over Webster Field, the total area within the 60 dB DNL contour would be approximately 51 ac for the no action alternative and 61 ac for the preferred alternative. The estimated off-base population within the 60 dB contour would be approximately 6 for both the no action alternative and the preferred alternative. The 70 dB DNL contour would not extend outside the property line.

- **Health and safety** – Under the preferred alternative, with increased flight and related activities, the potential for accidents on the ground and in the air could increase, although for UAVs the Navy specifically selects training areas to avoid overflights of densely populated areas. Due in part to increased engine reliability, the number of accidents has been reduced and there has been only minor property damage documented in the past.
- **Surface water quality** – Increasing the amount of flights and related activities would not significantly impact surface water quality. Specifically, the release of inert stores (signal cartridges), expended small arms rounds that contain lead, and the use of chaff (aluminum-coated and uncoated fiber material) and flares would have no significant impact. This non-significant impact determination also accounts for the fact that some stores have attached telemetry units which are battery-operated. The older nickel-cadmium batteries are being replaced over time by environmentally-friendly lithium iron disulfide batteries. Finally, there would be no significant impact to stormwater flow or collection systems or to any 100-year floodplain.
- **Aquatic biological resources** – The increased activities under the preferred alternative likely would increase the number of practice bombs dropped over target areas, including over water. However, this increase would not significantly increase the already extremely low probability of a direct strike on fish. Also, unrecovered and unrecoverable (buried) inert stores, expended military small-arms ammunition that contains lead, and the use of chaff and flares pose no significant threat to aquatic biology.
- **Protected species** – The increase in aircraft noise would have no significant impact on the northeastern beach tiger beetle, the bald eagle, or the peregrine falcon, though these

protected species are potentially located within the area. The northeastern beach tiger beetle is likely not breeding within the area and there have been no observed bald eagle or peregrine falcon nests. In addition, while the shortnose sturgeon and Atlantic sturgeon are present in the Chesapeake Bay, their populations are very small. Thus, the probability of a store (i.e., any item capable of being released or expended from aircraft) striking a sturgeon would be minimal and there would be no significant impact.

NAS Patuxent River periodically reviews the 1998 FEIS. As the types and tempo of air operations analyzed in the FEIS still pertain to current air operations and as the affected environment remains substantially unchanged, NAS Patuxent River has determined that the impact assessments remain valid today (Jarboe, pers. comm., March 4, 2010).

The Navy completed updated air installations compatible use zones (AICUZ) studies for the Webster Field Annex in 2006 (DoN, 2006) and for NAS Patuxent River in 2009 (DoN, 2009). The AICUZ updates were prepared to reflect changes in airfield operations since the last AICUZ update, in 1979 for both airfields, and to incorporate any reasonable projected mission changes. Consistent with Operational Alternative III of the 1998 FEIS, 91,546 annual NAS Patuxent River flight operations – approximately 70 percent fixed wing aircraft and 30 percent rotary-wing – and 69,836 annual Webster Field flight operations – approximately 75 percent rotary-wing aircraft, 21 percent fixed-wing, and 4 percent UAV or remotely operated aircraft – were used as the bases for the AICUZ studies. The relevant findings of the studies follow (DoN, 2006; 2009):

- **Noise** – The 60 dB and 65 dB DNL noise contours at NAS Patuxent River extend approximately 3 to 3.5 nautical miles (NM) northwest, northeast, southwest, and southeast from the runways, and result mostly from straight-in arrivals and projected operations of fixed-wing aircraft (DoN, 2009). The majority of the acreage encompassed by the 60 dB DNL contour and above is located over Navy-owned property or water. Approximately 3,608 ac are exposed to noise levels above 60 dB DNL off station, excluding area over water.

At Webster Field, a portion of both the 60 dB and the 65 dB DNL noise contours result in off-annex noise impacts (DoN, 2006). This off-annex exposure is mainly due to the rotary-wing flight paths used by aircraft at Webster Field over the St. Inigoes Shores residential area. Approximately 60 ac, 45 housing units, and 115 people are exposed to noise levels above 60 dB DNL off the annex.

Most NAS Patuxent River air operations cover large areas and most pass over the Potomac River for some portion of the flight path. For all operations, the only component that occurs over the river is flight. The most frequent flight component over the Potomac River is final approaches and takeoffs – in particular, the Piney approach and departure, which cross over the Piney Point/St. George area (Jarboe, pers. comm., March 4, 2010). Other frequent flight operations over the Potomac are operations under visual flight rules.

Webster Field Annex is used primarily by Navy aircraft from NAS Patuxent River for a variety of military training and testing activities, including helicopter, fixed-wing, and UAV operations. Most of the helicopter and fixed-wing operations are touch-and-go operations (Jarboe, pers. comm., June 22, 2010), in which aircraft land and take off without coming to a full stop. During these operations, the aircraft remain close to the airfield. Typically, UAVs that take off from Webster Field proceed over the Potomac River and fly in the UAV operations area that overlies Northumberland County in Virginia (Jarboe, pers. comm., June 22, 2010). In addition, there are a

number of UAV routes available for training that extend down the river and across the Chesapeake Bay, and continue over Maryland's Eastern Shore. Rarely, boat operations using a diver originate from the annex, typically using the St. Mary's River, not the Potomac River, for operations (Jarboe, pers. comm., March 4, 2010).

NAS Patuxent River frequently closes the CTR surface danger zone in the Chesapeake Bay, although not the portion of the CTR that overlies the lower LDZ. When closures are needed, NAS Patuxent River typically closes only that portion of the surface hazard zone within the hazard pattern, delimited by the Range Safety Office for each operation. At most, closures are for up to one or two hours (Jarboe, pers. comm., March 4, 2010). Table 5-1 compares the frequency and duration of closures of the surface danger zone in the bay to the annual closures projected for the 1998 DEIS. From 2005 through 2009, the frequency and duration of closures were substantially lower than those projected, with the actual levels never exceeding approximately 36 percent of the projected.

**Table 5-1**  
**CTR Closures from 2005 to 2009**

Closure	2005	2006	2007	2008	2009	FEIS Annual Projection
Number of Closures	118	94	107	39	63	324
Hours Cleared	195	167	173	78	117	840
Number of Watercraft Cleared	262	285	350	40	107	NA
<b>Note:</b> NA = Not applicable – No annual FEIS projection specified.						
<b>Source:</b> NAWCAD, 2010.						

## 5.1.6 Morgantown Generating Station Coal Barge Facility

The Morgantown generating station is located just south of the Harry Nice Bridge landing in Charles County, across the Potomac River from NSF Dahlgren (Figure 3.1-3a). In 2008, the owner of the generating station, Mirant Corporation, completed construction of and began operating a new offloading facility that supplements the station's railcar receiving system. The new facility allows the generating station to receive coal on large open barges that travel up the Potomac River and unload at this facility (Allen, pers. comm., February 19, 2009). Previously, the only option to transport coal to the station was by train. The barge facility also is used to export gypsum.

The coal barge unloading facility consists of a dock, an unloader, a transfer and distribution system, and a rail loading facility for shipping coal to Mirant's Chalk Point generating station in Prince George's County, on the Patuxent River at Swanson Creek (Maryland Power Plant Research Program [MPPRP], 2007). The unloading facility is located 336 ft offshore and is unconnected to land except by the conveying equipment. The dock extends approximately 836 ft into the Potomac River, and is 500 ft long and 50 ft wide. The unloading system feeds a 1,020-ft enclosed conveyor system, which moves the coal to an onshore transfer tower, from which two further conveyor systems carry the coal to the generating station's existing coal yards. At the new unloading facility, Mirant will unload no more than 5 million tons of coal per year, which is



the annual combined consumption rate of the Morgantown and Chalk Point generating stations (MPPRP, 2007).

The barge traffic generated by the project was estimated to be four to five 20,000-ton barges a week, dependent on commodity prices and transport costs, that would use the river's main channel to reach the offloading facility (MPPRP, 2007; Allen, pers. comm., August 26, 2009). However, actual coal deliveries vary and are very limited at this time – the majority of coal deliveries are by rail and, based on current market conditions, likely will remain so for the foreseeable future (Allen, pers. comm., June 3, 2010). In addition to the coal deliveries, beginning with the start of activities for the flue gas desulfurization system described below (Section 5.1.11), at least one dedicated barge a week has departed Morgantown, carrying synthetic gypsum to a wallboard manufacturing facility in New York (Allen, pers. comm., August 13, 2009; August 26, 2009; June 3, 2010). The gypsum (calcium sulfate) is formed during the desulfurization process (Mirant Mid-Atlantic, LLC, 2006).

The Navy has reached an operating agreement with Mirant and its barge unloading facility (J.L. McGettigan and J.L. Smith, letter, April 24, 2007). Mirant has agreed where feasible to schedule barge traffic through the PRTR outside the range's normal operating hours of Monday to Friday, 8 am to 4 pm and to coordinate alternate schedules with the Navy when PRTR operations would pose undue hardship to barge shipments. In addition, NSF Dahlgren and Mirant Corporation initiated a communication protocol to minimize conflicts between Navy activities and barge activities, and periodically will review the protocol and operational concerns (J.L. McGettigan and J.L. Smith, letter, April 24, 2007; Allen, pers. comm., February 19, 2009; August 13, 2009).

In March 2007, the MPPRP issued a draft environmental review (MPPRP, 2007) to assess the potential environmental effects of the proposed coal barge unloading facility at the Morgantown generating station. The relevant findings of the draft environmental review follow (MPPRP, 2007):

- **Range activities** – Barges in the lower Potomac River would navigate the main channel and would traverse the LDZ and the MDZ. Range activities may be delayed as barges transit the river between Point Lookout and the Potomac River Bridge, and when vessels navigate around Swan Point as all commercially navigable waters there are in the MDZ. It is unclear whether docking activities at the facility would increase such delays. Overall, operation of the facility was not expected to have a significant adverse effect on NSWCDD RDT&E activities.
- **Use of the Potomac River** – At a maximum, barge traffic would be about five barges per week. As commercial traffic on the Potomac River appears to be minimal – on the order of one or two vessels per week – the additional barge traffic servicing the facility was not expected to congest commercial traffic on the river. (See discussion of vessel traffic on the Potomac River in Section 4.2.1.2 – There are currently approximately 122 vessels per week transiting the river below Washington, DC [USACE, 2008].) Construction and operation of the facility would slightly restrict recreational boaters and fishermen from freely traveling the stretch of the river around the generating station's warm water discharge; however, no restrictions for recreational travel along the shoreline due to security were anticipated. Gill net stands located directly offshore from the generating station and commercial crabbing in the Morgantown vicinity of the Potomac River would not be adversely affected by construction or operation of the facility.

- **Noise** – Construction of the coal barge unloading facility was not expected to create adverse noise impacts. Noise emitted by operation of the facility would be similar in character to the existing site noise associated with coal handling and would not contribute to a noticeable increase in overall noise emissions from the facility, as experienced by nearby receptors. Based on a generic estimate of unloading and conveyor noise and the ¾-mi distance to the nearest residences, the facility likely would comply with state and county noise limits.
- **Surface water quality** – No change in Potomac River water quality parameters was expected due to the construction and operation of the coal barge unloading facility. The proposed conveyor represents state-of-the-art equipment for transferring coal over water, thus minimizing potential impacts from coal dust.
- **Aquatic biological resources** – Minor impacts to river bottom benthos may result as the pilings for the dock would be secured in the bed of the river. Due to the small size of the pilings – about 2 ft in diameter – impacts were expected to be minimal and would be concentrated around the area of the pilings. Should accidental coal spillage occur during the transfer of coal over water, lump coal may have some detrimental biological effects by altering sediment and decreasing sediment volumetric nutritional content. The proposed action was not expected to result in removing, altering, or restricting access to the Pascahanna Oyster Bar in the vicinity of the proposed facility, and coal dust that enters the water was not expected to result in adverse effects on oyster survival, growth, or filtration.

There may be minimal impact to fish habitat during construction, and no impacts were expected on fish and fish habitat from the operation of the facility. There may be minimal, short-term construction impacts to waterfowl while the dock is under construction, whereas no operational impacts to waterfowl were expected. The light posts and pilings on the dock could provide additional perching habitat for sea birds.

- **Protected species** – The placement of 130 pilings to build the dock could result in the loss of forage items for the shortnose sturgeon. Construction of the new dock also could result in sediment accumulation and resuspension, hypoxic conditions (partial lack of oxygen), and elevated nitrogenous conditions, all conditions to which sturgeon are sensitive. However, construction and operational disturbances to the water column were expected to be minimal and to have no significant adverse effects on the shortnose sturgeon.

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### 5.1.7 Morgantown Generating Station Flue Gas Desulfurization System

Another recent project at the Morgantown generating station (Figure 3.1-3a) was the installation of a flue gas desulfurization system and other associated facilities. The Mirant Corporation declared the desulfurization system operational on December 20, 2009 (Allen, pers. comm., June 3, 2010). The primary purpose of installing a flue gas desulfurization (FGD) system was to reduce sulfur dioxide (SO<sub>2</sub>) emissions from the existing coal-fired steam-generating units in keeping with Maryland's Healthy Air Act (Mirant Mid-Atlantic, LLC, 2006). There also is a co-benefit in reducing mercury emissions.

The new FGD system was constructed on previously-disturbed areas within the existing generation station property. The system consists of a SO<sub>2</sub> scrubber absorber with the following associated facilities (Mirant Mid-Atlantic, LLC, 2006; Hare, 2007; Allen, pers. comm., August 13, 2009):

- Limestone receiving, handling, and storage facilities
- Limestone slurry preparation facility
- Gypsum byproduct storage, handling, and offloading facilities
- New makeup water supply
- Wastewater treatment system for scrubber wastewater
- Solid waste storage and handling system for scrubber and wastewater treatment solids
- New 410-ft-tall, dual-flue exhaust stack

The FGD system was projected to use about 1.54 million gallons per day (mgpd) (Mirant Mid-Atlantic, LLC, 2006; Rucker, 2007) or 1.72 mgpd (Hare, 2007) of water for process makeup water. Mirant Corporation proposed to obtain the required makeup water from wells in the Patuxent aquifer. However, the Water Management Administration of the Maryland Department of the Environment (MDE) determined that Mirant's proposed groundwater withdrawal would have an unreasonable impact on the aquifer and users of the aquifer (Hare, 2007). In response, Mirant Corporation elected to use Potomac River water from the generating station's existing river water intake, rather than groundwater, and built a reverse osmosis system on site to desalinate the river water prior to use (Allen, pers. comm., June 4, 2010). Although the desalination process was estimated to approximately triple the amount of water needed to operate the FGD system – to an estimated maximum withdrawal of 4.68 mgpd (Hare, 2007), the generating station is obtaining the needed water wholly under its previously-authorized surface water withdrawal allocation (Allen, pers. comm., June 4, 2010).

The FGD system also requires limestone, which is transported to the generating station by rail. At full station capacity, approximately 429,000 tons of limestone is required annually (Mirant Mid-Atlantic, LLC, 2006).

Mirant Corporation submitted an environmental analysis of the potential environmental effects of the proposed project (Mirant Mid-Atlantic, LLC, 2006) to the Public Service Commission of Maryland in October 2006, as part of its application for a certificate of public convenience and necessity. The relevant findings of the environmental analysis follow (Mirant Mid-Atlantic, LLC, 2006):

- **Noise** – The predicted noise levels due to project construction activities would be well below the Charles County code construction limit of 90 A-weighted decibels (dBA) and construction impacts at the identified noise receptors would be minimal.

New noise sources would include twin booster fans, limestone ball mills, and a material handling system (conveyors, bulldozers, and loaders/unloaders), as well as truck and railway operations for bulk material handling. Noise impact modeling was performed to predict the maximum noise levels produced by the existing and proposed noise sources. The modeling results were combined with background noise levels measured at identified

receptors. The predicted noise level at the nearest residential property was below the Charles County noise standard.

- **Surface water quality** – The primary potential impacts to surface waters from site preparation and project construction activities would be erosion and sedimentation associated with earthmoving and material placement. Erosion and sedimentation impacts would be controlled and minimized through proper design and placement of runoff-control features. No direct impacts to surface waters would occur from construction activities.

The scrubber wastewater treatment system would discharge approximately 125 gallons per minute (gpm) of effluent at a temperature of 95 degrees Fahrenheit (°F) to the generating station's once-through cooling water discharge canal. As the average flow through the discharge canal is 1.0 million gpm, the treatment system discharge would be diluted by a factor of 8,333 before reaching the receiving waters of the Potomac River. Consequently, there would be no thermal impacts to the river and no impacts on the circulation patterns in the river.

Process wastewater would be treated using biological reactors and clarifiers, and would be filtered prior to discharge to the Potomac River. In addition, the effluent would need to meet enhanced nutrient reduction standards of less than 4 milligrams per liter (mg/l) of total nitrogen at the discharge. The FGD system discharge would not likely cause a violation of state water quality criteria and no adverse water quality impacts were expected.

The project would require updating and amending the generation station's stormwater pollution prevention plan (SWP3). The requirement of an updated and amended SWP3 would ensure that the project would be designed, constructed, and operated using best practices for controlling stormwater pollution and that there would be no significant environmental impacts.

In May 2007, the State of Maryland issued a proposed findings and final recommendations (Hare, 2007) that includes an assessment of the potential environmental effects of the FGD system. The relevant findings of the state's assessment follow (Hare, 2007):

- **Noise** – In a noise evaluation using conservative assumptions that tend to over-estimate noise impacts, the MPPRP evaluated the ability of the Mirant Corporation to operate the proposed FGD system in compliance with state and Charles County noise requirements. The MPPRP found that noise levels from operation of the proposed FGD system potentially could exceed the residential day and nighttime limits established by Charles County. The proposed findings and final recommendations recommended that Mirant Corporation be required to submit an updated noise analysis after the system components are selected and actual vendor specifications for noise characteristics are available. The analysis would be required to demonstrate that the equipment selection and engineering design incorporate sufficient noise mitigation to ensure that the project complies with all applicable noise regulations.

### 5.1.8 Morgantown Generating Station Coal Blending and Gypsum Loadout Facilities

Mirant Corporation also recently installed coal blending and gypsum loadout facilities at the Morgantown generating station (Figure 3.1-3a). The coal blending facilities use different types of coals to match the specifications of the boilers and air quality control equipment of the station's coal-fired steam-generating units. The facilities enable optimizing fuel flexibility while meeting Mirant Corporation's system-wide SO<sub>2</sub> emission reduction compliance plan, designed to meet the requirements of state-mandated emission reductions. The coal blending facilities include the following (Mirant Mid-Atlantic, LLC, 2008):

- Stackout facilities consisting of two transfer points
- Underground reclaim facilities in the north and south coal yards
- Reclaim transfer points to integrate the reclaim from the coal yards
- Refurbished and upgraded emergency reclaim
- Enclosed transfer locations with dust suppression

All of the coal blending facilities are installed within the generating station's coal yards.

The gypsum loadout facility supports the beneficial use and efficient transportation of synthetic gypsum, a byproduct formed during the desulfurization process – see Section 5.1.11. Gypsum from the Chalk Point generating station is transported to the Morgantown generating station by rail and, along with gypsum from Morgantown, is shipped by barge from the station's coal barge facility – see Section 5.1.10. The gypsum loadout facility conveys gypsum from gypsum storage to barges at the barge facility and includes the following (Mirant Mid-Atlantic, LLC, 2008):

- 1,000-ton per hour conveyor material handling system
- Five enclosed transfer towers
- One pier-located tripper conveyor system
- One telescoping barge loadout conveyor
- Rail unloading facility
- Rail unloading hopper and conveyor to support transport of Chalk Point-delivered gypsum to barge loadout

The gypsum loadout facility is installed at the perimeter of the coal yards and within the right-of-way of the coal barge unloader material handling system, within the generating station.

In August 2008, Mirant Corporation submitted an environmental analysis of the potential environmental effects of the proposed project (Mirant Mid-Atlantic, LLC, 2008) to the Public Service Commission of Maryland, as part of its application for a certificate of public convenience and necessity. The relevant findings of the environmental analysis follow (Mirant Mid-Atlantic, LLC, 2008):

- **Noise** – The predicted noise levels due to project construction activities would be well below the Charles County code construction limit of 90 dBA and construction impacts at the identified noise receptors would be minimal.

Noise from the operation of the coal blending facilities were expected to be lower than noise generated by the existing method of coal stacking and reclaiming in the coal yards. Noise from the operation of the gypsum loadout facility would not exceed typical noise levels generated by the existing transfer systems. The project would add minimal noise to the environment and the generating station would continue to comply with applicable noise regulations.

- **Surface water quality** – The primary potential impacts to surface waters from site preparation and project construction activities would be erosion and sedimentation associated with earthmoving and material placement. Erosion and sedimentation impacts would be controlled and minimized through proper design and placement of runoff-control features. No direct impacts to surface waters would occur from construction activities.

The project would require updating and amending the generation station's SWP3. The requirement of an updated and amended SWP3 would ensure that the project would use BMPs for controlling stormwater pollution and that there would be no significant environmental impacts.

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### 5.1.9 Residential Development in Colonial Beach

Over the last few years, the town of Colonial Beach, Virginia (Figure 1-3) has experienced substantial growth, and several major residential development projects have been initiated, including: the construction at Monroe Point of about 330 units on 51 ac and a 12-ac commercial site; the construction of 751 homes along Route 205 west of the creek separating Colonial Beach from the unincorporated parts of the county (Northern Neck Subdivision); and, nearby, Potomac Crossing, with 913 residential units, 182,000 sq ft of commercial space, a golf course, and a community recreation center (Colonial Beach Virginia Attractions, 2011; Delano, 2006 and 2007). However, in October 2007, the developer of Potomac Crossing announced the project was being put on hold due to unfavorable market conditions (Ficklin, 2007) and the project has remained on hold due to the economy (Colonial Beach Virginia Attractions, 2011).

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## 5.2 Reasonably Foreseeable Future Actions Relevant to the Proposed Action

A number of actions reasonably expected to occur in the future may potentially contribute to cumulative effects to the resources identified in Chapter 4. The relevant, reasonably foreseeable future actions identified can be categorized as follows:

- NSF Dahlgren projects that may affect the public in the vicinity of the installation, affect resources of the Potomac River, or affect natural resources on the installation
- Projects at nearby military installations that may affect protected species in the region
- Public projects that may constrain NSWCDD activities, affect use of the Potomac River, affect the public in the vicinity of NSF Dahlgren or the PRTR, affect the resources of the Potomac River, or affect protected species in the region

- Private development projects that may encroach on the Navy’s ranges at NSF Dahlgren, affect use of the Potomac River, affect resources of the river, or affect protected species in the region

A brief description of these actions follows, with an emphasis on components of the activity that are relevant to the effects previously identified. When determining whether a particular activity may contribute cumulatively and significantly to the effects identified in Chapter 4, the following attributes are considered: geographical distribution, intensity, duration, and the historical effects of similar activities.

### 5.2.1 Fort A.P. Hill Army Compatible Use Buffer Program

Under the Readiness and Environmental Protection Initiative, the Office of the Secretary of Defense (OSD) funds the armed services to implement compatible land use partnering projects – usually with state and local governments, and nonprofit organizations – that aim to relieve encroachment pressures on training, testing, and support activities at US military bases (OSD, 2007). The Army Compatible Use Buffer (ACUB) program creates land conservation partnerships between the Army and outside organizations to protect land from development that is incompatible with the military mission (USAEC, 2009a).

#### Encroachment

Encroachment refers to issues external to military operations that affect or have the potential to affect military installation testing, training, and other operations and overall military readiness (OSD, 2007).

The ACUB program at Fort A.P. Hill envisions creating an approximately 35,000-ac buffer around the installation, to prevent operational restriction that would occur if encroachment continues and to preserve the ecological integrity of the region (USAEC, 2009a). In 2006, under the program, Fort A.P. Hill and its conservation partners purchased an easement on a 1,320-ac tract. The Portabago Creek tract borders nearly 3 mi of the installation’s eastern boundary, close to important firing ranges and the impact area (The Nature Conservancy, 2006). The Fort A.P. Hill ACUB program has contributed towards the permanent preservation of approximately 10,000 ac since 2006 (Kristine L. Brown, pers. comm., October 4, 2012).

All Fort A.P. Hill ACUB projects undergo NEPA review (Kristine L. Brown, pers. comm., October 4, 2012). To date, all of the projects have qualified under the Department of the Army final rule on environmental analysis of Army actions (67 Federal Register 15290, Department of the Army, 2002) for categorical exclusions (Kristine L. Brown, pers. comm., November 19, 2012), which “are categories of actions with no individual or cumulative effect on the human or natural environment, and for which neither an EA nor an EIS is required” (32 CFR § 651.28).

## 5.2.2 Potomac Land Conservation

Many land conservation programs have historically operated and currently operate in Maryland and Virginia, including within the Lower Potomac River basin, to protect natural resources, farmland, and open space. Table 5-2 summarizes the acreages of protected land in each of the counties in Maryland and Virginia that border the Lower Potomac River.

Various conservation initiatives and programs – in particular, the three discussed in the following paragraphs – are expected to bring additional areas along the Lower Potomac River under protection in the future.

### Forest Legacy Program

The United States Forest Service administers the Forest Legacy Program in cooperation with state partners, including Maryland and Virginia. Through the use of voluntary conservation easements and fee-simple purchase, the incentive-based program protects environmentally-important and -sensitive forest lands, with emphasis on those that are threatened by conversion to non-forest uses. To maximize the benefits it achieves, the Forest Legacy Program focuses on the acquisition of partial interests in privately-owned forest lands (United States Forest Service, 2010). As of February 18, 2010, in Maryland 2,014 ac and in Virginia 5,971 ac of forest lands were protected under the program (United States Forest Service, 2010).

**Table 5-2**  
**Protected Land Area**  
**in Counties Bordering the Lower Potomac River**

County	County Land Area sq mi	Protected Area	
		ac	percent of county
Maryland			
Prince George's	485	15,128	4.9
Charles	461	19,497	6.6
St. Mary's	361	9,864	4.3
Virginia <sup>1,2</sup>			
Prince William	338	95,902	15.3
Stafford	270	94,181	18.1
King George	180	22,322	15.6
Westmoreland	229	19,344	13.2
Northumberland	192	3,487	2.8
<b>Note:</b> 1. Virginia protected area values are not split by county. 2. Virginia protected area values exclude military reservations. <b>Sources:</b> County land areas – United States Census Bureau, 2011. Maryland protected areas – Davenport, pers. comm., April 26, 2010; MDNR, 2009. Virginia protected areas – VDCR, 2010b.			



To be eligible for the Forest Legacy Program, lands must be located within a Forest Legacy Area designated in a federally-approved assessment of need, prepared by the state. The Southern Forest Legacy Area in Maryland encompasses 254,699 ac of forest lands in Prince George's, Charles, and St. Mary's counties, and in Calvert County (Van Hassent, pers. comm., April 30, 2010). In Virginia, Forest Legacy Areas encompasses forest lands in Prince William, Stafford, King George, Westmoreland, and Northumberland counties. Forest lands within these areas are targeted for future protection.

### **Northern Virginia Regional Conservation Forum**

The DoD Legacy Resource Management Program (DoD Legacy Program) was established by Congress in 1990 to protect, enhance, and conserve natural and cultural resources while preserving DoD's primary mission of military readiness (DoD, 2007b). The National Defense Authorization Act for fiscal year 1997 (Public Law 104-201, Section 2694) provided the flexibility to enter into cooperative agreements with public and private agencies, organizations, institutions, individuals, or other entities to carry out the program. The 1997 legislation also defined mandatory criteria for funding Legacy projects, including that projects must have regional or DoD-wide significance and involve more than one military department.

The DoD Legacy Program funded the State-wide Conservation Forums to Facilitate Cooperative Conservation project – Legacy Program Project 06-331 – for fiscal year 2006. This Office of the Secretary of Defense Legacy Program project provided for a conservation forum at the state-wide level in Virginia on December 15, 2006. The purpose of the forum was to launch regional conservation partnerships in support of the Governor of Virginia's land conservation initiative and military compatible land use and conservation buffers, and to coordinate future regional cooperative conservation partnerships in the Potomac River and York River watersheds (Cisar et al., 2007; DoD, 2007a). In April 2006, Governor Timothy M. Kaine had announced the goal of protecting an additional 400,000 ac of land across the Commonwealth during his term of office (Bryant and Bloxom, 2007), a goal that was surpassed with a total of 424,103 ac preserved by the end of 2009 (Appomattox News, 2010).

At the 2006 forum, attendees committed to a follow-on regional forum to explore specific conservation partnerships in the Northern Virginia area that includes MCB Quantico, Fort A.P. Hill, and NSF Dahlgren (DoD, 2007a). The Northern Virginia Regional Conservation Forum strives to identify strategic properties that need protection in the region (Richardson, pers. comm., June 3, 2008). However, the regional forum no longer is active; the last meeting having been held in 2010 (Richardson, pers. comm., October 24, 2012).

### **National Capital Region Land Conservation Act**

On June 19, 2009, the National Capital Region Land Conservation Act was introduced to the United States House of Representatives and on July 28, 2009 the act was introduced to the United States Senate. The act would create a new \$50 million grant program that would fund land preservation efforts. The act would authorize the Secretary of the Interior, acting through the Director of the National Park Service, to make grants to Maryland, Virginia, West Virginia, and the District of Columbia and their political subdivisions for assistance in acquiring lands and interests therein that affect or are within the National Capital Region and will be used for parks; open space; green space corridors that link public lands, lands subject to conservation

restrictions, or a combination of such lands; agriculture; forests; fish and wildlife habitat; watershed protection; historic preservation; sensitive environmental area protection; and public recreation. Virtually the entire National Capital Region is within the Potomac River watershed. The region includes the three Maryland counties – Prince George’s, Charles, and St. Mary’s – and two of the Virginia counties – Prince William and Stafford – that border the Lower Potomac River.

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### **5.2.3 Governor Harry W. Nice Memorial Bridge Improvement Project**

The two-lane Governor Harry W. Nice Memorial Bridge, which carries US Route 301 across the Potomac River and lands just north of NSF Dahlgren (Figures 1-1 and 3.1-3a), is the only bridge across the river south of the Woodrow Wilson Bridge, which carries Interstate I-495/the Washington Beltway. The Maryland Transportation Authority (MdTA) initiated planning for the Nice Memorial Bridge Improvement Project in 2006 to address the transportation conditions and capacity limitations at the bridge (MdTA, 2008). The purpose of the project is to (MdTA, 2010):

- Provide a crossing of the Potomac River that is geometrically compatible with the US Route 301 approach roadways
- Provide sufficient capacity to carry vehicular traffic on US Route 301 across the river in the design year 2030
- Improve traffic safety on US Route 301 at the approaches to the river crossing and on the bridge itself
- Provide the ability to maintain two-way traffic flow along US Route 301 during wide-load crossings, incidents, poor weather conditions, and when performing bridge maintenance and rehabilitation work

In 2009, the MdTA released an EA (MdTA, 2009) that evaluates alternatives to upgrade the bridge, and improve traffic flow and safety by adding two lanes of traffic. Four sets of alternatives were considered: Alternate 1 is the no-build alternative and would include extensive rehabilitation of the existing bridge; Alternates 2 and 4 would rehabilitate the existing two-lane bridge and build a new two-lane span adjacent to it; Alternates 3 and 5 would replace the existing two-lane bridge and build a new two-lane span adjacent to it; and Alternates 6 and 7 would build a new four-lane bridge and take the existing structure out of service. The build alternatives – Alternates 2 through 7 – provide reasonable tie-in points with the existing and planned highway network, capacity for 2030 traffic demand, the ability to maintain two-way traffic flow, improved safety on approach roadways and bridge, and the ability to comply with navigational channel guidelines. The build alternatives would require an alignment shift of the US Route 301 approach roadways to connect to the new bridge, and each includes a barrier-separated bicycle-pedestrian path (MdTA, 2009).

The EA does not identify a preferred alternative. However, in May 2010, the MdTA issued for review a draft Preferred Alternate/Conceptual Mitigation document (MdTA, 2010) that recommends Modified Alternate 7 – i.e., Alternate 7 with a modified bicycle/pedestrian option – as the preferred alternative. Modified Alternate 7 comprises the installation of a new four-lane bridge to the north of the existing bridge, with a single, barrier-separated, two-way

bicycle/pedestrian path on the south side of the new bridge. The existing bridge would be removed under Modified Alternate 7.

The draft Preferred Alternate/Conceptual Mitigation document presents the MdTA's rationale for identifying Modified Alternate 7 as the preferred alternative. The document also presents a summary of environmental impacts associated with the preferred alternative and the MdTA's proposed minimization and conceptual mitigation measures for the resources that would be affected by the preferred alternative. Quantitative impacts were updated with respect to those presented in the EA to reflect the minor changes to Alternate 7 that were incorporated into Modified Alternate 7; however, the qualitative discussions of impacts of Alternate 7 presented in the EA remain valid (MdTA, 2010). The relevant findings of the EA and the draft Preferred Alternate/Conceptual Mitigation document follow (MdTA, 2009; 2010):

- **Noise** – Dahlgren Wayside Park – immediately north of US Route 301 on the river, in Virginia – would experience design-year noise levels equal to or exceeding the impact criteria at picnic, beach, and lawn areas. Although the picnic and beach areas would be displaced by the preferred alternative, the remaining portion of the park could be used for recreation purposes; therefore, consideration of noise mitigation is appropriate. Feasibility and reasonableness of noise abatement was investigated for this location, resulting in a determination that a sound barrier at Dahlgren Wayside Park would not restrict access, cause safety or maintenance issues, or create drainage problems, could be constructed, would satisfy the criterion for a feasible sound barrier, and would be reasonable in terms of cost. It is MdTA policy to make final decisions on the construction of noise abatement during preliminary design.
- **Surface water quality** – The preferred alternative could affect the surface water quality in the study area. Construction impacts may include increased turbidity due to sedimentation from erosion or dredging activities, pollution from disturbed sediments, and runoff from impervious surfaces. Impacts to water quality during dredging and in-water demolition could include a temporary increase in turbidity, and potential release of nutrients and contaminants from bottom sediments. During construction, releases of sediment from land-disturbing activities would be minimized through erosion and sediment controls. Stormwater would be managed to limit downstream erosion and impairment of water quality.
- **Natural resources** – The preferred alternative would impact tidal open water, with impacts comprising permanent impact to 0.5 ac of Potomac River bed resulting from installing bridge piers and up to 65 acres of temporary impact to tidal waters from dredging for barge access. Minimization efforts during design would focus on reducing the number of piers and the required size of the dredge area. Prior to construction, the MdTA would obtain permits from the MDE and the USACE, and approval from the Maryland Critical Area Commission for the Chesapeake and Atlantic Coastal Bays for construction within the Potomac River. Mitigation for unavoidable impacts to waters would be required. Based on the findings of a draft compensatory mitigation plan and coordination with the regulatory agencies, out-of-kind mitigation through shoreline stabilization would adequately compensate for all functions and values lost from impacted resources.

The footprint of the preferred alternative would encompass approximately 8.4 ac of the 100-year floodplain of the Potomac River. However, the project would have a negligible effect on the floodplain because the majority of this floodplain acreage would be bridged. Construction of the proposed bridge and approach roadway would not accelerate shoreline erosion along the Potomac River.

- **Aquatic biological resources** – No impacts to SAV or oyster beds are anticipated. However, dredging activities necessary for bridge construction can entrain and destroy oyster eggs and larvae, particularly during spawning and spat periods, and larval oysters may become starved by ingesting sediment particles from increased sedimentation.

To protect anadromous fish and potential overwintering sturgeon, dredging would be restricted to certain times of the year, with the time-of-year restrictions to be refined in coordination with the resource agencies. An essential fish habitat (EFH) assessment completed for juvenile and adult summer flounder, and juvenile bluefish found that the proposed improvement project is not likely to adversely affect EFH for these species. The assessment stated that construction activities can be mitigated through time-of-year restrictions, conditional blast design requirements, blast pressure wave maximum thresholds, and other methods. As the project progresses through the design phase, avoidance and minimization measures would be clarified in consultation with the National Marine Fisheries Service (NMFS), specifically with respect to the service's recommendations relating to the effects of pile driving and subaqueous blasting.

The preferred alternative could affect waterfowl concentration areas, but direct impacts are unlikely. Overwintering waterfowl, which usually congregate near the bridge, may be affected by construction activities. Dredging and blasting windows would be coordinated with the MDNR and the Maryland CAC to attempt to protect waterfowl that might overwinter in the area.

- **Protected species** – Impacts to shortnose sturgeon habitat due to construction could include increased turbidity, and pollution from disturbed sediments and runoff from impervious surfaces. Sediment deposits and turbidity from dredging also could disrupt the sturgeon's foraging habitat.

No direct impacts to bald eagle nests are anticipated. However, prior to construction, eagle nests would be surveyed and further coordination undertaken with the Virginia Department of Game and Inland Fisheries (VDGIF), MDNR, and United States Fish and Wildlife Service (USFWS). Such coordination may result in time-of-year restrictions or activity modifications for some construction operations, such as tree clearing, grading, and blasting. Coordination with the USFWS also would be undertaken prior to construction to evaluate potential project impacts to peregrine falcons, which are nesting and breeding on the bridge.

The MdTA study team coordinated with regulatory agencies to develop the final environmental document, which was approved by the Federal Highway Administration on November 27, 2012. The Nice Memorial Bridge Improvement Project final environmental document comprises two components: a Finding of No Significant Impact (MdTA, 2012) and a Final Section 4(f) Evaluation (Federal Highway Administration and MdTA, 2012). The relevant findings of the Final Section 4(f) Evaluation follow (Federal Highway Administration and MdTA, 2012):

- **Use of the Potomac River** – Dahlgren Wayside Park includes a 450-foot-long by 60-foot-wide sand beach along the Potomac River, boat access for small watercraft, and picnic tables, and provides the public opportunities for recreational activities including fishing and canoeing/kayaking. Modified Alternate 7 would require approximately 2.2 acres of land from the 14.7-acre park, 15 percent of the total park acreage, including a portion of the park entrance road, a parking area, a portion of the picnic area, and a portion of the beach area. However, mitigation measures were incorporated into Modified Alternate 7 for Section 4(f) uses that cannot be avoided or further minimized and were documented in a memorandum of agreement, executed in September 2011. The memorandum of agreement specifies that the Dahlgren Wayside Park entrance and parking lot will be relocated, and that hardscape features such as picnic tables, barbecue grills, and a replacement boat landing will be installed.

The Finding of No Significant Impact (MdTA, 2012) documented the Federal Highway Administration's determination that the MdTA preferred alternate, Modified Alternate 7, will have no significant impact on the environment.

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## 5.2.4 Villages at Swan Point

US Steel Corporation and Brookfield Homes Corporation are proposing to build an expansion to a development project initiated in the 1980's at Swan Point in Issue, Maryland, which is approximately 7 mi southeast of NSF Dahlgren on the MDZ (Figures 1-3, 1-5, and 3.1-3a). The earlier development built the existing Swan Point Yacht and Country Club community, which consists of 322 homes, a golf course, and a marina. The project would add 1,500 homes to the 897-ac site on the Weir Peninsula, along with a hotel, a private beach, six observation piers, retail shops, restaurants, and a 150-slip marina on the Potomac River at Weir Creek (Degregorio, 2006; McConaty, 2007). The project also includes shoreline stabilization along the shore of the river and a bridge over Weir Creek.

One of the early concerns regarding the planned Villages at Swan Point was that the 0.07-mgpd capacity of the Swan Point Wastewater Treatment Plant was insufficient to accommodate the influx of people that would live in the new development. To accommodate the planned development, the plant, which discharges to Cuckold Creek, was upgraded to a 0.6-mgpd enhanced nutrient removal wastewater treatment plant, capable of achieving an effluent with a total nitrogen goal of 3 mg/l and a total phosphorus goal of 0.3 mg/l (MDE, 2009). MDE data show a marked decrease in nitrogen and phosphorus loading in Cuckold Creek since the upgrade was completed in 2007 (MDE, 2009).

Approximately 160 ac of the Villages at Swan Point are within the designated critical area (Degregorio, 2006). The Maryland Critical Area Act, passed in 1984, identified the critical area as all land within 1,000 ft of the mean high water line of tidal waters or the landward edge of tidal wetlands, and all waters of and lands under the Chesapeake Bay and its tributaries (CAC, 2008, 2009). The act also created the Maryland CAC, which reviews and approves state or local agency actions resulting in major development on private lands or lands owned by local jurisdictions.

The Villages at Swan Point is located in a portion of the critical area that was designated as resource conservation area. Resource conservation area is the most restrictive development

overlay in the critical area as it limits the density and use that is allowed. The Critical Area Act allows each county to up-zone 5 percent of its resource conservation area to a less-restrictive development overlay – i.e., a limited development area or an intensely developed area – and thereby enable more intensive use, a process termed “growth allocation.” To accommodate the Villages at Swan Point development plan, the developer needed to change the resource conservation area designation to both limited development area and intensely developed area designations. The Charles County Commissioners, in June 2006, and the Maryland CAC, in March and April 2007, approved with conditions the use of growth allocation for the re-designation (Umling, pers. comm., April 24, 2007; Charbonneau, pers. comm., August 25, 2009). These approvals were needed for the project proponent to proceed through Charles County preliminary and final plan approvals for the site development plans.

In 2006, Charles County had approved a master plan and general development plan for the Villages at Swan Point (Dailey, pers. comm., June 3, 2010). The preliminary subdivision plan for the first phase of the development was presented to the county planning commission and reviewed in September 2008. However, certain habitat protection requirements that were imposed as conditions on the growth allocation approvals need to be fulfilled prior to the approval by the county of the first Villages at Swan Point preliminary subdivision plan or preliminary site plan. The requirements pertain to, for example, the following (Umling, pers. comm., April 24, 2007; Dailey, pers. comm., June 3, 2010):

- Submitting for review and approval a detailed critical area buffer management plan
- Addressing the required 404 ac of forest interior dwelling species mitigation in a revised habitat management plan
- Addressing the protection of an active bald eagle nest
- Submitting for review and approval a final habitat management plan
- Establishing a permanent conservation easement

The Charles County Department of Planning and Growth Management currently awaits resolution of the habitat protection requirements (Dailey, pers. comm., June 3, 2010). The requirements will be carried over to each subsequent development phase. Additionally, the growth allocation approvals include a condition that at the time of each preliminary plan, should any additional habitat protection requirements become applicable based upon species migration or new information, the project proponent will be required to amend the habitat protection plan accordingly (Umling, pers. comm., April 24, 2007; Dailey, pers. comm., June 4, 2010).

Initiation of construction of all components of the development has been delayed because of the state of the economy and the housing market. Brookfield Homes anticipates that construction will begin in 2012 (Lannin, pers. comm., July 27, 2010).

Environmental reports have been requested from Brookfield Homes.

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## **5.2.5 St. Mary’s County Regional Airport**

St. Mary’s County Regional Airport is located four miles northeast of Leonardtown, Maryland and approximately 53 miles southeast of Washington, D.C. (Figure 5-1). The airport, owned and

operated by St. Mary's County, has one partial parallel taxiway, three connector taxiways and a turnaround (St. Mary's County, Maryland, 2012).

The Airport Master Plan was updated in 2002 to enable the airport to accommodate growth in aviation demand (Delta Airport Consultants Inc., 2002). As part of future airport improvements, Runway 11-29 will be lengthened and strengthened. St. Mary's County, in conjunction with the FAA and the Maryland Aviation Administration, is working to achieve an Airport Reference Code (ARC) designation of B-II (approach speed of 91-120 knots and a wingspan of 49 -78 ft) with a non-precision instrument approach (i.e., lateral course information only) of 0.5 mile for Runway 11, which will be extended by 1,200 feet from its current condition, and a non-precision instrument approach of one mile for Runway 29.

NSWCDD's special use airspace (Figure 1-6) does not overlap with St. Mary's County Regional Airport. The Proposed Action would not change the hours that airspace is restricted annually. Because the SUA under the Proposed Action would be used more frequently than under the other alternatives, the hours during it would be released to FAA control for potential use by civilian aviation would be reduced. However, commercial airliners fly along long established routes that do not cross the SUA. Although general aviation pilots do have the option of checking whether the SUA is in effect when planning their flights, very rarely do so; as a matter of course, they consider the SUA to be off-limits at all times (see Section 4.1.3.3). There is not expected to be any appreciable adverse effect on civilian aviation, inclusive of current or future availability of instrument approaches and other airspace or operational matters concerning the St. Mary's County Regional Airport.

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### 5.3 Summary of Cumulative Impacts Relative to the Proposed Action

Environmental effects associated with the proposed Navy action were thoroughly analyzed in Chapter 4. Most of these effects were determined to be individually non-significant. However, these actions, when combined with other similar actions occurring in the region of influence, may contribute to a cumulative significant effect on one or more environmental resources.

Table 5-3 shows in tabular format the potential environmental effects – identified previously in this chapter – of each action in the region of influence potentially contributing to a cumulative effect, the potential environmental effects of the Proposed Action, and the potential cumulative effects of all actions combined. A value of “NI” through “◆◆◆” was assigned to each action based on the intensity of its potential adverse effect to a specific resource area. (See the introduction to Chapter 4 for the qualitative framework used in this EIS to evaluate the intensity of impacts.) An explanation of each value is as follows:

- A “NI” value was given to an action that has no negative impacts to a particular resource.
- A “◆” was given to an action that has the potential for negligible or minor, but recoverable, negative impacts to a particular resource. A negative impact is recoverable if the affected resource could, over time, return to its pre-impact condition naturally – i.e., without human intervention – or through implementation of a restorative action.

- A “♦♦” was given to an action that has the potential for moderate, but recoverable, negative impacts to a particular resource.
- A “♦♦♦” was given to an action that has the potential for major, non-recoverable, negative impacts to a particular resource.

It is important to note that even if a resource was given a value of “♦♦” or “♦♦♦” for an individual action, it does not automatically generate a cumulative impact of “♦♦” or “♦♦♦.” This is due to difference in space and time from other actions or the resource that is potentially affected. In determining the cumulative impacts of NSWCDD outdoor RDT&E activities in combination with other activities in the region, the following types of potential cumulative impacts were considered:

**Table 5-3  
Summary of Cumulative Impacts**

	Range Activities	Use of the Potomac River	Property Values and Development	Electric Power Capacity	Noise	Health and Safety	Surface Water Quality	Natural Resources	Aquatic Biological Resources	Protected Species
<b>Past and Present Actions</b>										
NSF Indian Head Activities	NA	NI	♦	NI	NI	NI	NI	NI	NI	NI
MCB Quantico Activities	NA	NI	♦	♦	♦	NI	♦	NI	NI	NI
BPRF Activities	NI	♦	♦	NI	NI	♦	NI	NI	NI	NI
Fort A.P. Hill Activities	NA	NI	♦	NI	♦	NI	NI	NI	NI	NI
NAS Patuxent River and Webster Field Annex Activities	♦	NI	♦	NI	♦	♦	NI	NI	NI	NI
Morgantown Coal Barge Facility	♦	NI	♦	NI	♦	NI	♦	NI	♦	NI
Morgantown FGD System	NI	NI	♦	NI	♦	NI	♦	NI	NI	NI
Morgantown Coal Blending and Gypsum Loadout Facilities	♦	NI	♦	NI	♦	NI	♦	NI	♦	NI
Residential Development in Colonial Beach	♦	NI	NI	♦	NI	NI	♦	NI	NI	NI
<b>Reasonably Foreseeable Future Actions</b>										
Fort A.P. Hill ACUB Program	NA	NI	NI	NI	NI	NI	NI	NI	NI	NI
Potomac Land Conservation	NA	NI	NI	NA	NA	NA	NI	NI	NI	NI
Nice Memorial Bridge Improvement Project	♦	NI	♦	NI	♦	NI	♦	♦	♦	NI
Villages at Swan Point	♦	NI	NI	NI	♦	NI	♦	NI	♦	NI
St. Mary's Regional Airport	NA	NA	NI	NA	NI	NA	NA	NA	NA	NA
<b>Proposed Action</b>										
NSWCDD Outdoor RDT&E Activities	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
<b>Cumulative Impacts</b>										
Cumulative Impacts of All Actions	♦	♦	♦	♦	♦	♦	♦	♦	♦	NI
<b>Notes:</b> NA indicates not applicable. NI indicates no negative impacts. ♦ indicates potential for negligible or minor, but recoverable, negative impacts. ♦♦ indicates potential for moderate, but recoverable, negative impacts. ♦♦♦ indicates potential for major, non-recoverable, negative impacts.										



- Countervailing – negative impacts that are compensated for by beneficial effects
- Additive – the total loss of a resource from more than one incident
- Synergistic – when the total effect is greater than the sum of the effects taken independently

Potential cumulative effects are discussed below.

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## **5.4 NSWCDD Range Activities**

As the number of events on the ranges increases, scheduling RDT&E activities will become increasingly difficult. Other activities that require the use of the ranges or encroach on the ranges could further limit their availability for NSWCDD RDT&E activities.

NAS Patuxent River UAV activities out of the Webster Field Annex use airspace over a portion of the PRTR; however, these activities are limited to the LDZ, not the more-intensively utilized MDZ. Although the barge traffic generated by the Morgantown generating station coal barge facility would use the Potomac River's main channel and, as such, would pass through the PRTR, a communication protocol agreed to by NSF Dahlgren and Mirant Corporation is expected to minimize conflicts between Navy activities and barge activities. Further, to date, actual coal deliveries vary and are very limited. Encroachment of residential development in the vicinity of the ranges – e.g., residential development in Colonial Beach and the planned Villages at Swan Point, both along the edges of the PRTR – can affect NSWCDD activities on the range and may require increased deployment of range control boats to ensure the safety of the public.

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### **5.4.1 Recreational and Commercial Use of the Potomac River**

NSWCDD currently restricts public access to the PRTR danger zones, usually the MDZ, for testing approximately 750 hours per year, a value that could increase to approximately 1,000 hours per year under the Proposed Action. The difference in annual hours of river range usage can be expected to have some effect on marine commercial freight movements, commercial fishing, and recreational boating on the Potomac.

When firing mortars, the BPRF clears the installation's safety danger zone on the Potomac River approximately twice a year, for the duration of the two- to three-day tests. The Nice Memorial Bridge Improvement Project preferred alternate, Modified Alternate 7, would require approximately 2.2 acres of land from the 14.7-acre Dahlgren Wayside Park that provides the public opportunities for fishing and canoeing/kayaking in the Potomac River. However, the memorandum of agreement executed in September 2011 specifies that a replacement boat landing will be installed in the park. None of the other actions are expected to restrict recreational or commercial use of the Potomac River.

### **5.4.2 Property Values, Development, and Preservation Efforts Along the Potomac River**

As discussed in Section 4.2, although future real estate development is likely to continue, some within proximity to NSF Dahlgren, one possibly foreseeable consequence of increased population encroachment with no economic affiliation to NSF Dahlgren is the potential for a growing negative reaction to the Navy's activities, and particularly to the noise associated with them. Increases in noise complaints can be expected, not from an increase in Navy activity, but rather from a changing population with little relationship to NSF Dahlgren. Conceivably, dissatisfaction with NSF Dahlgren as a neighbor could nominally depress property values in the area, dampen the rate of future residential development, and affect land use patterns and ongoing development projects.

However, to monitor and control noise from its outdoor RDT&E activities and, thereby, reduce noise complaints from surrounding communities, NSWCDD has developed and implemented a noise management process (Appendix C). The process is described in Section 3.5.3.5. Implementation of the noise management process is expected to minimize noise impacts and noise complaints resulting from NSWCDD outdoor RDT&E activities, and substantially preclude noise-related effects on land use, property values, and future residential development.

NAS Patuxent River airspace covers the lower portion of the LDZ. The NAS uses the airspace for helicopter, fixed-wing, and UAV activities originating from the air station or the Webster Field Annex. Although these activities also could contribute to a negative reaction to the Navy's activities, there is only limited geographic overlap with the NSWCDD RDT&E activities, which predominantly occur in the MDZ. As mentioned below in Section 5.3.5, noise from detonations on Fort A.P. Hill and at MCB Quantico, and NAS Patuxent River aircraft activities and bombing activities at the CTR occasionally disturbs residents that live along the PRTR. Non-Navy and non-military activities along the lower Potomac River also could affect property values and future development. The recent construction of the coal barge facility, the scrubber stack, and the coal blending and gypsum loadout facilities at the Morgantown generating station, the mooring of barges at the generating station, and barge traffic on the river could contribute to an impression that the lower Potomac is increasingly becoming industrialized. Construction and dredging activities associated with the Nice Memorial Bridge Improvement Project additionally could contribute to that concern.

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### **5.4.3 Electric Power Capacity on NSF Dahlgren**

Increasing electric power capacity will be required to support NSWCDD's RDT&E activities – particularly in consideration of large electrical pulses resulting from EM energy activities – although the actual future capacity requirements are difficult to predict. Dominion Virginia Power has applied for an application to build a new 230 kilovolt (kV) transmission source and substation at NSF Dahlgren (Dominion Virginia Power, 2011). This project will meet long-term installation power demands and support the continued growth and economic development of King George County. If approved and implemented, there would be no cumulative impacts on electric power capacity.

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#### 5.4.4 Noise in the Vicinity of NSF Dahlgren and the PRTR

As discussed in Section 3.5.3, although the vicinity of NSF Dahlgren is relatively quiet, the Morgantown generating station, traffic on US Route 301, aircraft flying overhead, and boats on the river add continuous and intermittent noise. In addition, NSWCDD activities generate impulsive noise, from small arms firing, large-caliber gun firing, EM launcher firing, and explosive detonation, and continuous noise, from helicopters using the NSF Dahlgren airfield, aircraft brought from other airfields to be used in tests, and UAVs launched from the PRTR Complex land ranges and flown within the special-use airspace.

Noise from detonations on Fort A.P. Hill, detonations at MCB Quantico, and NAS Patuxent River aircraft activities and bombing activities on the CTR occasionally disturb residents who live along the PRTR. Noise emitted by operation of the Morgantown generating station coal barge facility, FGD system, and coal blending and gypsum loadout facilities is not expected to contribute to a noticeable increase in overall noise emissions from the facility, as experienced by nearby receptors. Under each of the no-build and build alternatives, 2030 noise levels from the Nice Memorial Bridge Improvement Project are expected to equal or exceed the impact criteria at noise sensitive area 3 – Dahlgren Wayside Park, in the vicinity of NSF Dahlgren. Construction of the Villages at Swan Point would cause short-term noise impacts along the shore of the Potomac, in the vicinity of the PRTR.

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#### 5.4.5 Health and Safety of Residents near NSF Dahlgren and the PRTR

NSWCDD RDT&E activities would result in negligible impacts on human health and safety. All activities are conducted in accordance with Navy policies, and carefully-conceived management controls, operation-specific RHAs and SOPs. Activities conducted by other military installations – such as mortar firing at the BPRF and NAS Patuxent River helicopter, fixed-wing, and UAV activities in airspace over the PRTR – likewise would have negligible impacts.

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#### 5.4.6 Potomac River Surface Water Quality

As discussed in Section 4.8 and in Sections 4.10 through 4.14 of this EIS, NSWCDD evaluated the potential effects of munitions RDT&E on the PRTR on human health and the environment. As there is the potential for munitions fired into the Potomac River to accumulate in sediments, water, and aquatic organisms, range-specific screening-level risk assessments (RSSRAs) were performed. A subset of munitions constituents (MCs) was selected as MCOPCs based on their total mass (cumulative over the last 90 years), toxicity of constituents, and Navy guidance (see Appendix F).

The RSSRAs evaluated MCOPCs by comparing modeled concentrations in water, sediment, and fish tissues to risk-based screening concentrations. The results of the ecological and human health RSSRAs (see Sections 4.11 through 4.14 and Section 4.8, respectively) indicate that input of MCOPCs from munitions testing in the PRTR are orders of magnitudes (hundreds to billions of times) below concentrations that could cause adverse effects to human health or the environment. Hence, no further analyses are required at this time. Based on this conclusion,

continued use of the PRTR for ordnance activities is expected to have negligible impact on surface water.

Potomac River surface water quality could be impacted by development of the Westside of MCB Quantico, residential development in Colonial Beach, and construction of the Villages at Swan Point. Development would increase impervious surfaces and stormwater runoff, which would carry pollutants to the river. Construction activities could result in sediments or fill entering the Potomac. Construction, dredging, and in-water demolition associated with the Nice Memorial Bridge Improvement Project may temporarily increase turbidity and could release nutrients and contaminants to Potomac River surface waters.

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#### **5.4.7 Natural Resources on NSF Dahlgren**

More intensive use of EM launchers and laser corridors would require maintenance of shrub-grass-herbaceous vegetation in order to clearly see the barricades across the roads in place during activities to stop noninvolved personnel from entering the area. These non-forested vegetation areas are cut with a bush hog every few years to keep the vegetation low enough to see over it down the roads, but the Proposed Action would cause this range vegetation maintenance to occur more frequently. No forests would be affected. The effect of increased vegetation maintenance, if required, in laser corridors is considered negligible. There would be no indirect impacts on wildlife.

Based on review of relevant and available environmental documentation pertaining to the actions considered in the cumulative effects analysis, none of the other actions are expected to impact natural resources on NSF Dahlgren. Therefore, no cumulative impacts are anticipated.

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#### **5.4.8 Aquatic Biological Resources of the Potomac River**

NSWCDD RDT&E activities would result in negligible impacts on SAV, plankton, aquatic invertebrates, fish, and birds. As described in Section 4.11, RDT&E activities may adversely affect EFH, but likely would result in minimal adverse effects on EFH, as the resulting changes to EFH and its ecological functions would be relatively small and insignificant.

Accidental coal spillage during operation of the Morgantown generating station could result in minor impacts to river bottom benthos. Dredging activities requisite to the Nice Memorial Bridge Improvement Project could entrain and destroy oyster eggs and larvae, and dredging-related sedimentation could affect larval oysters. The bridge improvement project also could affect waterfowl concentration areas. Construction activities and increased stormwater runoff resulting from development of the Westside of MCB Quantico, residential development in Colonial Beach, and the Villages at Swan Point; accidental coal spillage during operation of the Morgantown generating station; and construction, dredging, and in-water demolition associated with the Nice Memorial Bridge Improvement Project could impact water column and benthic EFH.

### **5.4.9 Protected Species**

NSWCDD RDT&E activities are not likely to adversely affect the shortnose sturgeon, Atlantic sturgeon, loggerhead turtle, Kemp's ridley turtle, and green sea turtle and would have no effect on the northeastern beach tiger beetle. Based on review of relevant and available environmental documentation pertaining to the actions considered in the cumulative effects analysis, none of the other actions are expected to impact protected species. Therefore, no cumulative impacts are anticipated.

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## **5.5 Greenhouse Gas Emissions and Climate Change**

NSWCDD RDT&E activities make an incremental contribution to greenhouse gas emissions, representing a very small percentage of total United States emissions. The potential effects of greenhouse gas emissions are by nature global and cumulative, as individual sources of greenhouse gas emissions are not large enough to have an appreciable effect on climate change. An appreciable impact on global climate change would only occur when proposed greenhouse gas emissions combine with emissions from other man-made activities on a global scale.

As discussed in Section 3.4.2, total greenhouse gas emissions from a source are often expressed as equivalent emissions of CO<sub>2</sub>, or CO<sub>2</sub> equivalents. In 2008, total United States greenhouse gas emissions were 7,077.4 teragrams or million metric tons CO<sub>2</sub> equivalents (USEPA, 2012). From 2008 to 2010 total United States emissions decreased by 3.0 percent (211.9 teragrams) to 6,865.5 teragrams CO<sub>2</sub> equivalents.

In accordance with the USEPA final rule on mandatory reporting of greenhouse gases (74 Federal Register 56260, USEPA, 2009b), NSF Dahlgren estimated that in 2008 the facility generated a total of 9,702 metric tons of CO<sub>2</sub> equivalents, or 0.009702 teragrams CO<sub>2</sub> equivalents. Based on this estimate, NSF Dahlgren's facility-wide total greenhouse gas emissions in 2008 represented approximately 0.0001 percent of the total emissions for the country as a whole. NSWCDD RDT&E activities when combined with other past, present, and reasonably foreseeable future actions would have the potential for negligible, long-term, indirect, negative impacts on climate.

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## **5.6 Unavoidable Adverse Impacts**

Unavoidable adverse impacts of the action proposed in this EIS would include short-term localized disturbances to the river bottom due to the firing of inert ordnance. Inert ordnance would be buried in river sediments after firing and would be left there. A very small percentage of this ordnance may resurface over time, releasing small concentrations of munitions constituents into river sediments and water. Unavoidable adverse ecological impacts due to NSWCDD outdoor RDT&E activities on the PRTR would be minor, temporary, and not significant.

## **5.7 Relationship between Short-Term Uses of Man's Environment and the Enhancement of Long-Term Productivity**

Adherence to the proposed mitigation measures (Chapter 6) would minimize the effects of NSWCCD outdoor RDT&E activities on the environment. Consequently, the majority of the effects of the activities would be temporary in nature (as described in Chapter 4) and would have no significant adverse long-term impacts on the maintenance and enhancement of long-term productivity. There would be some short-term adverse effects on the environment; however, they would be brief and localized.

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## **5.8 Irreversible and Irretrievable Commitment of Resources**

Irretrievably and irreversibly committed resources are those that are consumed during the construction and implementation of a project and that cannot be reused. Because their reuse is impossible, they are considered irretrievably and irreversibly committed to the development of the proposed project. These resources would include expendable materials necessary for construction, as well as fuels and other forms of energy that are utilized during project implementation.

During NSWCCD's outdoor RDT&E activities, non-renewable resources would be consumed. Since the reuse of these resources may not be possible, they could be considered irreversibly and irretrievably committed. The non-renewable resources would include energy resources necessary for the activities, and inert and live ordnance expended on the range.