

**Final  
Five-Year Review Report  
for  
Former Bay Head Road Annex  
IR Program Site 1**

**Former Naval Surface Warfare Center  
Carderock Division  
Annapolis Detachment  
Annapolis, Maryland**



**Naval Facilities Engineering Command  
Washington**

**Contract Number N40080-16-D-0322**

**Contract Task Order 009**

**July 2020**

**FINAL FIVE-YEAR REVIEW REPORT**  
**for**  
**FORMER BAY HEAD ROAD ANNEX IR**  
**PROGRAM SITE 1**

**FORMER NAVAL SURFACE WARFARE**  
**CENTER CARDEROCK DIVISION**  
**ANNAPOLIS DETACHMENT**  
**ANNAPOLIS, MARYLAND**

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**Contract Number N40080-16-0322**  
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**July 2020**

## TABLE OF CONTENTS

### NAVY FIVE-YEAR REVIEW SIGNATURE COVER

FIVE-YEAR REVIEW SUMMARY FORM.....	vi
EXECUTIVE SUMMARY.....	ES-1
1.0 INTRODUCTION.....	1-1
2.0 SITE CHRONOLOGY.....	2-1
3.0 BACKGROUND.....	3-1
3.1 Physical Characteristics.....	3-1
3.2 Land and Resource Use.....	3-1
3.3 Basis for Remedial Action.....	3-1
4.0 REMEDIAL ACTIONS.....	4-1
4.1 System Operation/Operation and Maintenance.....	4-1
5.0 PROGRESS SINCE THE LAST REVIEW.....	5-1
6.0 FIVE YEAR REVIEW PROCESS.....	6-1
6.1 Administrative Components.....	6-1
6.2 Community Involvement.....	6-1
6.3 Document Review.....	6-1
6.4 Data Review.....	6-2
6.5 Site Inspection.....	6-3
6.6 Public Records.....	6-4
6.7 Interviews.....	6-4
7.0 TECHNICAL ASSESSMENT.....	7-1
7.1 Question A is the Remedy Functioning as Intended by the Decision Documents?.....	7-1
7.2 Question B are the Exposure Assumptions, Toxicity Data, Clean-Up Levels, and Remedial Action Objectives Used at the Time of the Remedy Selection Still Valid?.....	7-1
7.2.1 Changes in Standards and to be Considered (TBCs).....	7-1
7.2.2 Changes in Exposure Pathways, Toxicity, and other Contaminant Characteristics.....	7-1
7.3 Question C Has Any Other Information Come to Light That Calls into Question the Protectiveness of the Remedy?.....	7-1
7.4 Technical Assessment Summary.....	7-1
8.0 ISSUES.....	8-1
8.1 Five-Year Review Issues and Recommendations.....	8-1
9.0 PROTECTIVENESS STATEMENT.....	9-1
10.0 NEXT REVIEW.....	10-1
11.0 REFERENCES.....	11-1

**TABLE OF CONTENTS (continued)**

**APPENDICES**

Appendix A   Signature Deadline Extension  
Appendix B   Site Inspection Checklist  
Appendix C   Site Photographs  
Appendix D   Site Interviews

**TABLES**

2-1   Chronology of Site Events ..... 2-2

**FIGURES**

3-1   Site Location Map .....3-6  
3-2   Site Layout Map.....3-7  
3-3   Site Features Map .....3-8

## LIST OF ACRONYMS

AFFF	Aqueous Film Forming Foam
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirements
BHRA	Bay Head Road Annex
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COPC	Contaminants of Potential Concern
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
CTA	Children's Theatre of Annapolis
DDD	Dichloro-diphenyl-dichloroethane
DDE	Dichloro-diphenyl-dichloroethylene
DDT	Dichloro-diphenyl-trichloroethane
DOD	Department of Defense
EBS	Environmental Baseline Survey
EPA	U.S. Environmental Protection Agency
ERC	Ecological Risk Characterization
FOST	Finding of Suitability to Transfer
HHRA	Human Health Risk Assessment
HI	Hazard Index
H&S	H&S Environmental, Inc.
HQ	Hazard Quotient
IR	Installation Restoration
JMWA	J.M. Waller Associates, Inc.
LUCs	Land-Use Controls
MDE	Maryland Department of the Environment
msl	mean sea level
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NSWC	Naval Surface Warfare Center
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PFBS	perfluorobutanesulfonic acid
PFCs	perfluorinated compounds
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
RAO	Remedial Action Objective
RBC	Risk-Based Concentration
RfD	Reference Dose Factor
RI	Remedial Investigation

**(LIST OF ACRONYMS, CONTINUED)**

ROD	Record of Decision
RPM	Remedial Project Manager
SI	Site Inspection
µg/L	micrograms per liter
USGS	U.S. Geological Survey

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## Five-Year Review Summary Form

SITE IDENTIFICATION		
<b>Site Name:</b> Former Naval Surface Warfare Center - Carderock Division, Annapolis Detachment (Former Bay Head Road Annex, IR Program Site 1)		
<b>EPA ID:</b> MD3170000167		
<b>Region:</b> 3	<b>State:</b> MD	<b>City/County:</b> Annapolis, Anne Arundel County
SITE STATUS		
<b>NPL Status:</b> Non-NPL		
<b>Multiple OUs?</b> No	<b>Has the site achieved construction completion?</b> Yes	
REVIEW STATUS		
<b>Lead agency:</b> Other Federal Agency <b>If "Other Federal Agency" was selected above, enter Agency name:</b> Department of the Navy		
<b>Author name (Federal or State Project Manager):</b> Mr. David Steckler, Remedial Project Manager		
<b>Author affiliation:</b> Naval Facilities Engineering Command Washington		
<b>Review period:</b> February 2015 – February 2020		
<b>Date of site inspection:</b> September 11, 2019		
<b>Type of review:</b> Statutory		
<b>Review number:</b> 4		
<b>Triggering action date:</b> February 12, 2015		
<b>Due date (five years after triggering action date):</b> 12 May 2020 (due to 3-month extension granted by MDE)		



## Five-Year Review Summary Form (continued)

### Issues/Recommendations Identified in the Five-Year Review:

The previous Five-Year Review concluded with the following recommendation: “The potential presence of PFOA and PFOS in groundwater should be evaluated prior to the next FYR.” In response to that recommendation, the Navy conducted a remedial investigation (RI) at the former BHRA. The results are presented in the *Draft Final Phase 1 Remedial Investigation Report Former Burn Pad, Former Bay Head Road Annex, Annapolis, Maryland*.

The 2020 RI report noted that “the only potentially unacceptable risk identified was for a hypothetical future resident, consuming groundwater as daily drinking water.” The report also noted that “future actions are warranted to supplement the data generated and analyzed in this investigation, in particular for groundwater that was determined to be impacted due to historic releases in the former Burn Pad Area at the Site. Additional investigation activities will refine the conceptual site model (CSM), including defining the nature and extent of PFAS groundwater impacts. These activities should include the completion of additional sampling of on- and off-site groundwater through temporary or permanent (monitoring wells) sampling points. Following completion of the additional activities, in accordance with the CERCLA process, the CSM and risk assessment will be updated as part of a RI Addendum.”

### Issue Category: Changed Site Conditions

**Issue:** New information identified PFAS in groundwater at the site boundary.

**Recommendation:** Navy intends to conduct additional investigation activities to refine the conceptual site model (CSM), including defining the nature and extent of PFAS groundwater impacts and potential unacceptable risks.

Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	Federal Facility	State	Ongoing

## Sitewide Protectiveness Statement

*The protectiveness statements for the former BHRA is summarized below.*

1. Site 1 – Bay Head Road Annex	<i>Protectiveness Determination:</i> <ul style="list-style-type: none"><li>• Short-Term Protective</li></ul>	<i>Due Date:</i> NA
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***Protectiveness Statement:***

The original remedy of ICs at the former BHRA is protective of human health and the environment. The final remedy is functioning as intended. With respect to the original site contaminants, the exposure assumptions, toxicity data, clean-up levels, and RAOs used at the time of the final remedy selection are still valid.

With respect to PFAS, the remedy at Site 1 is protective of human health and the environment in the short term. There is no drinking water exposure and the Code of Maryland Regulations prohibits the installation of new drinking water wells within 100 feet of a known source of contamination (COMAR 26.04.04.04). The Navy will continue evaluating options to achieve long-term protectiveness for the affected properties.

Signature of U.S. Department of the Navy and Date:

Willington Lin  
U.S. Navy



Base Environmental Coordinator,  
BRAC Program Office

Date 22 July 2020

## EXECUTIVE SUMMARY

This document presents the findings of the Fourth Five-Year Review Report for the Installation Restoration (IR) Site 1, Former Bay Head Road Annex (BHRA), Naval Surface Warfare Center (NSWC) – Carderock Division, Annapolis Detachment located in Anne Arundel County in Annapolis, Maryland. The final remedy for the site consisted of an institutional control in the form of a deed restriction which prohibited permanent residential land use in order to protect human health.

The remedy of institutional controls (deed restriction prohibiting residential use) for the former BHRA is protective of human health and the environment in the short-term. The remedy is functioning as intended. The current and expected future land use as a public park is consistent with the institutional controls established for the site. However, per- and polyfluoroalkyl substances (PFAS) identified in environmental media on- and off-site necessitate an additional land-use control, prohibiting the use of shallow groundwater as a drinking water source in the immediate vicinity of the groundwater plume.

The prior (2015) Five-Year Review identified a potential concern related to the former use of aqueous film forming foam (AFFF) at the burn pad and in a laboratory that previously existed at the former BHRA. Per- and polyfluoroalkyl substances (PFAS), the class of chemicals in AFFF, are considered emerging contaminants and their potential health risks are being examined by the United States Environmental Protection Agency (USEPA). Given the past use of AFFF at Site 1, the Navy completed a recent Remedial Investigation (RI) for PFAS on the BHRA property. The results are presented in the *2020 Draft Final Phase 1 Remedial Investigation Report Former Burn Pad, Former Bay Head Road Annex, Annapolis, Maryland* (Navy, 2020).

The site inspection, document review, and site interviews performed for this Five-Year Review have not identified any information that would call into question the protectiveness of the remedy. However, the results of the 2020 RI suggest that an additional land-use control is needed to protect human health in the long-term.

## 1.0 INTRODUCTION

This document presents the results of the Fourth Five-Year Review, undertaken to determine whether the final remedy at the former Bay Head Road Annex (BHRA), IR Site 1, NSWC – Carderock Division, Annapolis Detachment, Annapolis, Maryland is short-term protective of human health and the environment. The methods, findings, and conclusions of these evaluations required every five years are documented in Five-Year Review reports.

The Navy prepared this Five-Year Review report pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121 states:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section 104 or 106, the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The United States Environmental Protection Agency (USEPA) clarified this requirement further in the NCP; 40 Code of Federal Regulations (CFR) §300.430(f)(4)(ii) states:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such actions no less often than every five years after the initiation of the selected remedial action.*

A site inspection was conducted on September 11, 2019. This Five-Year Review was conducted in accordance with USEPA guidance (USEPA, 2001) and Navy policy (Department of the Navy, 2001c).

This is the fourth Five-Year Review for the former BHRA former NSWC Annapolis. The triggering action for this statutory review was the signing of the Third Five-Year Review Report on February 12, 2015. The Five-Year Review is required because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

The triggering action for this statutory review was the signing of the third Five-Year Review Report on February 12, 2015. The review is required because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure. As of November 13, 2019, the signature deadline for this fourth Five-Year Review was extended to May 12, 2020 by letter from the Maryland Department of the Environment to the U.S. Navy (Appendix A). For the fifth (next) Five-Year Review, the signature date will revert to the previous triggering action date of February 12, 2015.

## 2.0 SITE CHRONOLOGY

After World War II, the Army recognized the need for an air defense system capable of engaging high-speed, maneuverable targets. In 1945, the Army initiated a research and development program for the Nike I defensive missile system to protect major metropolitan areas and strategic military installations from aerial attack. During the mid-1950s, the Department of the Army purchased the parcel of land to be used as a Launch Area in the Nike Missile Defense System for the cities of Annapolis and Washington, DC.

The Bay Head Road Annex Launch Area, designated W-26 Nike Battery, was used by the Army for Nike missile defense operations from 1954 until 1969. Maintenance activities by the Army during that sixteen-year period required the storage, handling, and disposal of missile components and propellants as well as solvents, fluids, fuels, and other materials necessary for operations and maintenance. Hazardous materials and waste were commonly generated at Nike missile sites and often disposed of onsite.

Several former Nike missile site structural features remain onsite, including one former missile launching pad and separate fueling, generator, assembly, storage, and wastewater disposal areas. The missile launching pad consists of one concrete structure, approximately 17 feet deep, which was used to store the missiles.

After Nike Battery deactivation, the Facility was used by the Navy to conduct burn tests to determine heat resistant properties of materials for use onboard Navy ships. Materials were burned in a level concrete pad and analyzed for off-gas production and fire hazard potential. The Navy's operations at the Facility ended in the late 1990s. In 1999, the Children's Theatre of Annapolis (CTA) officially became a tenant from the Department of Defense (DOD) and used the former Navy buildings for set construction and storage.

At the time of the site inspection from the First Five-Year Review in March 2004, nearly all of the Facility had been developed, cleared of trees, and only a small portion remained covered in natural vegetation. Facility access was restricted by fencing, though access remained to areas formerly used by the Army and the Navy. Separate areas existed for recreational activities with two baseball fields, a picnic pavilion, and a restroom/locker room located in the southern portion of the Facility. A septic system was located between the ball fields. This septic system, which included drain and leaching fields, served the pavilion between the two baseball fields.

The first demolition of several former Navy buildings began in November 2006. In total, nine buildings, two former missile launching pads, the pavilion, septic field, burn pad, and evaporation pond have all been demolished and/or removed from the property. Specifically, two former missile launching pads have been covered to form a parking lot for the children's theater. The pavilion between the former baseball fields has been removed. The baseball fields and former septic field have been replaced by three soccer fields. Old fencing along the western boundary of the property has been replaced by new fencing. The soccer fields began development in Spring 2008 and were completed in September 2008. Permanent light structures were built in April 2009. A children's playground was constructed in April 2010.

In response to the findings of the previous Five-Year Review, the Navy conducted an RI beginning in 2016 and completed in 2020 with the publication of the draft final 2020 RI report.

The review period for this Fourth Five-Year Review Report is from February 2015 to February 2020. The date of the site inspection was September 11, 2019. Table 2-1 summarizes the site chronology.

**TABLE 2-1****CHRONOLOGY OF SITE EVENTS  
FORMER NSWC ANNAPOLIS  
ANNAPOLIS, MARYLAND**

<b>Event</b>	<b>Date</b>
Bay Head Road Annex Launch Area, designated W-26 Nike Battery, was used by the Army for Nike missile defense operations	1954 - 1969
Property transferred from Army to Navy	1971
Navy conducted research related to burn testing	1972 – 1981
Property used as equipment/supply storage facility	1981 – 1985
Two Preliminary Assessment (PA) Reports were prepared for the Navy	1985 and 1990
Navy conducted a Site Inspection (SI) in accordance with the recommendations identified in the 1990 PA	1991
Phase I Environmental Baseline Survey (EBS) was performed	1995
Children's Theatre of Annapolis becomes tenant of property	1999
Remedial Investigation (RI) was performed	2000
Record of Decision (ROD) completed and signed	2001
Finding of Suitability to Transfer (FOST) completed and signed	2001
Facility transferred from the Department of Defense to Anne Arundel County	2004
First Five-Year Review Completed and Signed	2005
Demolition and removal of former Navy buildings began	2006
Construction of auditorium for the Children's Theatre of Annapolis completed	2008
Three soccer fields installed on property	2008
Permanent light structures installed for soccer fields	2009
Second Five-Year Review Completed and Signed	2010
Construction of a new children's playground and walking/bike path	2010
Third Five Year Review Completed and Signed	2015
Initiated PFAS RI	2016
Published draft Final RI report	2020
Fourth Five Year Review Completed and Signed	2020

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## **3.0 BACKGROUND**

### **3.1 PHYSICAL CHARACTERISTICS**

The former Bay Head Road Annex site consists of a tract of land approximately 24 acres in size, located on the peninsula between the Magothy and Severn Rivers, less than two miles from the Chesapeake Bay. Figure 3-1 shows the location of the Bay Head Road Annex in relation to the surrounding area. The topographic relief across the property is approximately 15 feet, ranging from 13 to 28 feet above mean sea level (msl). The lowest elevations are in the northeast portion of the site, which borders an unnamed tributary to the Little Magothy River. The highest elevations are found in the eastern portion of the property centered on the three former missile magazines. The property is relatively flat but has a gradual decrease in grade to the northeast, coinciding with the unnamed tributary noted above. Two north-trending, shallow, grass-lined swales provide surface water drainage. The western swale encircles the former septic system and drains to the north where it intersects with an east-trending swale that discharges to the sodded area along the northern property boundary. The eastern swale is less pronounced and discharges both along the eastern and northeastern property boundaries.

The property is underlain by interbedded clay, silt, and sand, identified as the Talbot Formation (Department of the Navy, 2001b). Depth to groundwater varies from 16 feet in the southeast portion of the site to 9 feet in the northwest. Flow is toward the unnamed tributary at an estimated velocity of 0.48 feet per day (Department of the Navy, 2001b).

### **3.2 LAND AND RESOURCE USE**

Residential areas to the north and west surround the former Bay Head Road Annex. U.S. Routes 50 and 301 are located south of the site with undeveloped land, residential areas, and Sandy Point State Park to the east. Current land use at the property is recreational as a public park. There are three soccer fields used by youth athletic teams and permanent lighting structures around the fields. There are no residences on the property, nor are there plans for future residential use. Figure 3-2 shows a layout of the property using the aerial imagery from 2007. Figure 3-3 shows the aerial imagery with the property boundaries and several highlighted areas.

There are no permanent water bodies at the site. Surface water runoff from the site is directed to the storm water drainage system with discharge to the drainage basin of the Little Magothy River and ultimately to the Chesapeake Bay.

### **3.3 BASIS FOR REMEDIAL ACTION**

The need for remedial action at the former Bay Head Road Annex was based on site history, the nature and extent of contamination, and the results of human health and ecological risk assessments. Each of these is discussed in the following sections.

#### **History of Contamination**

Two Preliminary Assessment (PA) Reports were prepared for the Facility in 1985 and 1990 by the Navy. The PAs identified potential locations of contamination (e.g., missile assembly building, missile fueling and war heading area, transformer locations, magazine drainage area, septic system, possible disposal areas, etc.). Test results of soil and sediment sampling from the 1985 PA revealed low levels of toluene, a common degreasing solvent, and the pesticide Dichlorodiphenyltrichloroethane (DDT) and its breakdown products Dichloro-diphenyl-



dichloroethane (DDD) and Dichloro-diphenyl-dichloroethylene (DDE) in several of the samples collected. The results of the 1985 groundwater sampling revealed low concentrations of oil and grease in one of the two samples collected. The 1990 PA concluded with recommendations for further evaluation in accordance with the Superfund Site Assessment process. Therefore, the former Bay Head Road Annex facility was officially established as IR Site 1, and a Site Inspection (SI) was scheduled under the Navy's IR program.

In 1991, the Navy conducted an SI in accordance with the recommendations identified in the 1990 PA to evaluate potential groundwater, surface water, sediment, and soil contamination. The SI concluded that low levels of inorganic metals and organic contaminants were present in soil, sediment, surface water and groundwater at the site. The analytical results for metals in surface soil samples were compared with published background concentrations, and were reported at levels that did not exceed background ranges established by the U.S. Geological Survey (USGS). The organics, specifically the polycyclic aromatic hydrocarbons (PAHs), were within ranges representative of urban areas; therefore, a Remedial Investigation (RI) was not recommended due to the low concentrations reported, and the lack of an active source of contamination.

A Phase I Environmental Baseline Survey (EBS) was conducted in 1995, as the site was scheduled for closure under the Base Realignment and Closure (BRAC) IV program. The purpose of the Phase I EBS was to assess the existing environmental information related to storage, release, treatment, or disposal of hazardous substances or petroleum products and to document the environmental condition of the property. The septic system located near the center of the site was identified in the EBS as an Area of Concern (AOC) due to the potential introduction of metals from the overflow of a thermal metal coating process used by the Navy. A further assessment was deemed necessary to determine the nature and extent of potential contaminants on site and if current and future exposures to the contaminants posed human and/or ecological risks based on the proposed recreational land use.

An RI was recommended in the 1995 EBS to further assess the septic system and the surrounding environment. The 2000 RI consisted of sampling surface and subsurface soil, sediment, and groundwater (EA Engineering, 2000). An assessment of the inactive septic system was also conducted, including collection of sludge and leaching well soil and water samples. Analytical sample results were compared to the EPA's Region III Risk-Based Concentrations (RBCs) and ecologically-based screening values. RBCs were developed using highly conservative exposure scenarios suggested by the EPA and the best available toxicological data. They represent conditions that are protective of human health. The ecologically-based screening values are designed to be protective of animal organisms.

More recently a RI was completed in 2020 to determine the nature and extent of PFAS contamination in environmental media and to quantify potential risks (Navy, 2020).

### **Description of Contamination**

A number of preliminary human and ecological chemicals of potential concern (COPCs) were identified in the 2000 RI after screening the analytical results against the identified human and ecological risk screening criteria. Organic and inorganic compounds with concentrations that exceeded the human and ecological risk screening criteria were identified as COPCs and the corresponding sample locations were plotted on a site drawing. Since the highest chemical concentrations are typically found closest to the source, sample concentrations were evaluated with respect to location to identify potential source areas.

Consequently, two potential source areas with elevated human and ecological contaminants were identified: the bermed evaporation pond southwest of the former burn pad with PAHs as a concern

for humans, and the surface area in the vicinity of soil sample S-5 with pesticides as an ecological concern. Although elevated levels of some metals and PAHs in individual surface soil samples appeared to be greater than background concentrations (indicating they occurred as a result of site-related activities), no additional source areas were identified.

An evaluation of the potential fate and transport of contaminants was conducted by EA Engineering, Science, and Technology, Inc. (EA). Each contaminant was assessed for its potential for future migration by sediment and soil erosion and leaching from soil by precipitation. Contaminant migration was assessed for groundwater, surface water, and air. In summary, it was determined that contaminants could leach from soil and sediment, and surface water and groundwater could transport contaminants offsite. However, potential down gradient groundwater exposures were deemed low due to the low-level concentrations of the contaminants and the relative immobility of metals and pesticides in groundwater. Contaminant transport in air was not considered a significant pathway due to soil cover, soil type, and general high moisture content.

The recent 2020 RI identified PFAS in all environmental media at the former BHRA, originating at the former burn pad and migrating to the north and west via shallow groundwater.

## **Summary of Human and Ecological Risks**

A Human Health Risk Assessment (HHRA) and Ecological Risk Characterization (ERC) were conducted as part of the 2000 RI to assess the human health and ecological risks that could result if the contamination at the site were not remediated. The HHRA was prepared to evaluate the magnitude of potential adverse effects on human health associated with current or future recreational and residential exposures to site-related chemicals. The ERC was conducted to characterize the potential threats to ecological receptors posed by contaminants at the site.

### **Human Health Risks**

The site was evaluated for potential risks to people who used the site at the time of the assessment as well as people who may use the site in the future. Cancer and non-cancer risks were calculated based on current and future land use at the site, which is recreational. Potentially exposed population groups for the assessment included recreational users, community gardeners, maintenance workers, construction workers, and adult and child residents. The results of the assessment indicated that there were no unacceptable risks to any of these populations. It should be noted, however, that the residential scenario only included exposure to groundwater and did not include exposure to soil and sediment.

### **Exposure Assessment**

Onsite and offsite recreational users (ages one to five and six to fifteen), community gardeners (children and adults), maintenance workers, construction workers, and adult and child residents (groundwater only) were the potential receptors evaluated in the risk assessment. No unacceptable cancer or non-cancer risks were calculated for the identified receptor populations based on reasonable maximum exposures.

### **Toxicity Assessment**

Carcinogenic risk was calculated based on cancer slope factors (CSFs) developed by the EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CSFs are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of lifetime cancer risk associated with exposure at that intake level. The "upper-bound" reflects the conservative estimate

of the risks calculated from the CSFs. Using this approach makes under-estimates of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies of chronic animal bioassays to which animal-to-human extrapolation and uncertainly factors have been applied. No cancer risks in excess of the EPA identified acceptable range of  $10^{-4}$  through  $10^{-6}$  were identified for any receptor population evaluated.

The evaluation of non-carcinogenic effects is based on the Hazard Index (HI), which is the summation of the Hazard Quotients (HQs) for individual chemicals. The HQ is a comparison of chemical-specific chronic exposure doses with the corresponding protective doses derived from health criteria. EPA recommends that remedial actions may be warranted for sites where the HI is greater than 1.0. No non-cancer risks with an HI in excess of 1.0 were identified for any receptor population evaluated.

In summary, no unacceptable cancer or non-cancer risks were calculated for the identified receptor populations based on reasonable maximum exposures.

The 2020 (PFAS) RI compared validated soil, groundwater, sediment, and surface water sample results against human health screening levels for the following current and reasonable future land-use scenarios and receptors:

- Current/future recreational user (adult/child)
- Current/future outdoor (commercial/industrial) worker
- Future construction/excavation/utility worker
- Hypothetical future on-site resident (adult/child)

Findings of the 2020 human health assessment indicated that would be an unacceptable risk to a hypothetical future resident using groundwater underlying the site as a source of drinking water.

### Ecological Risk Characterization Results

An ERC conforming to Steps 1 and 2 of the eight-step ecological risk assessment process for Superfund was completed to assess potential risks to ecological receptors from contaminant exposure. These steps included a screening-level problem formulation, ecological effects evaluation, exposure estimate, and risk calculation. The results indicated that ecological screening criteria were exceeded for maximum concentrations of seven metals including aluminum, antimony, cadmium, lead, manganese, silver, and zinc; the polychlorinated biphenyl (PCB) Aroclor 1260; and pesticides 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. When mean concentrations were used, six chemicals fell below the screening level, indicating that even slightly elevated analyte concentrations were not widespread at the site. Only the concentration of 4,4'-DDT indicated a potential problem. The highest concentration of 2.7 mg/kg was found at soil sample S-5, but it was an order of magnitude greater than the values at any other location. This indicated a point source problem that increased potential ecological risk. However, the overall ecological risks were minimal because the value only slightly exceeded the potential risk threshold. Also, the affected area in the vicinity of S-5 was small and represented minimal wildlife habitat. Down-gradient samples were collected and DDT concentrations were non- detectable. The 2000 RI revealed little evidence of significant DDT transport via surface water, groundwater, or air.

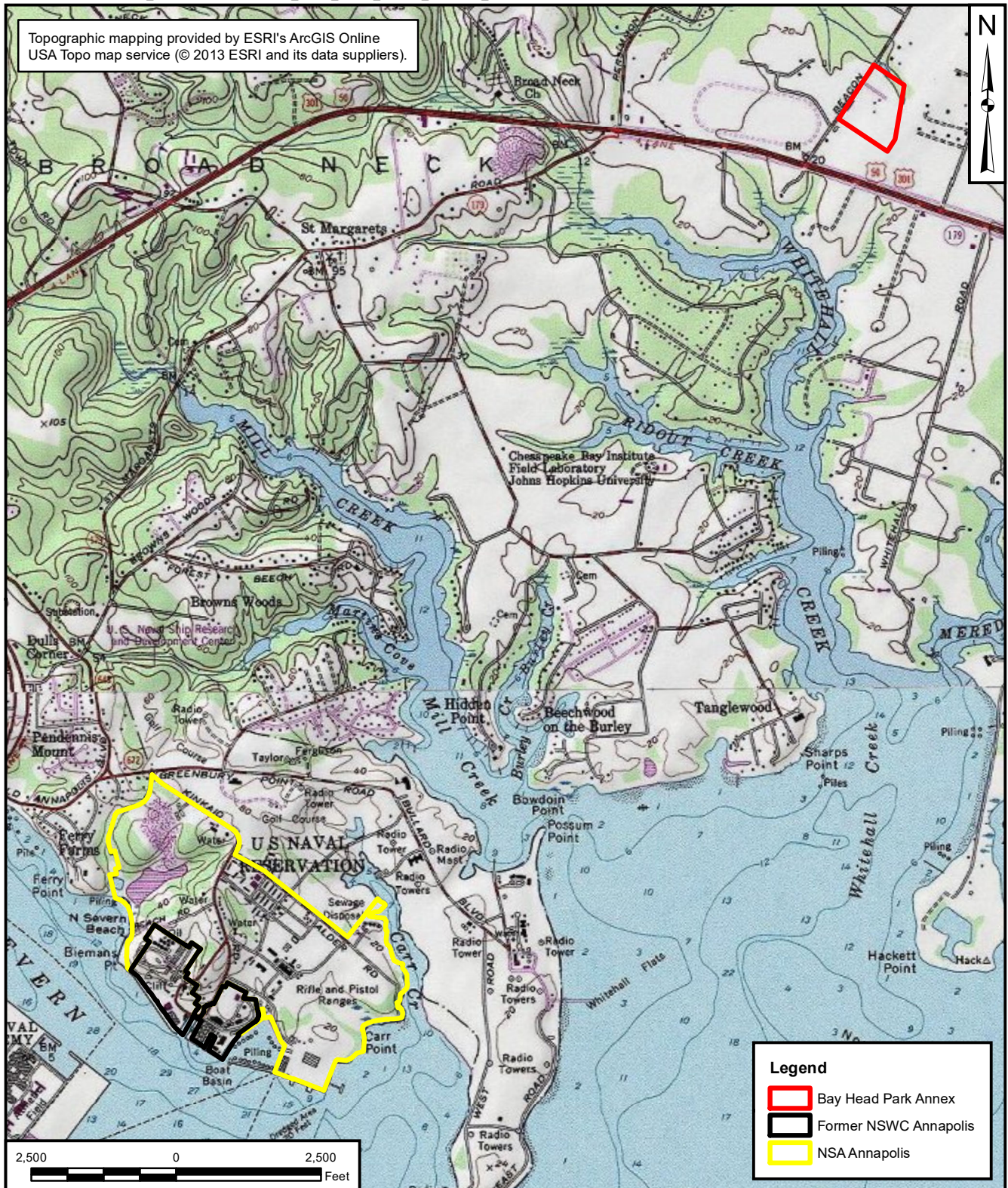
Therefore, based on these conclusions, no unacceptable ecological risk was identified.

The 2020 (PFAS) RI included an evaluation of the validated soil, sediment, and surface water sample results for exposure pathways for plants, invertebrates, birds and mammals using the multi-tiered ecological risk assessment process. This resulted in the identification of the following pathways for further evaluation:

- Terrestrial birds and mammals – PFOS in soil
- Aquatic-dependent birds and mammals – PFOS and PFOA in surface water

Results of the subsequent evaluations concluded that these pathways are complete but insignificant, based on available screening levels.





DRAWN BY	DATE
J. ENGLISH	8/11/14
CHECKED BY	DATE
A. McGIVNEY	8/11/14
REVISED BY	DATE
P. O'BRIEN	10/30/19
SCALE	
AS NOTED	



**SITE LOCATION MAP**  
**BAY HEAD ROAD ANNEX**  
**FORMER NSWC ANNAPOLIS**  
**ANNAPOLIS, MARYLAND**

CONTRACT NUMBER	TO NUMBER
16-D-0322	009
APPROVED BY	DATE
APPROVED BY	DATE
FIGURE NO.	REV
FIGURE 3-1	1





DRAWN BY	DATE
J. ENGLISH	08/11/14
CHECKED BY	DATE
A. McGIVNEY	10/30/19
REVISED BY	DATE
P. O'BRIEN	10/30/19
SCALE AS NOTED	



**SITE LAYOUT MAP**  
**BAY HEAD ROAD ANNEX**  
**FORMER NSWC ANNAPOLIS**  
**ANNAPOLIS, MARYLAND**

CONTRACT NUMBER 16-D-0322	TO NUMBER 009
APPROVED BY _____	DATE _____
APPROVED BY _____	DATE _____
FIGURE NO. FIGURE 3-2	REV 1





DRAWN BY	DATE
J. ENGLISH	08/12/14
CHECKED BY	DATE
A. McGIVNEY	10/30/19
REVISED BY	DATE
P. O'BRIEN	10/30/19
SCALE AS NOTED	



**SITE FEATURES MAP**  
**BAY HEAD ROAD ANNEX**  
**FORMER NSWC ANNAPOLIS**  
**ANNAPOLIS, MARYLAND**

CONTRACT NUMBER 16-D-0322	TO NUMBER 009
APPROVED BY _____	DATE _____
APPROVED BY _____	DATE _____
FIGURE NO. FIGURE 3-3	REV 1

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## 4.0 REMEDIAL ACTION

The results of the human and ecological risk assessments completed for the former BHRA revealed no unacceptable levels of risk based on the identified industrial/commercial, recreational, and construction worker levels of exposure. A residential risk assessment for soil at the former BHRA was not evaluated. Given the exposure assumptions developed for the human health risk assessment, the primary remedial action objective was to prevent land use that may permit human exposures greater than those associated with recreational use. Under this remedy, an institutional control as a deed restriction prohibiting future residential development was implemented at the time of property transfer.

The ROD states in Section 9.1 that, *“institutional controls will be implemented to restrict future use of the site to non-residential use. The deed restrictions will be detailed in the FOST.”* The covenant and restriction regarding permanent residential use that was incorporated into the transfer deed from the Finding of Suitability to Transfer (FOST) [Department of the Navy, 2001c] states:

*“Covenant and Restriction Regarding Permanent Residential Use:*

*GRANTEE is prohibited from using PREMISES for permanent residential purposes. GRANTEE hereby covenants, on behalf of itself, its successors, and its assigns, that no permanent residence shall be constructed or otherwise developed on the PREMISES and that no portion of the PREMISES shall be used as a permanent residence.” (US Navy, 2001a.)*

The ICs were verified in the transfer deed. Copies of the deed are on file at the Anne Arundel County Courthouse at the Department of Public Land Records.

The selected remedy protects human health by prohibiting future residential use, thereby limiting human exposure to contaminants present at the site.

The selected remedy is in full compliance with Applicable or Relevant and Appropriate Requirements (ARARs) and provides long-term effectiveness and permanence. The selected remedy poses no risk to the community during its implementation.

The remedial action is to be reviewed at least once every five years to re-evaluate site conditions, confirm the presence of ICs, and determine the need for further remedial action to protect human health.

### 4.1 SYSTEM OPERATION/OPERATION AND MAINTENANCE

There are no active remedial systems in operation at the BHRA Annapolis. The remedy is ICs. There have been no operation and maintenance costs incurred to date.

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## 5.0 PROGRESS SINCE THE LAST REVIEW

This is the Fourth Five-Year Review Report for the former BHRA. There have been no significant changes in property use since the previous Five-Year Review.

Issues identified during the first three Five-Year Reviews have been corrected or are no longer applicable; these include previously observed openings in fences surrounding the property and former missile area, and former missile hatch doors not being secured. Two of the three former missile silo hatch covers are no longer present and were paved over by the current property owner for the purpose of constructing the primary parking area for the theater and park. The hatch that remains, near Building 205, is enclosed by a locked fence and was secured and barred shut during the 2019 inspection.

Due to the finding of the third Five-Year review regarding the Navy's historic use of AFFF at the former BHRA, the Navy conducted a CERCLA RI at Bay Head Park, beginning in 2016. The objective of the investigation was to define the nature and extent of PFAS contamination in on- and off-site environmental media and to quantify the potential human health and ecological risks associated with PFAS impacts. The results of the RI are presented in the *Draft Final Phase 1 Remedial Investigation, Former Burn Pad, Former Bay Head Road Annex, Annapolis, Maryland* (Navy, 2020), which is available at:

[https://www.bracpmo.navy.mil/brac\\_bases/northeast/Former\\_Naval\\_Surface\\_Warfare\\_Center\\_Annapolis/documents.html](https://www.bracpmo.navy.mil/brac_bases/northeast/Former_Naval_Surface_Warfare_Center_Annapolis/documents.html). A summary is presented in Section 6.4.

There were no other issues identified during this Five-Year Review related to site operations or implementation of the remedy. The Navy is working closely with its state regulatory partner, the Maryland Department of the Environment (MDE), as well as the Anne Arundel County Department of Environmental Health, regarding future efforts pertaining to PFAS impacts on- and off-site.

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## 6.0 FIVE YEAR REVIEW PROCESS

### 6.1 ADMINISTRATIVE COMPONENTS

The USEPA and MDE were notified of the initiation of the Five-Year Review in August 2019. The NSWC Annapolis Five-Year Review team was led by Mr. David Steckler, the Remedial Project Manager (RPM) for the Navy. Ms. Linda Gustafson, the MDE RPM, participated in the review.

The following are components of the Five-Year Review:

- Community involvement
- Document review
- Data review
- Site inspection
- Five-Year Review report development and review

### 6.2 COMMUNITY INVOLVEMENT

A public notice was published in *The Baltimore Sun* newspaper on August 14, 2019 and the *Bowie Blade News* newspaper on August 15, 2019 that a Five-Year Review was being conducted for Former NSWC Annapolis, BHRA.

Upon completion of the Five-Year Review, notices will be sent to the same local newspapers indicating that the results of the review are available to the public at the location identified below:

U.S. Naval Academy  
Environmental Division  
Attn: Mr. Steve Godio  
Halligan Hall (Building 181)  
181 Wainwright Road  
Annapolis, MD 21402  
Phone: 410-293-1024  
[steven.godio@navy.mil](mailto:steven.godio@navy.mil)

### 6.3 DOCUMENT REVIEW

The Five-Year Review included a review of relevant documents. The documents reviewed included the following:

- EA Engineering, Science, and Technology, Inc. 2000. *Remedial Investigation, Naval Surface Warfare Center, Carderock Division-Annapolis Detachment, Bay Head Road Annex, IR Program Site 1, Annapolis, Maryland*. Final prepared for Department of the Navy Engineering Field Activity Chesapeake. January.
- EA Engineering, Science, and Technology, Inc., 2001. *Site Inspection Study, David Taylor Research Center, Bay Head Road Annex, Annapolis, Maryland*. October.

- Department of the Navy, Engineering Field Activity Chesapeake, 2001. *Finding of Suitability to Transfer (FOST) – Naval Surface Warfare Center, Carderock Division, Annapolis Detachment, Annapolis, Maryland.* May.
- Department of the Navy, Engineering Field Activity Chesapeake, 2001. *Record of Decision – Bay Head Road Annex, IR Program Site 1, Former Naval Surface Warfare Center-Carderock Division, Annapolis Detachment, Annapolis, Maryland.* March.
- Department of the Navy, Naval Facilities Engineering Command Washington, 2005. *Final Five-Year Review for Bay Head Road Annex, IR Program Site 1 – Former Naval Surface Warfare Center, Carderock Division, Annapolis Detachment, Annapolis, Maryland.* Completed by J.M Waller Associates. December 2004 (Navy signature May 24, 2005).
- Department of the Navy, Naval Facilities Engineering Command Washington, 2010. *Final Five-Year Review for Bay Head Road Annex, IR Program Site 1 – Former Naval Surface Warfare Center, Carderock Division, Annapolis Detachment, Annapolis, Maryland.* Completed by J.M Waller Associates. January 2010 (Navy signature March 4, 2010).
- Department of the Navy, Naval Facilities Engineering Command Washington, 2010. *Final Five-Year Review for Bay Head Road Annex, IR Program Site 1 – Former Naval Surface Warfare Center, Carderock Division, Annapolis Detachment, Annapolis, Maryland.* Completed by H&S Environmental. February 2015 (Navy signature February 12, 2015).
- Department of the Navy, 2020. *Draft Final Phase 1 Remedial Investigation, Former Burn Pad, Former Bay Head Road Annex, Annapolis, Maryland.* March.

## 6.4 DATA REVIEW

The remedy for the former BHRA involved a deed restriction to prohibit land from residential use. No documentation was found to indicate the intended current and future use (i.e., commercial/industrial use) plans for usage and development have changed. As noted previously, the ICs currently in-place on the property prevent residential use of the property.

Past reports were reviewed to evaluate operational history and identify environmental information that has been published since the previous Five-Year Review. Since the last Five-Year Review, the Navy completed a RI in 2020 to assess environmental impacts related to PFAS, a group of chemicals in AFFF identified as an emerging contaminant. EPA defines an emerging contaminant as a chemical or material characterized by a perceived, potential, or real threat to human health or the environment or by a lack of published health standards (EPA, 2013). A contaminant also may be "emerging" because of the discovery of a new source or a new pathway to humans.

The initial effort consisted of sampling two shallow, nearby, private drinking water wells for PFAS compounds including perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS). PFAS were not detected in either sample at or above laboratory detection limits.

The next phase focused on the former BHRA and its immediate down gradient/downstream

environs. Sampling consisted of collecting in-situ “grab” groundwater from various depths, surface and subsurface soil, sediment, and surface water samples. PFOS and PFOA concentrations in groundwater ranged from non-detect, up gradient of the source to the low 10s of micrograms per liter (µg/L) near the former burn pad. The EPA’s Lifetime Health Advisory level for combined PFOA and PFOS is 0.070 µg/L. The presence of PFOS and PFOA in groundwater does not present a risk to park users or those immediately down gradient. The park and nearby community receive their water from the county and there is have no direct access to groundwater. There are a small number of nearby private drinking water wells; however, those wells are screened in the deep Magothy Aquifer, which is extremely unlikely to be impacted by any surficial contamination.

PFAS constituents were also detected at all soil sample locations within/around, and all sediment samples downgradient of, the former burn pad. For PFOS (the chemical present at the highest level in BHRA soils), a screening value of 1,300 µg/kg was applied. This screening level was calculated based on default residential exposure assumptions using USEPA’s Regional Screening Level Calculator ([https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl\\_search](https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search), 2016). Detected concentrations, which ranged from 0.5 micrograms per kilogram (µg/kg) to 170 µg/kg total PFAS, were an order of magnitude lower than the risk-based screening level. Given that detected concentrations were below the conservative residential soil screening criteria, these soil/sediment results pose no current risk to current onsite users (including park/recreational users).

At the time of this fourth Five-Year Review, the Navy completed a comprehensive Phase I RI at the former BHRA (Navy, 2020). The document concluded by noting the following.

The only potentially unacceptable risk identified was for a hypothetical future resident, consuming groundwater as daily drinking water. Future actions are warranted to supplement the data generated and analyzed in this investigation, in particular for groundwater that was determined to be impacted due to historic releases in the former Burn Pad Area at the Site.

Additional investigation activities will refine the CSM, including defining the nature and extent of PFAS groundwater impacts. These activities should include the completion of additional sampling of on- and off-site groundwater through temporary or permanent (monitoring wells) sampling points. Following completion of the additional activities, in accordance with the CERCLA process, the CSM and risk assessment will be updated as part of a RI Addendum.”

## **6.5 SITE INSPECTION**

An inspection of the site was conducted on September 11, 2019. The purpose of the inspection was to assess the protectiveness of the remedy and to document that the ICs applied to the site are currently in place and effective.

The site was being used for recreational purposes as park athletic fields and for the Children’s Theater of Annapolis building. There was no evidence of residential buildings or residential activities on the site. Appendix B contains the Site Inspection Checklist. Photographs taken during the site inspection are included in Appendix C.

As discussed in Section 5, the issues identified in the 2004 Five-Year Review site visit were reviewed during the 2019 site visit. Access to the former missile silo area is prevented by a fence, and the hatch to the silo was secured. Based on the site inspection, no significant issues or deficiencies were identified. No residential developments are present on the site, and no activities were observed that would violate the institutional controls for the site.

## **6.6 PUBLIC RECORDS**

Land Records for Anne Arundel County are available digitally for public viewing on the county website, and digital land records set are obtained through the State of Maryland's online land records database, MDLANDREC ([www.Mdlandrec.net](http://www.Mdlandrec.net)). The land record volumes (deeds, land use agreements, assignments, etc.) kept by the Clerk of the Circuit Court for Anne Arundel County are maintained and indexed on MDLANDREC.net. A search was performed on MDLANDREC.net for the deeds and associated land use records for the site on November 5, 2019 the availability of these records was confirmed at the Anne Arundel County Clerk of the Circuit Court office in Annapolis, Maryland.

Transfer of the subject parcels from the United States of America to Anne Arundel County Maryland is recorded in Deed Book 15301, pp. 652-667, dated September 3, 2003. Section 7 of Enclosure 1 to the Deed (Covenants and Restrictions) includes the prohibition of future use of the property for residential purposes. The deed for the transferred property includes a "Notice of Environmental Condition" and incorporates by reference the environmental reports related to the site (e.g., the EBS, ROD, FOST, etc.). However, it should be noted that these environmental reports, incorporated by reference, are not recorded in the county's land records and are not available at the Clerk of the Circuit Court office. The grantee, Anne Arundel County, acknowledged receipt of these records by its executed acceptance of the deed. Any instrument recorded for future transfer of the property would be required to incorporate or reference the original covenant at a minimum, as well as subsequently identified environmental covenants and restrictions, if any.

The Anne Arundel County Department of Public Works indicated that the subject property uses municipal water. As such, any future request for a permit for water supply well installation at the facility would not be issued. There are no water supply wells on the former BHRA.

## **6.7 INTERVIEWS**

As part of the Five-Year Review process, interviews were conducted with key personnel, including representatives from the Navy and MDE. A representative for a current property tenant, the Children's Theater, declined to respond to an interview questionnaire. Copies of the interviews are contained in Appendix D. Responses in general were favorable and did not call into question the effectiveness of the remedy for the former BHRA.



## **7.0 TECHNICAL ASSESSMENT**

### **7.1 QUESTION A: IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?**

The review of documents, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the results of the site inspection indicate that the original remedy is functioning as intended by the ROD, with respect to the original site contaminants. The ICs placed on the site to prohibit residential development are in effect. The property is designated for recreational use by the Anne Arundel County Office of Planning and Zoning. In summary, the institutional controls are functioning as intended in preventing exposure to potential site-related contaminants at levels that may pose a risk to human health.

Future actions will be taken to address hypothetical future risk from PFAS in shallow groundwater.

### **7.2 QUESTION B: ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEAN-UP LEVELS, AND REMEDIAL ACTION OBJECTIVES (RAOS) USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?**

With respect to the original site contaminants, the exposure assumptions, toxicity data, and RAOs used for the remedy selection are still valid for the purposes of this five-year review. As reported in the 2015 Five-Year Review, the non-carcinogenic risks associated with iron and vanadium (based on the latest RfD values) would be slightly higher than that calculated during the 2001 RI. However, institutional controls have been implemented and maintained as part of the remedy to prevent unacceptable exposure to soils impacted by these COCs.

However, the results of the 2020 PFAS RI indicate a change in the exposure assumption. A hypothetical future resident, using groundwater as a drinking source would be exposed to an unacceptable risk. This risk is partially mitigated by the Code of Maryland Regulations, which prohibits the installation of new drinking water wells within 100 feet of a known source of contamination (COMAR 26.04.04.04).

### **7.3 QUESTION C: HAS ANY OTHER INFORMATION COME TO LIGHT THAT CALLS INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?**

The site inspection, document review, and interviews have identified no other information that would call into question the current protectiveness of the original remedy. However, the presence of PFAS in groundwater may necessitate an additional land-use control (LUC).

### **7.4 TECHNICAL ASSESSMENT SUMMARY**

According to the information presented herein, the final remedy is functioning as intended by the ROD. There have been no changes in the physical condition of the site or site use (current or expected future land use) that would affect the protectiveness of the remedy. As long as the ICs using deed restrictions to prohibit residential use remain in-place and are followed, risk levels to humans should remain within acceptable levels under current use.

However, the presence of PFAS in groundwater may necessitate an additional LUC to ensure long-term protectiveness.

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## 8.0 ISSUES/RECOMMENDATIONS

### 8.1 FIVE-YEAR REVIEW ISSUES AND RECOMMENDATIONS

The table below summarizes any issues and related recommendations identified as a result of completing this Five-Year Review.

Issues/Recommendations	
<b>OU(s) without Issues/Recommendations Identified in the Five-Year Review:</b>	
<p>The previous Five-Year Review concluded with the following recommendation: “The potential presence of PFOA and PFOS in groundwater should be evaluated prior to the next FYR.” In response to that recommendation, the Navy conducted a remedial investigation at the former BHRA. The results are presented in the 2020 <i>Draft Final Phase 1 Remedial Investigation Report Former Burn Pad, Former Bay Head Road Annex, Annapolis, Maryland</i>.</p> <p>The 2020 RI report noted that “the only potentially unacceptable risk identified was for a hypothetical future resident, consuming groundwater as daily drinking water.” The report also noted that “future actions are warranted to supplement the data generated and analyzed in this investigation, in particular for groundwater that was determined to be impacted due to historic releases in the former Burn Pad Area at the Site. Additional investigation activities will refine the conceptual site model (CSM), including defining the nature and extent of PFAS groundwater impacts. These activities should include the completion of additional sampling of on- and off-site groundwater through temporary or permanent (monitoring wells) sampling points. Following completion of the additional activities, in accordance with the CERCLA process, the CSM and risk assessment will be updated as part of a RI Addendum.”</p>	

Issue Category: Changed Site Conditions				
<b>Issue:</b> New information identified PFAS in groundwater at the site boundary.				
<b>Recommendation:</b> Navy intends to conduct additional investigation activities to refine the conceptual site model (CSM), including defining the nature and extent of PFAS groundwater impacts and potential unacceptable risks.				
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	Federal Facility	State	Ongoing

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## 9.0 PROTECTIVENESS STATEMENT

### Protectiveness Statement(s)

#### Protective Remedies:

The original remedy of ICs at the former BHRA is protective of human health and the environment. The final remedy is functioning as intended. With respect to the original site contaminants, the exposure assumptions, toxicity data, clean-up levels, and RAOs used at the time of the final remedy selection are still valid.

With respect to PFAS, the remedy at Site 1 is protective of human health and the environment in the short term. There is no drinking water exposure and the Code of Maryland Regulations prohibits the installation of new drinking water wells within 100 feet of a known source of contamination (COMAR 26.04.04.04). However, to achieve long-term protectiveness, the Navy intends to work with the affected landowners to implement a land-use control prohibiting the use of shallow groundwater.

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## **10.0 NEXT REVIEW**

The next Five-Year Review for the former NSWC Annapolis will be completed within five years of the original triggering action date of this report, or February 12, 2025.

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## 11.0 REFERENCES

EA Engineering, Science, and Technology, Inc., 1991. Site Inspection Study, David Taylor Research Center, Bay Head Road Annex, Annapolis, Maryland. October.

EA Engineering, Science, and Technology, Inc. 2000. Remedial Investigation, Naval Surface Warfare Center, Carderock Division-Annapolis Detachment, Bay Head Road Annex, IR Program Site 1, Annapolis, Maryland. Final prepared for Department of the Navy Engineering Field Activity Chesapeake. January.

EPA, 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. Interim Final. EPA 540-R-99-006. Edison, NJ.

EPA, 2001. Comprehensive Five-Year Review Guidance, Office of Emergency and Remedial Response, EPA-R-01-007. June.

EPA, 2013. Emerging Contaminants INTERNET Web Site. From <https://www.epa.gov/fedfac/emerging-contaminants-and-federal-facility-contaminants-concern>.

Department of the Navy 2001a. Navy/Marine Corps Policy for Conducting Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Statutory Five-year Reviews. November.

Department of the Navy, 2001b. Record of Decision (ROD), Bay Head Road Annex, IR Program Site 1, Former Naval Surface Warfare Center-Carderock Division, Annapolis Detachment, Annapolis, Maryland. May.

Department of the Navy, 2001c. Finding of Suitability to Transfer (FOST), Naval Surface Warfare Center-Carderock Division, Annapolis Detachment, Annapolis, Maryland. March.

Department of the Navy, 2005. Final Five- Year Review Report for Bay Head Road Annex, IR Program Site 1 – Former Naval Surface Warfare Center – Carderock Division, Annapolis Detachment, Annapolis, Maryland. Naval Facilities Engineering Command Washington. May.

Department of the Navy, Naval Facilities Engineering Command Washington, 2010. Final Five-Year Review Report for Bay Head Road Annex, IR Program Site 1 – Former Naval Surface Warfare Center – Carderock Division (prepared by Agviq-CH2MHill). May.

Department of the Navy, Naval Facilities Engineering Command Washington, 2015. Final Five-Year Review Report for Bay Head Road Annex, IR Program Site 1 – Former Naval Surface Warfare Center – Carderock Division (prepared by H&S Environmental). February.

Department of the Navy, 2020. Draft Final Phase 1 Remedial Investigation Report Former Burn Pad, Former Bay Head Road Annex, Annapolis, Maryland. March.

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## **APPENDIX A**

### **SIGNATURE DEADLINE EXTENSION**



# Maryland

## Department of the Environment

Larry Hogan, Governor  
Boyd K. Rutherford, Lt. Governor

Ben Grumbles, Secretary  
Horacio Tablada, Deputy Secretary

November 13, 2019

Mr. Paul F. Burgio  
Department of the Navy  
Base Realignment and Closure  
Program Management Office East  
4911 South Broad Street.  
Washington Navy Yard, 20374

RE: Former Bay Head Road Annex – 2020 Five Year Review Extension Request

Dear Mr. Burgio:

The Federal Facilities Installation Restoration Program of the Maryland Department of the Environment has reviewed your request to extend the signature due date of the 2020 Five Year Review for the Bay Head Annex site to May 12, 2020. The request is approved, with the caveat that the signature due date of the next Five Year Review for this site will revert back to February 12, 2025.

If you have any questions, please contact me at (410) 537-4238.

Sincerely,

A handwritten signature in cursive script that reads "Linda Gustafson".

Linda Gustafson  
Remedial Project Manager  
Federal Facilities Installation Restoration Program

cc: Mr. David Steckler, Remedial Project Manager, NAVFAC Washington  
Mr. Ira May, Chief, Federal Assessments and Remediation Division

**APPENDIX B**  
**SITE INSPECTION REPORT**

**APPENDIX B**  
**FORMER BAY HEAD ROAD ANNEX**  
**ANNAPOLIS, MARYLAND**  
**PAGE 1 OF 15**

<b>I. SITE INFORMATION</b>	
<b>Site name:</b> <b>Former NSWC Annapolis</b>	<b>Date of inspection:</b> <b>September 11, 2019</b>
<b>Location and Region:</b> <b>Annapolis, MD</b>	<b>EPA ID:</b> <b>NA</b>
<b>Agency, office, or company leading the five-year review:</b> <b>NAVFAC Washington</b>	<b>Weather/temperature:</b> <b>Sunny, 89°F</b>
<b>Remedy Includes:</b> (Check all that apply) <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 45%;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____ </div> <div style="width: 45%;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls </div> </div>	
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached	
<b>II. INTERVIEWS</b> (Check all that apply)	
<b>1. O&amp;M site manager</b> _____ <b>NA</b> _____ <div style="display: flex; justify-content: space-between; margin-left: 150px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
<b>2. O&amp;M staff</b> _____ <b>NA</b> _____ <div style="display: flex; justify-content: space-between; margin-left: 150px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	

**APPENDIX B**  
**FORMER BAY HEAD ROAD ANNEX**  
**ANNAPOLIS, MARYLAND**  
**PAGE 2 OF 15**

3.	<b>Local regulatory authorities and response agencies</b> (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.
<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;">Agency</div> <div style="width: 40%; border-bottom: 1px solid black;">Department of the Navy</div> <div style="width: 20%;"></div> <div style="width: 20%;"></div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 20%;">Contact</div> <div style="width: 40%; border-bottom: 1px solid black;">Dave Steckler</div> <div style="width: 20%; border-bottom: 1px solid black;">RPM</div> <div style="width: 20%; border-bottom: 1px solid black;">09/11/19 202-365-0241</div> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <div style="width: 20%;">Name</div> <div style="width: 40%;">Title</div> <div style="width: 20%;">Date</div> <div style="width: 20%;">Phone no.</div> </div> <div style="border-bottom: 1px solid black; padding-top: 5px;"> Problems; suggestions; <input checked="" type="checkbox"/> Report attached (See Appendix C) No problems noted </div>	
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<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;">Agency</div> <div style="width: 40%; border-bottom: 1px solid black;"></div> <div style="width: 20%;"></div> <div style="width: 20%;"></div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 20%;">Contact</div> <div style="width: 40%; border-bottom: 1px solid black;"></div> <div style="width: 20%; border-bottom: 1px solid black;"></div> <div style="width: 20%; border-bottom: 1px solid black;"></div> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <div style="width: 20%;">Name</div> <div style="width: 40%;">Title</div> <div style="width: 20%;">Date</div> <div style="width: 20%;">Phone no.</div> </div> <div style="border-bottom: 1px solid black; padding-top: 5px;"> Problems; suggestions; <input checked="" type="checkbox"/> Report attached </div>	
<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;">Agency</div> <div style="width: 40%; border-bottom: 1px solid black;"></div> <div style="width: 20%;"></div> <div style="width: 20%;"></div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 20%;">Contact</div> <div style="width: 40%; border-bottom: 1px solid black;"></div> <div style="width: 20%; border-bottom: 1px solid black;"></div> <div style="width: 20%; border-bottom: 1px solid black;"></div> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <div style="width: 20%;">Name</div> <div style="width: 40%;">Title</div> <div style="width: 20%;">Date</div> <div style="width: 20%;">Phone no.</div> </div> <div style="border-bottom: 1px solid black; padding-top: 5px;"> Problems; suggestions; <input type="checkbox"/> Report attached </div>	
4.	<b>Other interviews</b> (optional) <input checked="" type="checkbox"/> Report attached. (Appendix C)

**APPENDIX B**  
**FORMER BAY HEAD ROAD ANNEX**  
**ANNAPOLIS, MARYLAND**  
**PAGE 3 OF 15**

<b>III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)			
<b>1.</b>	<b>O&amp;M Documents</b> <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
<b>2.</b>	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
<b>3.</b>	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
<b>4.</b>	<b>Permits and Service Agreements</b> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
<b>5.</b>	<b>Gas Generation Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
<b>6.</b>	<b>Settlement Monument Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
<b>7.</b>	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
<b>8.</b>	<b>Leachate Extraction Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
<b>9.</b>	<b>Discharge Compliance Records</b> <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
<b>10.</b>	<b>Daily Access/Security Logs</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A



**APPENDIX B**  
**FORMER BAY HEAD ROAD ANNEX**  
**ANNAPOLIS, MARYLAND**  
**PAGE 4 OF 15**

IV. O&M COSTS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A																																																			
<b>1.</b>	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> Contractor for State <input type="checkbox"/> PRP in-house <input type="checkbox"/> Contractor for PRP <input type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Contractor for Federal Facility <input type="checkbox"/> Other _____   																																																		
<b>2.</b>	<b>O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate _____ <input type="checkbox"/> Breakdown attached  <p style="text-align: center;">Total annual cost by year for review period if available</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">From _____</td> <td style="width: 20%;">To _____</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> <td></td> </tr> </table>			From _____	To _____					Date	Date	Total cost		<input type="checkbox"/> Breakdown attached		From _____	To _____			<input type="checkbox"/> Breakdown attached		Date	Date	Total cost		<input type="checkbox"/> Breakdown attached		From _____	To _____			<input type="checkbox"/> Breakdown attached		Date	Date	Total cost		<input type="checkbox"/> Breakdown attached		From _____	To _____			<input type="checkbox"/> Breakdown attached		Date	Date	Total cost		<input type="checkbox"/> Breakdown attached	
From _____	To _____																																																		
Date	Date	Total cost		<input type="checkbox"/> Breakdown attached																																															
From _____	To _____			<input type="checkbox"/> Breakdown attached																																															
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From _____	To _____			<input type="checkbox"/> Breakdown attached																																															
Date	Date	Total cost		<input type="checkbox"/> Breakdown attached																																															
<b>3.</b>	<b>Unanticipated or Unusually High O&amp;M Costs During Review Period</b> Describe costs and reasons: _____ _____ _____ _____ _____ 																																																		
V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A																																																			
<b>A. Fencing</b>																																																			
<b>1.</b>	<b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input checked="" type="checkbox"/> N/A Remarks _____  																																																		
<b>B. Other Access Restrictions</b>																																																			
<b>1.</b>	<b>Signs and other security measures</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A Remarks _____  																																																		

**APPENDIX B**  
**FORMER BAY HEAD ROAD ANNEX**  
**ANNAPOLIS, MARYLAND**  
**PAGE 5 OF 15**

<b>C. Institutional Controls (ICs)</b>			
1.	<b>Implementation and enforcement</b> Site conditions imply ICs not properly implemented <span style="float: right;"><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A</span> Site conditions imply ICs not being fully enforced <span style="float: right;"><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A</span>  Type of monitoring (e.g., self-reporting, drive by) _____ Frequency _____ Responsible party/agency _____ Contact _____  <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <span>Name</span> <span>Title</span> <span>Date</span> <span>Phone no.</span> </div> Reporting is up-to-date <span style="float: right;"><input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A</span> Reports are verified by the lead agency <span style="float: right;"><input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A</span>  Specific requirements in deed or decision documents have been met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Violations have been reported <span style="float: right;"><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A</span> Other problems or suggestions: <input type="checkbox"/> Report attached  _____ _____ _____		
2.	<b>Adequacy</b> <span style="margin-left: 20px;"><input checked="" type="checkbox"/> ICs are adequate</span> <span style="margin-left: 20px;"><input type="checkbox"/> ICs are inadequate</span> <span style="float: right;"><input type="checkbox"/> N/A</span> Remarks _____ _____ _____		
<b>D. General</b>			
1.	<b>Vandalism/trespassing</b> <span style="margin-left: 20px;"><input type="checkbox"/> Location shown on site map</span> <span style="margin-left: 20px;"><input checked="" type="checkbox"/> No vandalism evident</span> Remarks _____ _____		
2.	<b>Land use changes on site</b> <input checked="" type="checkbox"/> Remarks Industrial land-use consistent with remedy. _____ _____		
3.	<b>Land use changes off site</b> <input checked="" type="checkbox"/> N/A Remarks _____ _____		
<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b> <span style="margin-left: 20px;"><input type="checkbox"/> Applicable</span> <span style="margin-left: 20px;"><input checked="" type="checkbox"/> N/A</span>			
1.	<b>Roads damaged</b> <span style="margin-left: 20px;"><input type="checkbox"/> Location shown on site map</span> <span style="margin-left: 20px;"><input type="checkbox"/> Roads adequate</span> <span style="float: right;"><input checked="" type="checkbox"/> N/A</span> Remarks _____ _____		

**APPENDIX B**  
**FORMER BAY HEAD ROAD ANNEX**  
**ANNAPOLIS, MARYLAND**  
**PAGE 6 OF 15**

<b>B. Other Site Conditions</b>			
Remarks <hr/> <hr/> <hr/> <hr/>			
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
<b>A. Landfill Surface</b>			
1.	<b>Settlement</b> (Low spots) Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Depth _____	<input type="checkbox"/> Settlement not evident
2.	<b>Cracks</b> Lengths _____ Widths _____ Depths _____ Remarks _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Cracking not evident
3.	<b>Erosion</b> Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Depth _____	<input type="checkbox"/> Erosion not evident
4.	<b>Holes</b> Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Depth _____	<input type="checkbox"/> Holes not evident
5.	<b>Vegetative Cover</b> <input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress T Trees/Shrubs (indicate size and locations on a diagram) Remarks _____		
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input type="checkbox"/> N/A Remarks _____		
7.	<b>Bulges</b> Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Height _____	<input type="checkbox"/> Bulges not evident

**APPENDIX B**  
**FORMER BAY HEAD ROAD ANNEX**  
**ANNAPOLIS, MARYLAND**  
**PAGE 7 OF 15**

8.	<b>Wet Areas/Water Damage</b> <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks _____	<input type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map    Areal extent _____ <input type="checkbox"/> Location shown on site map    Areal extent _____ <input type="checkbox"/> Location shown on site map    Areal extent _____ <input type="checkbox"/> Location shown on site map    Areal extent _____
9.	<b>Slope Instability</b> <input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of slope instability Areal extent _____ Remarks _____	
<b>B. Benches</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	<b>Flows Bypass Bench</b> Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay
2.	<b>Bench Breached</b> Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay
3.	<b>Bench Overtopped</b> Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A or okay
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	<b>Settlement</b> Areal extent _____    Depth _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of settlement
2.	<b>Material Degradation</b> Material type _____    Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of degradation
3.	<b>Erosion</b> Areal extent _____    Depth _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of erosion

**APPENDIX B**  
**FORMER BAY HEAD ROAD ANNEX**  
**ANNAPOLIS, MARYLAND**  
**PAGE 8 OF 15**

4.	<b>Undercutting</b> Areal extent _____ Depth _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting	
5.	<b>Obstructions</b> Type _____ <input type="checkbox"/> Location shown on site map     Areal extent _____ Size _____ Remarks _____	<input type="checkbox"/> No obstructions	
6.	<b>Excessive Vegetative Growth</b> Type _____ <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map     Areal extent _____ Remarks _____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	<b>Gas Vents</b> <input type="checkbox"/> Active <input type="checkbox"/> Passive <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____		
2.	<b>Gas Monitoring Probes</b> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____		
3.	<b>Monitoring Wells</b> (within surface area of landfill) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____		
4.	<b>Leachate Extraction Wells</b> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____		
5.	<b>Settlement Monuments</b> <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A Remarks _____		

**APPENDIX B**  
**FORMER BAY HEAD ROAD ANNEX**  
**ANNAPOLIS, MARYLAND**  
**PAGE 9 OF 15**

<b>E. Gas Collection and Treatment</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Gas Treatment Facilities</b> <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____  		
2.	<b>Gas Collection Wells, Manifolds and Piping</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____  		
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____  		
<b>F. Cover Drainage Layer</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Outlet Pipes Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____  		
2.	<b>Outlet Rock Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____  		
<b>G. Detention/Sedimentation Ponds</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Siltation</b> Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____  		
2.	<b>Erosion</b> Areal extent _____ Depth _____ <input type="checkbox"/> Erosion not evident Remarks _____  		
3.	<b>Outlet Works</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____  		
4.	<b>Dam</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____  		

**APPENDIX B**  
**FORMER BAY HEAD ROAD ANNEX**  
**ANNAPOLIS, MARYLAND**  
**PAGE 10 OF 15**

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1.	<b>Deformations</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____ _____	
2.	<b>Degradation</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Degradation not evident Remarks _____ _____	
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1.	<b>Siltation</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Siltation not evident Areal extent _____ Depth _____ Remarks _____ _____	
2.	<b>Vegetative Growth</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A <input type="checkbox"/> Vegetation does not impede flow Areal extent _____ Type _____ Remarks _____ _____	
3.	<b>Erosion</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____ _____	
4.	<b>Discharge Structure</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____ _____	
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____ Depth _____ Remarks _____ _____	
2.	<b>Performance Monitoring</b> Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____ _____	

**APPENDIX B**  
**FORMER BAY HEAD ROAD ANNEX**  
**ANNAPOLIS, MARYLAND**  
**PAGE 11 OF 15**

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Pumps, Wellhead Plumbing, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ _____		
2.	<b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ _____		
<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____ _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____ _____		



**APPENDIX B**  
**FORMER BAY HEAD ROAD ANNEX**  
**ANNAPOLIS, MARYLAND**  
**PAGE 12 OF 15**

<b>C. Treatment System</b>		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____	
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____	
5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____	
6.	<b>Monitoring Wells</b> (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>D. Monitoring Data</b>		<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality	
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining	

**APPENDIX B**  
**FORMER BAY HEAD ROAD ANNEX**  
**ANNAPOLIS, MARYLAND**  
**PAGE 13 OF 15**

<b>E. Monitored Natural Attenuation</b>	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
<p>1.     <b>Monitoring Wells</b> (natural attenuation remedy)</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <input type="checkbox"/> Properly secured/locked  <input type="checkbox"/> All required wells located </div> <div style="width: 30%;"> <input type="checkbox"/> Functioning    <input type="checkbox"/> Routinely sampled  <input type="checkbox"/> Needs Maintenance </div> <div style="width: 30%;"> <input type="checkbox"/> Good condition  <input type="checkbox"/> N/A </div> </div> <p>Remarks_____</p>		
<b>X. OTHER REMEDIES</b>		
None..		

**APPENDIX B  
FORMER BAY HEAD ROAD ANNEX  
ANNAPOLIS, MARYLAND  
PAGE 14 OF 15**

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>
<p>Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).</p> <hr/> <p><u>Institutional controls prohibiting residential development were added to the Deed</u> <u>and no evidence of such activities was noted during conduct of the site</u> <u>inspection.</u></p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	
<b>B.</b>	<b>Adequacy of O&amp;M</b>
<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <hr/> <p style="text-align: center;">NA</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	

**APPENDIX B  
FORMER BAY HEAD ROAD ANNEX  
ANNAPOLIS, MARYLAND  
PAGE 15 OF 15**

<b>C.</b>	<b>Early Indicators of Potential Remedy Problems</b>
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;">NA</div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div>	
<b>D.</b>	<b>Opportunities for Optimization</b>
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;">NA</div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div> <div style="border-bottom: 1px solid black; padding-bottom: 5px; margin-bottom: 5px;"></div>	

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## **APPENDIX C**

**SITE PHOTOGRAPHS,  
SEPTEMBER 11, 2019**



Children's Theatre of Annapolis Building – East View



Former Burn Pad area, facing east.



Former Navy Building 215, facing south.



Former Navy Building 218, facing east.





West Soccer Field (Former Septic Field), facing west.



Former Navy Building 202, facing west. Former burn pad area beyond fence.



South end of Former Navy Building 211, theater building in background.



Buildings 205 and 216 – abandoned.

## **APPENDIX D**

### **2019 FIVE-YEAR REVIEW INTERVIEWS**

	<b><u>Interview Contact</u></b>	<b><u>Title</u></b>	<b><u>Response Received</u></b>
1.	Mr. David Steckler	NAVFAC Washington RPM	Yes
2.	Ms. Linda Gustafson	MDE RPM	Yes
3.	Mr. Mark Garrity	Parks Administrator Anne Arundel County	Yes
4.	Mr. Jason Kimmel	Operations Manager Childrens' Theater of Annapolis	No



## **Bay Head Road Annex Five-Year Review Interview Information**

<b>Date of Interview</b>	February 6, 2020
<b>Interviewee Name</b>	Linda Gustafson
<b>Title</b>	Remedial Project Manager
<b>Organization</b>	Maryland Department of the Environment
<b>Address</b>	1800 Washington Blvd., Suite 625 Baltimore, Maryland 21230
<b>Phone</b>	410-537-4238
<b>Email</b>	<a href="mailto:Linda.Gustafson@maryland.gov">Linda.Gustafson@maryland.gov</a>
<b>Person conducting Interview (if applicable)</b>	
<b>Type of Interview Method</b>	email

## **Interview Questions**

### **Background Information:**

1. What is your overall impression of the project? (General sentiment)

Response – Investigative work is ongoing with no problems to report as of this time.

2. What effects have site operations had on the surrounding community?

Response – Because we are investigating the nature and extent of per- and polyfluoroalkyl substances (PFAS) at this site, due to their emerging contaminant status more interest from the community is anticipated with regard to our findings; however, as of this time I am not aware of any adverse impacts to the community.

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response – I am not aware of any community concerns regarding the Former Bay Head Annex site.

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Response – I am not aware of any of the above-mentioned events/incidents occurring at this site.

5. Do you feel well informed about the site's activities and progress?

Response – My Navy counterpart, David Steckler, contacts me with updates as events occur. A draft Remedial Investigation (RI) is currently under Navy review. A public meeting is planned to occur in April to inform the community of its findings.

6. Do you have any comments, suggestions, or recommendations regarding the site's impact on the community?

Response – No.

#### **State and Local Considerations:**

7. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, give purpose and results.

Response – My last site visit was in November 2017, as the team was scoping the RI investigation. My Navy counterpart and I keep in touch via email and phone regarding updates to site activities/investigations.

8. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Response – I have not been contacted with any complaints, violations or other related site incidents to date.

9. Have there been any changes in regulations or clean up levels since implementing the remedy that may affect the site?

Response – No enforceable standards/Maximum Contaminant Levels for PFAS have been promulgated by the USEPA or MDE to date, but are anticipated at some point in the future.

#### **Performance and Operations and Maintenance (O&M) Problems:**

10. Is the remedy functioning as expected? How well is the remedy performing?

Response – Outside of the discovery of PFAS in soil, surface- and groundwater due to past fire-training activities (currently under investigation), the current remedy is performing as intended.

11. Is there a continuous on-site Operations and Maintenance (O&M) presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Response – No.

12. Have any problems been encountered which required, or will require, changes to this remedial design or this Record of Decision(ROD)?

Response – Yes – as mentioned above, PFAS has been detected at the site due to historical fire-training activities and is currently in the RI phase, with potential for changes to the existing remedial design and/or Record of Decision.

13. Do you have any comments, suggestions, or recommendations regarding the project's operations and site management?

Response – The Navy and MDE are collaborating on the ongoing PFAS investigation and are preparing to share the findings of the RI (currently in the draft stage) with the community within the next few months.

**Bay Head Road Annex Five-Year Review Interview Information**

<b>Date of Interview</b>	24 September 2019
<b>Interviewee Name</b>	David Steckler
<b>Title</b>	Remedial Project Manager
<b>Organization</b>	Department of the Navy
<b>Address</b>	1314 Harwood Street SE, Washington Navy Yard, DC 20374
<b>Phone</b>	202.365.0241
<b>Email</b>	<a href="mailto:david.steckler@navy.mil">david.steckler@navy.mil</a>
<b>Person conducting Interview (if applicable)</b>	
<b>Type of Interview Method</b>	Written

**Interview Questions****Background Information:**

1. What is your overall impression of the project? (General sentiment)

Response – It is moving forward appropriately.

2. What effects have site operations had on the surrounding community?

Response – Past operations have resulted in the release of PFAS to environmental media.

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response – None.

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Response – No.

5. Do you feel well informed about the site's activities and progress?

Response – Yes.

6. Do you have any comments, suggestions, or recommendations regarding the site's impact on the community?

Response – No.

**State and Local Considerations:**

7. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, give purpose and results.

Response – None.

8. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Response – None.

9. Have there been any changes in regulations or clean up levels since implementing the remedy that may affect the site?

Response – PFAS was recently identified as an emerging contaminant.

**Performance and Operations and Maintenance (O&M) Problems:**

10. Is the remedy functioning as expected? How well is the remedy performing?

Response – Yes.

11. Is there a continuous on-site Operations and Maintenance (O&M) presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Response – No.

12. Have any problems been encountered which required, or will require, changes to this remedial design or this Record of Decision(ROD)?

Response – The presence of PFAS will require a future record of decision.

13. Do you have any comments, suggestions, or recommendations regarding the project's operations and site management?

Response – No.



**Bay Head Road Annex Five-Year Review Interview Information**

Date of Interview	9/20/19
Interviewee Name	Mark Garrity
Title	Parks Administrator
Organization	Anne Arundel County
Address	1 Harry S. Truman Parkway Annapolis, Maryland 21409
Phone	410-222-7867
Email	<a href="mailto:rpgarr00@aacounty.org">rpgarr00@aacounty.org</a>
Person conducting Interview (if applicable)	
Type of Interview Method	email Questionnaire

**Interview Questions****Background Information:**

1. What is your overall impression of the project? (General sentiment)

Response – Extremely successful.

2. What effects have site operations had on the surrounding community?

Response – Expanded use by citizens.

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.

Response – No

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.

Response – Yes  
 2018 - Teenage boy committed suicide.  
 2017 - Vandal's spray painted buildings  
 2016 - Unknown persons damaged turf with ATV's - minor damage

5. Do you feel well informed about the site's activities and progress?

Response – yes

6. Do you have any comments, suggestions, or recommendations regarding the site's impact on the community?

Response – The site continues to have a positive impact on the community providing recreational, athletic and cultural activities for all ages.

### State and Local Considerations:

7. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, give purpose and results.

Response – *Yes - Routine safety patrols by Park Rangers - Monthly maintenance inspections and repairs C/e repavement of the parking lot. 2015 - Federal Lands to Parks Report to National Park Service*

8. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

Response – *No*

9. Have there been any changes in regulations or clean up levels since implementing the remedy that may affect the site?

Response – *NO*

### Performance and Operations and Maintenance (O&M) Problems:

10. Is the remedy functioning as expected? How well is the remedy performing?

Response – *yes - Quite well*

11. Is there a continuous on-site Operations and Maintenance (O&M) presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Response – *There is not a continuous on-site presence by County staff. Staff perform weekly safety patrols and Bi-weekly trash runs. Community volunteers i.e. Youth Athletic Group and Theater group maintain trash for their activities.*

12. Have any problems been encountered which required, or will require, changes to this remedial design or this Record of Decision(ROD)?

Response – *No*

13. Do you have any comments, suggestions, or recommendations regarding the project's operations and site management?

Response – *No*