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NWS YORKTOWN, VA
SSIC 5000-33a

**FINAL SITE MANAGEMENT PLAN FISCAL YEARS 2022 THROUGH 2023 NWS
YORKTOWN VA**

11/01/2021
CH2M HILL

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Naval Facilities Engineering Systems Command Mid-Atlantic
Norfolk, Virginia

Final

**Site Management Plan
Fiscal Years 2022–2023**

Naval Weapons Station Yorktown
Yorktown, Virginia

November 2021



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Prepared for NAVFAC Mid-Atlantic
by CH2M HILL, Inc.
Virginia Beach, Virginia
Contract N62470-21-D-0007
CTO 5283



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Acronyms and Abbreviations

AM	Action Memorandum
amsl	above mean sea level
AOC	Area of Concern
AR	Administrative Record
BEHP	bis(2-ethylhexyl)phthalate
bgs	below ground surface
bio-cell	bioremediation cell
CAX	Cheatham Annex
CCR	Construction Completion Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIP	Community Involvement Plan
COC	constituent of concern
COPC	constituent of potential concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CVOC	chlorinated volatile organic compound
DCA	dichloroethane
DCE	dichloroethene
DNA	dinitroaniline
DNT	dinitrotoluene
DPT	direct-push technology
EE/CA	Engineering Evaluation/Cost Analysis
ERA	Ecological Risk Assessment
ERI	Expanded Remedial Investigation
ERP	Environmental Restoration Program
ESD	Explanation of Significant Differences
FFA	Federal Facility Agreement
FFS	Focused Feasibility Study
FS	Feasibility Study
ft/day	foot (feet) per day
FY	Fiscal Year
HHRA	Human Health Risk Assessment
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HRSD	Hampton Roads Sanitation District
IAS	Initial Assessment Study
iRACR	Interim Remedial Action Completion Report
IRP	Installation Restoration Program
LTM	long-term monitoring
LUC	land use control
MCL	maximum contaminant level
MEC	munitions and explosives of concern
mg/kg	milligram(s) per kilogram
MIP	membrane interface probe
MNA	monitored natural attenuation
MRP	Munitions Response Program

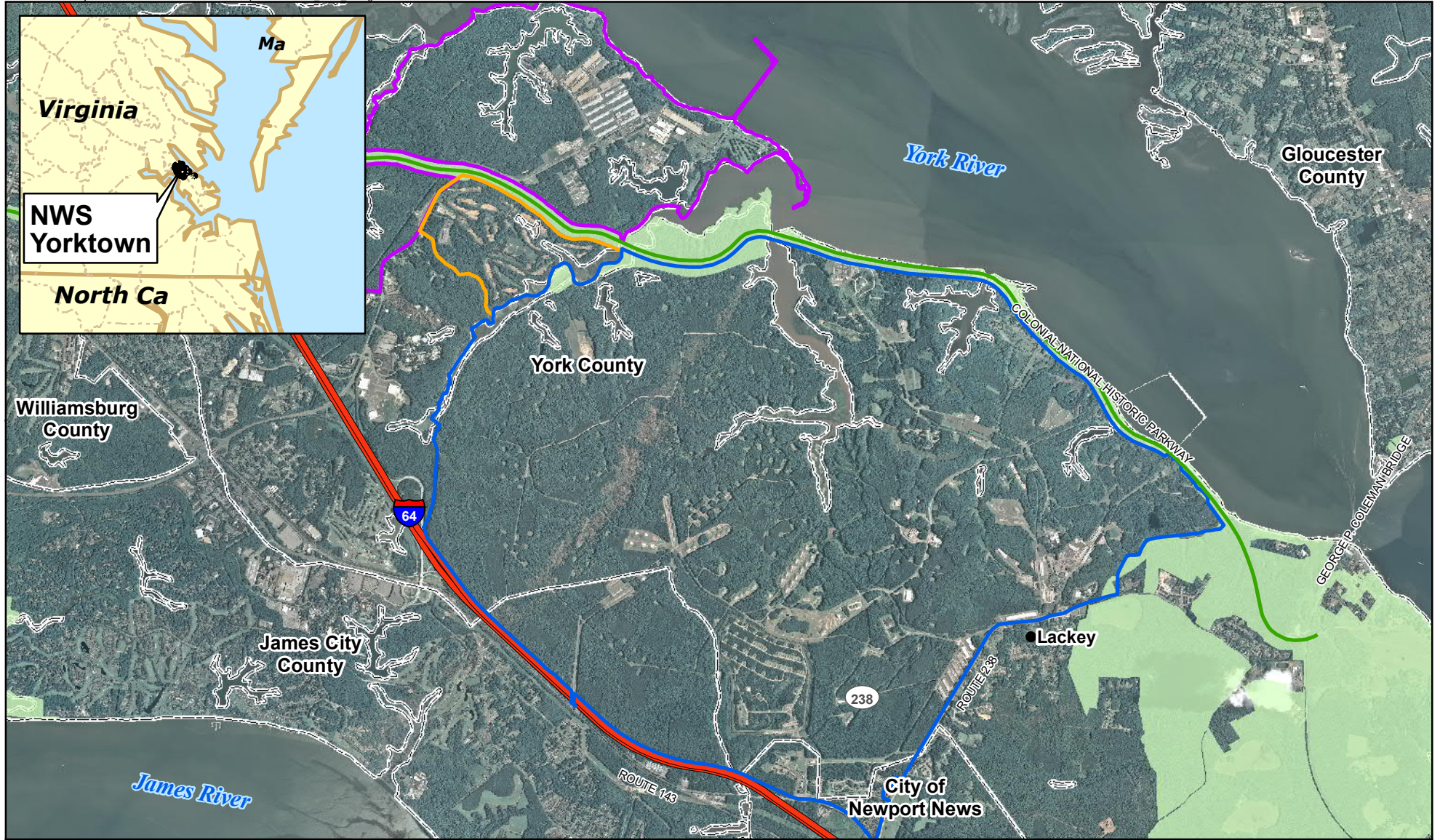
MWR	Morale, Welfare, and Recreation
NACIP	Navy Assessment and Control of Installation Pollutants
NAVFAC	Naval Facilities Engineering Systems Command
Navy	Department of the Navy
NEDED	Naval Explosives Development Engineering Department
NFA	no further action
NPDES	National Pollutant Discharge Elimination System
NTCRA	non-time-critical removal action
NWS	Naval Weapons Station
OU	Operable Unit
PA	Preliminary Assessment
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PFAS	per- and polyfluoroalkyl substances
PFOS	perfluorooctane sulfonate
PP	Proposed Plan
ppm	part(s) per million
PRG	preliminary remediation goal
RA	remedial action
RAA	remedial action alternative
RACR	Remedial Action Completion Report
RAO	remedial action objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RG	remediation goal
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SI	Site Inspection
SMP	Site Management Plan
SSA	Site Screening Area
SSP	Site Screening Process
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TAL	target analyte list
TCA	trichloroethane
TCE	trichloroethene
TCL	target compound list
TM	Technical Memorandum
TNB	trinitrobenzene
TNT	trinitrotoluene
USEPA	United States Environmental Protection Agency
UST	underground storage tank
UU/UE	unlimited use/unrestricted exposure

UXO	unexploded ordnance
VC	vinyl chloride
VDEQ	Virginia Department of Environmental Quality
VOC	volatile organic compound
WDDA	Wood Debris Disposal Area
yd ³	cubic yard

Introduction

This document presents the Fiscal Years (FYs) 2022 through 2023 annual amendment to the Site Management Plan (SMP) for Naval Weapons Station (NWS) Yorktown, Yorktown, Virginia. This SMP meets the requirements of the Federal Facility Agreement (FFA) (USEPA, 1994) between the Naval Facilities Engineering Systems Command (NAVFAC) Mid-Atlantic, Commonwealth of Virginia Department of Environmental Quality (VDEQ), and Region 3 of the United States Environmental Protection Agency (USEPA) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This annual update to the SMP is being submitted in accordance with the requirements of the FFA. **Figure 1-1** illustrates the location of the installation within the Commonwealth of Virginia.

The purpose of the SMP is to provide a management tool for NAVFAC Mid-Atlantic, NWS Yorktown, VDEQ, USEPA, and their consultants to use in planning, reviewing, and setting priorities for all response activities to be conducted during FY 2022 and FY 2023 at NWS Yorktown. The SMP establishes schedules and conceptual approaches for continued CERCLA activities at NWS Yorktown Environmental Restoration Program (ERP) sites. The prioritization of activities, proposed schedules, and work descriptions were jointly developed by the Department of the Navy (Navy), USEPA, and VDEQ on the basis of goals agreed to by all parties. The SMP is a working document that is updated annually. This annual SMP update supersedes the FY 2021–2022 SMP (CH2M, 2020c).



Legend

- ▬ NWS Yorktown Base Boundary
- ▬ Kings Creek Commerce Park
- ▬ Cheatham Annex
- County Boundary
- ▬ Colonial National Historic Parkway
- Colonial National Historic Park

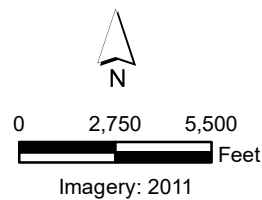


Figure 1-1
 Location of NWS Yorktown
 Site Management Plan for FY 2022 to 2023
 NWS Yorktown
 Yorktown, Virginia

Background and Regulatory Framework

2.1 Activity Description

NWS Yorktown is an 8,881-acre installation located on the Virginia Peninsula in York and James City Counties, Virginia (**Figure 1-1**). NWS Yorktown is bounded on the northwest by Cheatham Annex (CAX) and the King's Creek Commerce Park on the northeast by the York River and the Colonial National Historic Parkway; on the southwest by Route 143 and Interstate 64; and on the southeast by Route 238 and the town of Lackey.

Originally named the United States Mine Depot, NWS Yorktown was established in 1918 to produce naval mines for the North Sea barrage during World War I. For 20 years after World War I, the depot continued to receive, reclaim, store, and issue mines, depth charges, and related materials. During World War II, the facility was expanded to include three trinitrotoluene (TNT) loading plants and new torpedo overhaul facilities. A research and development laboratory for experimentation with high explosives was established in 1944. In 1947, a quality evaluation laboratory was developed to monitor special tasks assigned to the facility which included the design and development of depth charges and advanced underwater weapons. On August 7, 1959, the depot was renamed the United States NWS Yorktown. Today, the primary mission of NWS Yorktown is to provide ordnance, technical support, and related services to sustain the war-fighting capability of the armed forces in support of national military strategy.

2.1.1 Hydrogeologic Setting

NWS Yorktown is situated within the Virginia Coastal Plain Physiographic Province, which is characterized by unconsolidated sediments several thousand feet in thickness (Meng and Harsh, 1988). Deposition and erosion associated with fluctuating sea levels resulted in terraces that decrease in topographic elevation in a stair-step pattern with scarps, oriented north to south, that delineate the eroded shoreline along the toe of each terrace. Two terraces (Lackey Plain and Croaker Flat) are divided by one scarp (the Camp Peary Scarp) within the boundaries of NWS Yorktown.

A total of ten geologic formations have been identified (Brockman et al., 1997) beneath NWS Yorktown. The upper-most geologic formations consist of alluvial, colluvial, and marsh deposits composed of silt, sand, and pebbles with some clay. The geologic units are grouped into hydrostratigraphic units based upon hydraulic characteristics. The lithological sequence of aquifers and confining/semi-confining units relevant to CERCLA investigations at NWS are, from youngest to oldest: the Columbia aquifer, the Cornwallis Cave confining unit, the Cornwallis Cave aquifer, the Yorktown confining unit, and the Yorktown-Eastover aquifer. Groundwater flow is locally controlled by topography with discharge to downgradient surface water bodies and a primary flow and discharge direction toward the York River.

Across the northern part of the Base near the York River, in the vicinity of Sites 1, 3, 6, 7, 11, 17, 24, and 25 (**Figure 2-1**), the Camp Peary Scarp truncates the Columbia aquifer, the Cornwallis Cave confining unit, the Cornwallis Cave aquifer, and some to all of the Yorktown confining unit; as a result, the upper units are missing and either the Yorktown-Eastover aquifer or a thin portion of the Yorktown confining unit occurs at the surface. In some areas, the Cornwallis Cave aquifer and confining unit are absent and the Columbia aquifer overlies the Yorktown confining unit. Where present, the Columbia aquifer ranges in thickness between 5 and 10 feet, with horizontal hydraulic conductivity between approximately 0.4 to 8 feet per day (ft/day) and vertical hydraulic conductivity between 1.7×10^{-4} and 1.7×10^{-1} ft/day (Brockman et. al., 1997). The dark greenish gray clay and silt of the Yorktown confining unit is absent north of Turkey Road between the west and south branches of Felgates Creek, along the streambeds of Felgates Creek, Indian Field Creek and their unnamed tributaries (Brockman et al., 1997). Where present, the unit is up to 36 feet thick. Vertical hydraulic conductivity of the confining unit ranges from 1.3×10^{-5} ft/day to 7.4×10^{-3} ft/day.

The Yorktown-Eastover aquifer extends across all of NWS Yorktown and ranges between 60 and 100 feet thick. Horizontal hydraulic conductivity ranges from 0.004 to 3 ft/day and vertical hydraulic conductivity ranges between 1.7×10^{-5} and 4.8×10^{-1} ft/day. Transmissivity of the aquifer ranges from 0.5 to 40 square feet per day, with a primary direction of groundwater flow from west to east.

2.2 Environmental Restoration Program

2.2.1 Regulatory History

In 1975, the Department of Defense began the Navy Assessment and Control of Installation Pollutants (NACIP) Program to assess past hazardous and toxic materials storage and disposal activities at military installations. Comprehensive environmental restoration activities at NWS Yorktown began in 1984 under the NACIP program. The NACIP Program was revised in 1986 to reflect the requirements of CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA). SARA established the Installation Restoration Program (IRP) to address releases of hazardous substances, pollutants, and contaminants on installations and former properties resulting from past practices that may pose risks to human health and the environment. The IRP is currently addressed under the ERP. The Navy is committed to cleaning up sites that pose a threat to human health or the environment and implementing environmental stewardship practices that ensure Navy waste management operations are in compliance with all federal and state regulations and Navy policy.

On October 15, 1992, NWS Yorktown was added to the National Priorities List based on a Hazard Ranking System score of 50. An FFA between the Navy and the USEPA was signed in August 1994 (USEPA, 1994), and incorporated the Resource Conservation and Recovery Act (RCRA) Solid Waste Management Units (SWMUs) at NWS Yorktown, as identified in a 1992 RCRA SWMU Investigation Report (A. T. Kearney, 1992). The FFA Findings of Fact identified 16 Sites (Sites 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 16, 17, 18, 19, and 21) for Remedial Investigation (RI). Appendix A of the FFA identified 19 Site Screening Areas (SSAs) (SSAs 1 through 19) for the Site Screening Process (SSP). Subsequent to the FFA, six additional SSAs (SSA 20 through SSA 25) were identified for consideration under CERCLA. Based on the results of the SSP, 11 of the SSAs were determined to warrant RI/Feasibility Study (FS) efforts under CERCLA: SSA 1 (currently Site 23), SSA 6 (currently Site 24), SSA 7 (currently Site 25), SSA 10 (currently Site 28), SSA 14 (currently Site 34), SSA 16 (currently Site 16), SSA 18 (currently Site 26), SSA 20 (currently Site 29), SSA 22 (currently Site 33), SSA 24 (currently Site 30), and SSA 25 (currently Site 32). Appendix B of the FFA identified 21 Areas of Concern (AOCs) (AOCs 1 through 21) for desktop audits under CERCLA to determine if the AOCs warranted further consideration in the SSP. With the exception of AOCs 5, 6, and 7, which are associated with SSA 15, the Navy, in partnership with USEPA and VDEQ, agreed that no action was warranted for all other AOCs (Baker, 1997a). However, one additional AOC (AOC 23, currently Site 31) was added in 2007 when it was determined that groundwater in the industrial area upgradient of Site 12 was contaminated with trichloroethene (TCE). In addition, although Site 31 was not included in the FFA, investigations at this site have been or will be conducted following CERCLA guidance, and is included in this document.

The Department of Defense has established the Munitions Response Program (MRP) under the Navy ERP to address munitions and explosives of concern (MEC) at other than operational ranges. The Department of Defense and the Navy are establishing policy and guidance for munitions and response actions under the MRP; however, the key program drivers developed to date conclude that munitions response action will be conducted under the process outlined in the National Contingency Plan as authorized by CERCLA. In 2007, the Navy initiated investigations of numerous MRP sites at NWS Yorktown, including the Morale, Welfare, and Recreation (MWR) Skeet Range, UXO 2 (formerly Site 2), and UXO 3. Although the MWR Skeet Range and UXO 3 were not included in the FFA, investigations at these sites have been conducted following CERCLA guidance, and are included in this document.

Table 2-1 identifies active sites, SSAs, and AOCs addressed under CERCLA at NWS Yorktown and those in which it was determined that no action or no further action (NFA) is required. **Figure 2-1** shows the location of each site at

NWS Yorktown. Active sites are discussed in **Section 3**. Additional background information for sites and SSAs with no action or NFA determinations prior to 2008 is provided in previous SMPs.

2.2.2 CERCLA Process

The objectives of the CERCLA process are to evaluate the nature and extent of contamination at a site, assess potentially unacceptable risks to human health and the environment, and to identify, develop, and implement appropriate remedial actions (RAs) in order to protect human health and the environment. The major elements of the CERCLA process are described in **Table 2-2**.

2.2.3 Partnering

The Navy works in partnership with USEPA and VDEQ and has established a formal NWS Yorktown Partnering Team to implement CERCLA. Partnering Team decisions are documented through consensus statements and partnering meeting minutes; a summary of Team¹ consensus statements is presented in **Table 2-3**.

2.2.4 Community Participation

NWS Yorktown has developed a Community Involvement Plan (CIP) (CH2M, 2014g) and established a Restoration Advisory Board comprised of members of the community, local environmental group members, and state and federal officials who meet annually to keep the community informed on environmental issues at NWS Yorktown.

The documents prepared for the ERP are maintained in the Administrative Record (AR) file for review by the public. The index of the NWS Yorktown AR is available at the information repository, the York County Public Library at 8500 George Washington Memorial Highway, Yorktown, Virginia. Documents from the AR are available through the NWS Yorktown public website: <https://go.usa.gov/xfP6h>.

Additional information regarding Restoration Advisory Board meetings or environmental cleanup programs at Yorktown may also be obtained from the Public Affairs Officer at:

NWS Yorktown
160 Main Road, Yorktown, VA 23691
(757) 887-4939

¹ NWS Yorktown and CAX conducted joint Partnering meetings between 2000 and September 2008, when the Bases split into separate Partnering Teams.

Table 2-1. Site Summary NWS Yorktown
 FY 2022 - 2023 SMP
 Naval Weapons Station Yorktown, Yorktown, Virginia

Site Identification	Other Identification				Site Name	Site Description	FFA Status	Current CERCLA Status	Comments/Notes
	IAS (1984) RCRA (1992)	FFA	Navy OU Number	EPA OU Number					
Site 1	IAS Site 1	Site 1	Soil - VIII	Soil - 6	Dudley Road Landfill	10 acre landfill with soil cover in place; 1999 removal action of soil/waste	Findings of Fact RI/FS	Post-ROD (soil/waste)	ROD for soil/waste AR # 001000 (June 1999) Site Inspections/Five-Year Reviews (2002, 2007, 2013, 2018) LUC RD for soil/waste (2014) RI for GW/SW/SD (2017) FS for GW/SW/SD (2018) LUCs for soil/waste ongoing PP for GW/SW/SD ongoing
				GW/SW/SD - 33				PP/ROD (GW/SW/SD)	
Site 2 (UXO-2 see bottom of table)	IAS Site 2	Site 2		Soil/GW/SW/SD - 31	Turkey Road Landfill	5 acre landfill; 1994 partial removal action of waste	Findings of Fact RI/FS	MRP	Site 2 was transferred to the MRP on June 19, 2007
Site 3	IAS Site 3	Site 3	Soil - IX	Soil - 6	Group 16 Magazine Landfill	2 acre landfill; 1999 removal action of soil/waste	Findings of Fact RI/FS	Response Complete (soil/waste)	ROD for soil/waste AR # 001000 (June 1999) Five-Year Review (2007) ESD (2008) RI (2012) FS for GW (2014) PP for GW/SW/SD (2020) ROD for GW/SW/SD ongoing Pre-RD investigation for GW ongoing
				GW/SW/SD - 35				PP/ROD (GW/SW/SD)	
Site 4	IAS Site 4	Site 4	Soil - XVII	Soil - 7	Burning Pad Residue Landfill	10 acre landfill; 1994 removal of action waste, 2003 removal action of soil/waste, 2005 removal action of soil	Findings of Fact RI/FS	Response Complete	NFA ROD (September 2005) for soil/waste AR# 001750 RI GW/SW/SD (2010) PP GW/SW/SD (2010) ROD GW/SW/SD (2011) AR#000262
				GW/SW/SD - 14					
Site 5	IAS Site 5	Site 5	Soil/GW/SW/SD - I	Soil/GW/SW/SD - 1	Surplus Transformer Storage Area	1000 square foot area, stored surplus transformers; 1982 removal action of soil/waste	Findings of Fact RI/FS	Response Complete	NFA ROD (September 1994) for Site 5 all media AR# 001174
Site 6	IAS Site 6	Site 6	Soil - XIII (Flume Area) and XIV (Excavated Area)	Soil/SW/SD - 34, 37 GW - 17, 34, 37	Explosives-Contaminated Wastewater Impoundment	Includes the following three areas: flume area, impoundment area, and excavated area; 2000 removal action of bioremediation cell; wetlands created in impoundment area	Findings of Fact RI/FS	Post-ROD (soil/SW/SD)	ROD for soil/SD/SW AR # 001001 (October 1998) LTM of GW/SW/SD Five-Year Reviews (2002, 2007, 2013, 2018) LUCs ongoing RI for Soil/GW/SW/SD ongoing*
			GW - XV						
			SW - XV (Impoundment Area)						
			SD - XIII (Flume Area) and XV (Impoundment Area)						
Site 7	IAS Site 7	Site 7	Soil/SD - XII	Soil - 2 & 29 GW/SW/SD - 2,17, & 29	Plant 3 Explosives-Contaminated Wastewater Discharge Area	300 foot long drainage and surrounding area; 1996 <i>ex-situ</i> Bioremediation Pilot Study (soil). Expanded site area includes all of former Plant 3.	Findings of Fact RI/FS	Post-ROD (soil/SW/SD/GW)	ROD for soil/SW/SD/GW AR # 001001 (October 1998) Five-Year Reviews (2002, 2007, 2013, 2018) RI (2007) LTM GW completed (2010) Expanded RI for GW/Soil/SW/SD (2018)* Pre-FS investigation (2021) LUCs ongoing Supplemental Pre-FS Investigation ongoing LTM GW reinitiated 2018 and ongoing
			GW/SW - XV					RI/FS (soil/GW/SW/SD)	
Site 8	IAS Site 8	Site 8		Soil - 18 & 25 GW/SW/SD - 25	NEDED Explosives-Contaminated Wastewater Discharge Area	300 foot drainage way and surrounding area; 2007 removal action of soil/SD	Findings of Fact RI/FS	RI/FS (soil/GW/SW/SD)	NFA consensus statement (May 2008) for soil/SD RI for GW (2011) Supplemental RI for Soil/GW/SW/SD (2020)* Pre-FS investigation ongoing
Site 9	IAS Site 9	Site 9	Soil - VII	Soil - 3, 32	Plant 1 Explosives-Contaminated Wastewater Discharge Area	600 foot natural drainage way; 1994 removal action of soil/SD/waste	Findings of Fact RI/FS	Response Complete (soil/SW/SD) RI/FS (soil/GW/SW/SD)	NFA ROD for soil/SW/SD AR# 002077 (March 1998) RI for Soil/GW/SW/SD ongoing*
Site 11	IAS Site 11	Site 11	Soil - X	Soil - 8 GW - 16	Abandoned Explosives Burning Pits	0.5 acre waste disposal/burning area; 2000 removal action of waste ash/soil	Findings of Fact RI/FS	Response Complete (all media)	NFA ROD (September 2010) for all media AR# 000122 RACR completed February 2012
Site 12	IAS Site 12	Site 12	Soil - III and IV	Soil/GW/SW/SD - 4	Barracks Road Landfill	Includes the following 3 areas: Area A (4 acres), Area B/C (1.6 acres), Wood/Debris Disposal Area (3.3 acres); 1997 removal action of surface debris/onsite buildings and installation of geosynthetic landfill cover	Findings of Fact RI/FS	Post-ROD (soil/SW/SD/GW)	ROD for soil/GW/SW/SD AR# 000871 (April 1997) ESD to remove GW VOCs from LTM (2011) Five-Year Reviews (2002, 2007, 2013, 2018) LUC RD (2013) RACR (2015) LUCs ongoing LTM (GW) ongoing Wood Debris Disposal Area investigation work planning ongoing
			GW/SW/SD - V						
Site 16 / SSA 16	IAS Site 16	Site 16	Soil/GW/SW/SD - II	Soil/GW/SW/SD - 5	West Road Landfill	5 acre landfill; 1992 removal action of surface debris; 1994 removal action of waste/surface debris Site addressed with SSA16 (0.4 acre scrap metal storage area)	Findings of Fact RI/FS	NFA	ROD (September 1995) for soil/GW AR# 000671 Tech Memo for risk management of GW HH risk complete (2013) Five-Year Review (2012) ESD completed to remove LUCs (all media then NFA) (2013) Five-Year Review (2018)

Table 2-1. Site Summary NWS Yorktown
 FY 2022 - 2023 SMP
 Naval Weapons Station Yorktown, Yorktown, Virginia

Site Identification	Other Identification			Site Name	Site Description	FFA Status	Current CERCLA Status	Comments/Notes
	IAS (1984) RCRA (1992)	FFA	Navy OU Number					
Site 17	IAS Site 17	Site 17	Soil - XI	Soil - 8	Holm Road Landfill	Findings of Fact RI/FS	Response Complete (all media)	NFA ROD (September 2010) for all media AR# 000121 RACR completed February 2012
Site 18	IAS Site 18	Site 18		Soil/GW/SW/SD - 9	Building 476 Discharge Area	Findings of Fact RI/FS	Response Complete (all media)	NFA ROD (September 2005) for all media AR# 001749
Site 19	IAS Site 19	Site 19	Soil - VI	Soil - 3, 32 GW/SW/SD - 32	Conveyor Belt Soils at Building 10	Findings of Fact RI/FS	Post-ROD (soil) RI/FS (soil/GW/SW/SD)	ROD for soil AR# 002077 (March 1998) Five-Year Reviews (2002, 2007, 2013, 2018) LUCs ongoing RI (Soil/GW/SW/SD) ongoing*
Site 21	SWMU 21	Site 21	Soil - XVII	Soil - 7	Battery and Drum Disposal Area	Findings of Fact RI/FS	Response Complete (soil)	NFA ROD (September 2003) for soil/waste AR# 001374 GW/SW/SD RI (2010) PP GW/SW/SD (2010) ROD GW/SW/SD (2011) AR#000262
Site 22	Not Identified	Not Identified	Soil - XVII	Soil - 7 GW/SW/SD - 15	Burn Pad	Not identified	Response Complete (soil/SW/SD) Post-ROD (GW)	NFA ROD for soil AR# 001375 (September 2003) RI for GW/SW/SD (2010) PP for SW/SD (2010) NFA ROD for SW/SD AR#000262 (2011) FS for GW (2011) PP and ROD for GW AR#0002532 (2012) LUC RD (2013) Pre-RD Investigation for GW (2020) LUCs ongoing Remedy optimization work planning ongoing
Site 23	SWMU 99 EPIC 37	SSA 1		Soil/GW/SW/SD - 10	Building 428 Teague Road Disposal Area	Appendix A SSA/SSP	RI/FS (all media)	Revised Draft Final Round I RI (2008) RI ongoing
Site 24	IAS Site 14 SWMU 27 EPIC 25	SSA 6		Soil/GW - 19	Aviation Field	Appendix A SSA/SSP	RD/RA (soil)	Revised Draft Final Round I RI (2008) RI for all media (2014) EE/CA for soil and waste removal action (2015) Soil and waste removal action ongoing
Site 25	SWMU 25 AOC A, EPIC 22 & 23	SSA 7		Soil/GW/SW/SD - 20	Building 373 Rocket Plant	Appendix A SSA/SSP	RI/FS (all media)	Revised Draft Final Round I RI (2008) RI report for all media ongoing
Site 26	SWMU 87	SSA 18		Soil/GW/SW/SD - 21	Building 1816 Mark 48 Waste Otto Fuel Tank	Appendix A SSA/SSP	RI/FS (all media)	Revised Draft Final Round I RI (2008) RI for all media ongoing
Site 27	SWMU 80 & 81	SSA 9		Soil/GW/SW/SD - 12	Building 1751 Chemistry Laboratory Neutralization Unit and Drainage Area	Appendix A SSA/SSP	Response Complete (all media)	NFA ROD (September 2006) all media AR# 001930
Site 28	SWMU 107	SSA 10		Soil/GW/SW/SD - 24	Building 28 X-Ray Facility Tank Drain Field	Appendix A SSA/SSP	Response Complete (all media)	BERA (2008) NFA ROD (2011) all media AR# 000161
Site 29	Not Identified	Not Identified		Soil/GW/SW/SD - 13	Lee Pond (SSA 20)	Not identified	Response Complete (all media)	NFA ROD (2009) for all media AR#000099
Site 30 / AOC 22	Not Identified	Not Identified		Soil/GW/SW/SD - 11	Bracken Road Incinerator and Environs (former SSA 24)	Not identified	Response Complete (all media)	NFA ROD (2011) for all media AR#000120
Site 31 / AOC 23	Not Identified	Not Identified		Soil/GW/SW/SD - 22	Barracks Road Landfill Industrial Area	Appendix B Desktop Audit	RI/FS (GW/SW/SD/VI/Soil)	RI for all media (2019) Periodic VI monitoring and reporting (2021) FS ongoing
Site 32 (SSA 25)	Not Identified	Not Identified		Soil/GW/SW/SD - 23	Wetlands Downgradient of Beaver Pond	Not Identified	Response Complete (all media)	BERA (2008) EE/CA (2008) NFA ROD (2011) for SD/SW AR# 000255 SI documenting NFA for upgradient Soil/GW (2013)
Site 33 (SSA 22 / AOC 4)	Not Identified	Not Identified		Soil/GW/SW/SD - 28	Sand Blasting Grit Pile	Not Identified	SSP NFA (soil) RI/FS (GW/SW/SD/soil/debris)	Site Screening Process Report 2001 AR# 01350 SI for all media conducted in 2018 being documented in RI SAP RI for all media ongoing*
Site 34 (SSA 14)	SWMU 72	SSA 14		Soil/GW/SW/SD - 27	Building 537 Discharge to Felgates Creek	Appendix A SSA/SSP	RI/FS (soil/GW/SW/SD)	EE/CA for soil/SD (2005) CCR (2009) RI ongoing

Table 2-1. Site Summary NWS Yorktown
 FY 2022 - 2023 SMP
 Naval Weapons Station Yorktown, Yorktown, Virginia

Site Identification	Other Identification				Site Name	Site Description	FFA Status	Current CERCLA Status	Comments/Notes
	IAS (1984) RCRA (1992)	FFA	Navy OU Number	EPA OU Number					
SSA 2	SWMU 54	SSA 2			Former EOD Burning/Disposal Area	4.1 acre storage area for 2 small (3 yd ³) dumpsters; 1994 removal action of surface debris	Appendix A SSA/SSP	SSP NFA	NFA 1992 RCRA SWMU Investigation AR# 000780
SSA 3	SWMU 56, 57, 58, 59	SSA 3			Fire Training Pits and Vicinity	2.7 acre fire training area; 1996 removal action of soil/tanker trailer	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report 2001 AR# 01350
SSA 4	SWMU 102	SSA 4			Weapons Casing/Drum Disposal Area	0.5 acre former disposal area; 1994 removal action of surface debris	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report 2001 AR# 01350
SSA 5	SWMU 101	SSA 5			Bypass Road Landfill	0.9 acre disposal area; 1994 removal action of surface debris	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report 2001 AR# 01350
SSA 8	SWMU 122, 123	SSA 8			Building 350 Rail Roadhouse Maintenance Area Trench Outfall	0.4 acre underground oil/water separator	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report (July 1997) AR# 01.10-07/29/97 0905
SSA 11	SWMU 113	SSA 11			Building 3 Neutralization Unit	0.2 acre drainage system (rectangular tank, trench, and sump)	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report (July 1997) AR# 01.10-07/29/97 0906
SSA 12	SWMU 133, 134; EPIC 41, 42	SSA 12			Public Works Storage Yard/Building 683 Vicinity	1.5 acre storage area comprised of 2 waste accumulation areas (open field and fenced area)	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report (July 1997) AR# 01.10-07/29/97 0907
SSA 13	AOC R	SSA 13			Building 529 Battery Drainage Area	0.5 acre paved area for discharge of washwater into storm drain	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report (July 1997) AR# 01.10-07/29/97 0908
SSA 15	SWMU 127	SSA 15			Sewage Treatment Plant #1 Sludge Drying Beds and Discharge Area	0.3 acre sewage treatment plant; 2001 removal action of imhoff tank, trickling filter, sludge drying bed, and chlorination unit	Appendix A SSA/SSP	NFA	NFA (August 2010) AR# 002435
SSA 17	SWMU 74	SSA 17			Building 1456 Mark 46 Waste Otto Fuel Tank	2.35 acre area around UST and associated piping; 1995 removal action of UST system	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report (March 1996) AR# 03.13-03/18/96 00666
SSA 19	SWMU 31, 32, AOC B	SSA 19			Beaver Road/Ponds 11 and 12 Drainage Area and Environs	164 acres surrounding the open burn/open detonation area	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report (March 1996) AR# 03.13-03/18/96 00667
SSA 21	Not Identified	Not Identified			Roosevelt Pond	22.2 acre pond receiving storm water from industrial area	Not Identified	SSP NFA	NFA Site Screening Process Report 2001 AR# 01350
SSA 23	Not Identified	Not Identified			Coal Storage Area	1 acre coal storage area surrounded by 9-inch thick reinforced concrete wall	Not Identified	SSP NFA	NFA Site Screening Process Report 2001 AR# 01350
AOC 1	AOC O	AOC 1			Building 350 Rail Roadhouse Transformer Pad	Fenced concrete pad outside Building 350	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 2	SWMU 128	AOC 2			Building 372 - PW Vehicle Maintenance O/W Separator	Below grade two chambered concrete oil/water separator	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 3	AOC J	AOC 3			Blasting Grit Spill Area	Area near Building 1347 where black powdery/glassy material was observed (may result from previous sandblasting activities)	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 4	AOC S	AOC 4			Paint Shop Grit Disposal Area	Area of soil and pavement outside building 530 where a container of metal grit was previously stored. Pavement was badly worn and contains staining	Appendix B Desktop Audit	NFA	Desk Top Audit determined site as SSA 22. NFA in SSP AR# 01350
AOC 7	SWMU 177	AOC 7			STP # 4 Sludge Drying Beds	Inactive sewage treatment plant (clarifier, settling tanks, and sludge drying beds); unit managed sanitary waste and possibly explosive contaminated wastewater	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 8	SWMU 37	AOC 8			Building 118 Waste Oil O/W Separator	One or two underground oil/water separators of unknown size and construction.	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 9	SWMU 147 & 148	AOC 9			Building 683 O/W Separator	50 feet by 50 feet concrete pad used for washing heavy equipment. Wastewater drains to below grade two chambered oil/water separator	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 10	EPIC 45	AOC 10			Stoney Point Road Disposal Area (STP # 2)	Area of soil where construction debris from barracks demolition was disposed.	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909

Table 2-1. Site Summary NWS Yorktown
 FY 2022 - 2023 SMP
 Naval Weapons Station Yorktown, Yorktown, Virginia

Site Identification	Other Identification				Site Name	Site Description	FFA Status	Current CERCLA Status	Comments/Notes
	IAS (1984) RCRA (1992)	FFA	Navy OU Number	EPA OU Number					
AOC 11	SWMU 174	AOC 11			Building 710 Waste O/W Separator	Below grade two chambered concrete oil/water separator	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 12	SWMU 71	AOC 12			Building 457 O/W Separator	Below grade two chambered oil/water separator that received discharge from boiler operations. May be near/assoc/w SSA 14	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 13	SWMU 98	AOC 13			Building 370 O/W Separator	Underground oil/water separator; Liquid contents unknown, but suspected to be oil contaminated wastewater from boiler activities	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 14	SWMU 160	AOC 14			Building 1811 - Supply Storage Yard	Concrete storage pad where usable materials and waste was stored on and around pad.	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 15		AOC 15			Building 1744 Explosive Burning Silo	Building 1744 Explosive Burning Silo	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 16	SWMU 107	AOC 16			X-Ray Facility Tank	Below grade two chambered oil/water separator that received discharge from X-ray facility	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 17	SWMU 29 EPIC 34	AOC 17			Dredge Material Disposal Area	Vegetated area where dredge spoils from the York River were deposited	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 18	AOC M	AOC 18			Code 17 Contaminated Soil Runoff Drainage ways	Area of pavement where oil contaminated soil was placed on plastic. Discolored area of pavement caused by drainage from this area and SWMU 104 was observed	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 19	SWMU 104	AOC 19			Code 17 Storage Compound	Two fenced-in areas of pavement where contaminated liquid and soil are stored in drums. Discolored area of pavement caused by drainage from this area and AOC M was observed	Appendix B Desktop Audit	NFA	Consensus for NFA September 1997 Partnering Meeting
AOC 20	SWMU 72	AOC 20			NEDED Discharge areas to Felgates Creek	Two pipes discharged explosive contaminated wastewater to Felgates Creek	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997-AR# 01.10-09/23/97 00909
AOC 21	SWMU 181, 97, 168	AOC 21			West Road Coal Storage Area/Buildings 370 & 708 Coal Storage Piles	Currently known as SSA 23	Appendix B Desktop Audit	NFA	Portion of AOC became SSA 23; Remainder of site NFA as documented in EPA letter July 11, 1995
MWR Skeet Range	Not Identified	Not Identified			MWR Skeet Range	30 acre small arms range	Not identified	MRP	NFA ESI 2008 AR# 02180
UXO 2	IAS Site 2	Site 2		Soil/GW/SW/SD - 31	Turkey Road Landfill	5 acre landfill; 1994 partial removal action of waste	Findings of Fact RI/FS	RI/FS (all media)	Site 2 was transferred to the MRP and became UXO 2 on June 19, 2007 RI ongoing
UXO 3				SD - 30	NMC Munitions Loading Pier	Current and former munitions loading pier along the shoreline of the York River; surrounded by ESQD arcs	Not identified	PA/SI	PA (2013) SI Phase I (2014) SI Phase II (2017) AAR completed in 2017, no further work currently planned. However, until the remaining active pier is no longer used and the area investigated, the site cannot be closed.
EOD Range	SWMU 54	SSA 2			EOD Range	Open Burn/Open Detonation Range	Not identified	No Action until range closure; MRP following range closure	The DoN and VDEQ agreed in 2008 that the site will be addressed by the MRP once the range is closed or is no longer active.
Demolition Range					Demolition Range	230 acres in the northwestern portion of the base; the limits of the Demolition Range are based upon the area of the former EOD range that does not overlap the current EOD Range	Not identified	No Action until range closure; MRP following range closure	Identified as potential MRP site based on findings of PA (Malcom Pirnie, 2005). Recommended for MRP once the range is closed or is no longer active (CH2M, 2010).

Notes:

Sites 10, 13, 14, and 15 went NFA prior to the FFA. They are listed in the IAS (C.C. Johnson & Associates, Inc. and CH2M HILL, 1984).
 Site 20 is documented in the Dames and Moore Confirmation studies (1986 and 1988). It became SSA 18 during an SSP investigation (Baker, 1996 - AR No. 00666) and is later designated as Site 26.
 * Indicates site media that have previously been documented in a ROD, but have been reopened in order to investigate areas not previously investigated

Indicates NFA Site/SSA/AOC

AOC - Area of Concern
 CERCLIS - Comprehensive Environmental Response, Compensation, and Liability Information System
 FFA - Federal Facilities Agreement
 FS - Feasibility Study
 GW - Groundwater
 IAS - Initial Assessment Study
 LUC - Land Use Control
 NFA - No Further Action
 O/W - Oil/Water
 OU - Operable Unit
 PP - Proposed Plan
 RCRA - Resource Conservation and Recovery Act

RD - Remedial Design
 RI - Remedial Investigation
 ROD - Record of Decision
 SD - Sediment
 SSA - Site Screening Area
 SSP - Site Screening Process
 STP - Sewage Treatment Plant
 SW - Surface Water
 SWMU - Solid Waste Management Unit
 UST - Underground Storage Tank
 UXO - Unexploded Ordnance
 VOC - Volatile Organic Compound

Table 2-2. Major Elements of the CERCLA Process
 FY 2022 - 2023 SMP
 Naval Weapons Station Yorktown, Yorktown, Virginia

Preliminary Assessment (PA)	Initiation of concern about a site, area, or potential contaminant source. The PA is a limited-scope assessment designed to distinguish between sites that clearly pose little or no threat to human health or the environment and sites that may pose a threat and require further investigation. Environmental samples are rarely collected during a PA. The PA also identifies sites requiring assessment for possible response actions. If the PA results in a recommendation for further investigation, an SI is conducted.
Site Investigation (SI)	Some sites warrant preliminary or interim investigations, studies, or removal/remedial actions. If it is unclear as to whether a site should be included in the CERCLA RI/FS process, an SI is sometimes conducted to make a general determination if activities at the site have impacted environmental media. SIs typically include the collection of environmental and waste samples to determine which hazardous substances are present at a site and to determine if these substances have been released to the environment.
Remedial Investigation (RI)	During an RI, data are collected to characterize site conditions, determine the nature of the waste, assess risk to human health and the environment, and, if necessary, conduct treatability testing to evaluate the potential performance and cost of the treatment technologies being considered.
Treatability Study (TS)	Treatability studies may be conducted at any time during the CERCLA process. The need for a treatability study generally is identified during the FS. Treatability studies may be classified as either bench-scale (laboratory studies) or pilot-scale (field studies). For technologies that are well-developed and tested, bench-scale studies are often sufficient to evaluate performance. For innovative technologies, pilot tests may be required to obtain the desired information. Pilot tests simulate the physical and chemical parameters of the full-scale process, and are designed to bridge the gap between bench-scale and full-scale operations. Treatability studies are performed to assist in the evaluation of a potentially promising remedial technology. The primary objectives of treatability testing are to provide sufficient data to allow treatment alternatives to be fully developed and evaluated during the FS and support the remedial design of a selected alternative.
Engineering Evaluation/ Cost Analysis (EE/CA) and Interim Removal Action (IRA)	Removal actions are implemented to clean up or remove hazardous substances from the environment at a specific site in order to mitigate the spread of contamination. Removal actions may be implemented at any time during the CERCLA process. Removal actions are classified as either time-critical or non-time-critical actions. Actions taken immediately to mitigate an imminent threat to human health or the environment, such as the removal of corroded or leaking drums, are classified as time-critical removal actions. Removal actions that may be delayed for 6 months or more without significant additional harm to human health or the environment are classified as non-time-critical removal actions (NTCRA). For an NTCRA, an EE/CA is prepared rather than the more extensive FS. An EE/CA focuses only on the substances to be removed rather than on all contaminated substances at the site. It is possible for a removal action to become the final remedial action if the risk assessment results indicate that no further remedial action is required in order to protect human health and the environment.
Feasibility Study (FS)	The FS is the mechanism for the development, screening, and detailed evaluation of alternative remedial actions. The RI and FS can be conducted concurrently; data collected in the RI influences the development of remedial alternatives in the FS, which in turn affect the data needs and scope of treatability studies and additional field investigations. This phased approach encourages the continual scoping of the site characterization effort, which minimizes the collection of unnecessary data and maximizes data quality.
Proposed Plan (PP)	A PP presents the remedial alternatives developed in the FS and recommends a preferred remedial alternative. The public has an opportunity to comment on the PP during an announced formal public comment period. Site information is compiled in an administrative record and placed in the general IR program information repositories established at local libraries for public review. The public comments are reviewed and the responses are recorded in a document called a Responsiveness Summary. At the end of the public comment period, an appropriate remedial alternative is chosen to protect human health and the environment. All parties directly involved in the restoration program (Navy, EPA, and VDEQ) must agree on the selected alternative.
Record of Decision (ROD)	The ROD document is issued to explain and document the selected remedial action. Public comments received during the PP are addressed as part of the responsiveness summary in the ROD. A notice to the public is issued when the ROD is signed by Navy and EPA following State concurrence.
Remedial Design/Remedial Action (RD/RA)	The final stage in the process is the RD/RA. The technical specifications for cleanup remedies and technologies are designed in the RD phase. If land use controls are a component of the remedy, the Land Use Control Remedial Design is generated during this phase. The RA is the actual construction or implementation phase of the cleanup process.
Remedy In Place (RIP)	For long-term remedies where it is anticipated that remedial action objectives will be achieved over a long period, the RIP milestone signifies the completion of the remedial action construction phase, and that the remedy has been implemented and has been demonstrated to be functioning as designed (i.e., all testing has been accomplished and the remedy will function properly).
Response Complete (RC)	Within the CERCLA process there are multiple points at which a decision can be made that no further response action is required. Properly documented (necessary regulatory notification or application for concurrence has occurred), these decisions constitute response complete and/or site closeout. RC is the point at which the remedy has achieved the required reduction in risk to human health and the environment (cleanup goals have been met). Response complete is followed by site closeout.
Long-Term Management	Long-term management may be required to monitor long-term protectiveness of the remedy, and may include implementation and management of LUCs, groundwater monitoring, and preparation of Five-Year Review reports. Long-term management is required at sites where hazardous substances, pollutants, or contaminants remain onsite after RC, and are at levels that prevent unlimited use and unrestricted exposure. Five-year reviews generally are required by CERCLA or program policy when hazardous substances remain on site above levels that permit unrestricted use and unlimited exposure. Five-year reviews provide an opportunity to evaluate the implementation and performance of a remedy to determine whether it remains protective of human health and the environment. Generally, reviews are performed 5 years after the initiation of a CERCLA response action, and are conducted every 5 years as long as future uses remain restricted. Five-year reviews for NWS Yorktown are performed by the Navy, the lead agency for the site, but EPA retains responsibility for determining the protectiveness of the remedy.

Table 2-3. NWS Yorktown/CAX Partnering Team Consensus Statement Summary
 FY 2022 - 2023 SMP
 Naval Weapons Station Yorktown, Yorktown, Virginia

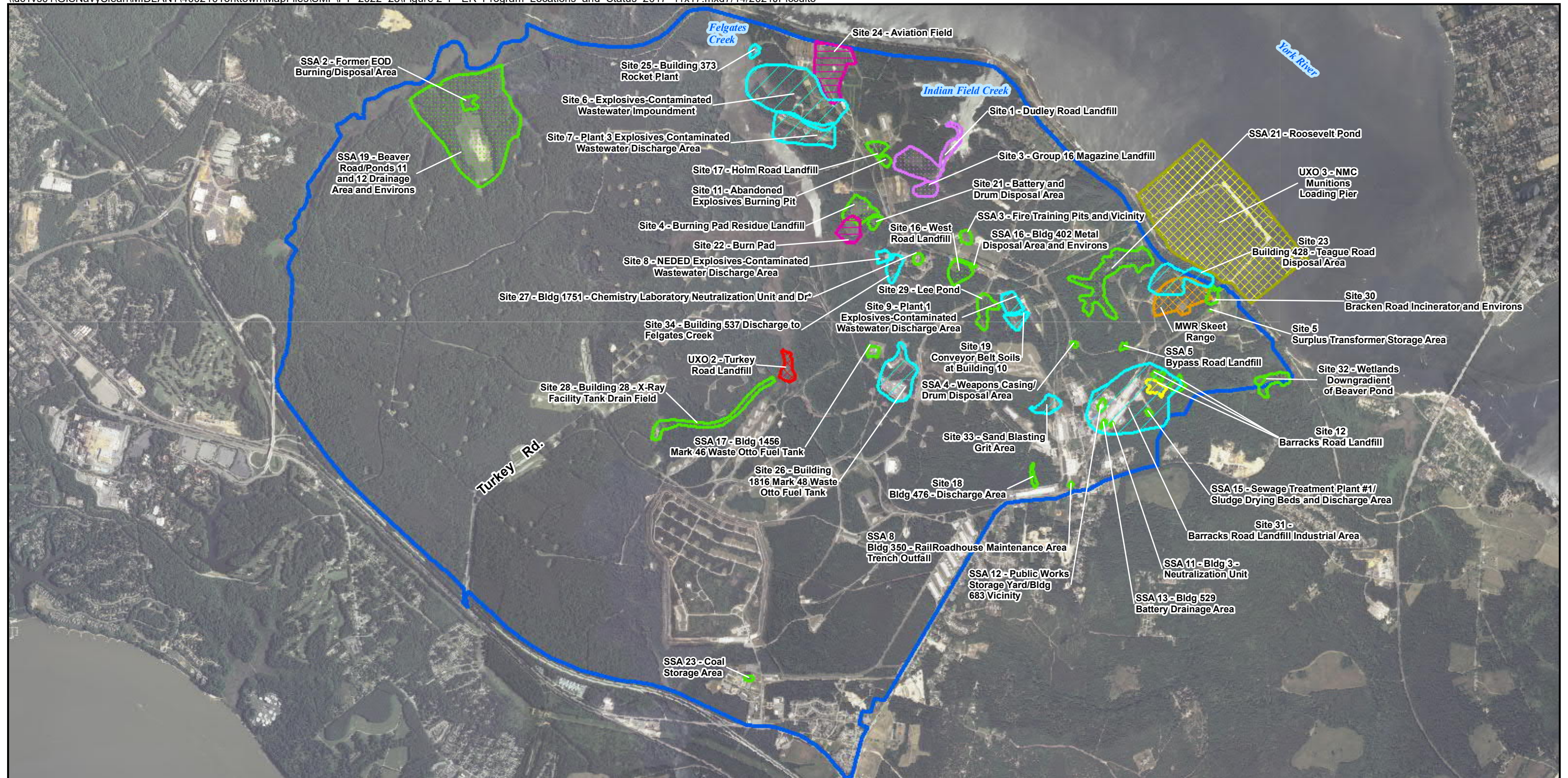
Number	Consensus Statement Number	Date	Facility	Site	Topic	Consensus Statement
	NA	10/23/2001	WPNSTA	18	Site 18	The Team agreed to separate the Mercury issue from the Site 18 ROD.
	NA	10/23/2001	WPNSTA		Dec. 2002 Partnering Meeting	The team agreed to start at 12:00 noon Monday, December 3, 01 (lunch on own prior to starting) and meet through Wednesday evening with site visits Thursday December 6, 2001.
	NA	12/3/2001	WPNSTA	6, 7	LUCIP Review Sites 6 & 7	state the site size and then the size of the restricted area, annotate Global Position Coordinates (GPS) of restricted area on figures.
	NA	12/3/2001	WPNSTA/CAX		Define Metrics in Partnering Deliverable	Keep as stated in deliverable.
	NA	12/4/2001	WPNSTA	6	Site 6 – Explosives-Contaminated Wastewater Impoundment	This site is former cache where TNT was placed in a hole and stored. The hole was later backfilled. Soil with concentrations of cadmium and zinc were left in the hole and then backfilled with 4 feet of soil. After discussing the conditions of the site, the team agreed to evaluate whether further action was required at this site.
	NA	2/5/2002	WPNSTA	18	Site 18	Because Site 18 is NFA, the team proposed to schedule preparation of documents for this site on the same schedule as Sites 23-26.
	NA	2/5/2002	WPNSTA	2, 8, 14	Sites 2, 8, and SSA 14	Sites 2, 8, and SSA 14 (2 will be a ROD, 8 & SSA 14 will be a ROD) will track on a later schedule than Sites 23-26.
	NA	2/5/2002	WPNSTA	8, 18, SSA 14	RI Sites 8, 18 & SSA 14	Baker will update the report and resubmit for review and comment.
		2/5/2002	WPNSTA/CAX	12	5-Year Review	The team agreed to form a subgroup to research and report out at the March meeting on this issue. The subgroup consists of Bob Stroud and Jennifer Davis.
	NA	2/5/2002	WPNSTA/CAX		2002 Goals Update	The team agreed to include the Goals as part of each meeting's minutes.
	NA	2/5/2002	WPNSTA/CAX		Consensus Statement Documentation	The team agreed to document Consensus Statements by site as an addendum to the Site Management Plan. Mary is to evaluate possible methods (by site, chronologically, etc.) and report back to the team during the March Meeting.
	NA	2/5/2002	WPNSTA/CAX		Draft FFA	Scott Park/Jennifer Davis to prepare Draft FFA Addendum for counsel review and submittal to EPA and DEQ.
1	3/13/2002-1	3/13/2002	WPNSTA/CAX		Documentation of Consensus Statements	The team agreed to document Consensus Statements by site as an addendum to the Site Management Plan. A tracking number will be used to track the documents consisting of date and numerical sequence (i.e.: Month/Day/Year-Number – 3/13/02-1).
2	3/13/2002-2	3/13/2002	WPNSTA	4	Clean-up level	If Site 4 removal action cannot achieve residential levels then Sites 4 and 22 ROD will split into two separate RODS.
3	4/23/2002-3	4/23/2002	WPNSTA/CAX		Identification of new sites	The Team agrees that the FFA (Sections 9.3a and 9.3b) gives the team the authority to add newly identified sites to the SMP.
4	4/24/2002-4	4/24/2002	WPNSTA/CAX		Site Management Plan	The team agreed to go final with the FY 2002/2003 Draft SMP and revise text for the FY 2003/2004 submittal. Baker will provide Final covers for the FY 2002/2003 SMP.
7	4/24/2002-7	4/24/2002	WPNSTA/CAX		Community Relations Plan	The Team agrees to go final with the Community Relations Plan. If appropriate, final covers and spines will be submitted.
8	6/03/2002-8	6/3/2002	WPNSTA	GWOU 1	Groundwater Operable Unit 1 – Work Plan	The Team agrees to investigate and install groundwater monitoring wells if a removal action(s) at site 24 within Groundwater Operable Unit I shows contamination or materials that pose a potential risk to receptors with the potential of exposure to groundwater (waste left in place or confirmatory samples detections exceed PRG).
10	8/6/2002-10	8/6/2002	WPNSTA		Five Year Review Report, WPNSTA Yorktown Sites 1, 6, 7, 12, 16, and 19	The team agrees with the 5-year review Report findings and agrees to go final with the document. Jeff Harlow to pursue signature of the document by Admiral.
12	9/18/2002-12	9/18/2002	WPNSTA/CAX		New technical team member	The Team agreed to add Marlene Ivester as a technical member to the team.
13	9/18/2002-13	9/18/2002	WPNSTA/CAX		Facilitator	The team agreed a facilitator is needed for a few meetings.
14	10/22/2002-14	10/22/2002	WPNSTA		LUCIPs	The Team agreed to revise the LUCIP to incorporate two sections: Site Environmental History and References. Also, the LUCIP will include a brief executive summary of the ROD (about 1 paragraph, similar to the Camp Allen Landfill LUCIP). The numbers of signs for each site is as follows: - Site 12: At least four signs, placed at egress points to the site (of the ten proposed, four will be mandatory) - Site 19: At least three signs, placed at egress points to the site - Site 1: At least three signs, placed at egress points to the site - Sites 6 & 7: At least three signs for Site 6 at egress points and one sign at Site 7 egress point
15	10/23/2002-15	10/23/2002	WPNSTA/CAX		N/A	The Team agreed to add a goal to the FY03 Team Goals to be self-facilitating by end of third Quarter 2003 (5 additional meetings).
16	10/23/2002-16	10/23/2002	WPNSTA		GWOU I	The Team agreed that Baker can proceed with submitting the response to comments and with submitting a revised Draft Final Work Plan for GWOU I to the normal distribution list.
17	10/23/2002-17	12/4/2002 Revised	WPNSTA/CAX		WPNSTA-SSAs 3-24; 23-26; 2, 8, 18 & SSA 14; GWOU I, 27-30 CAX-1, 4 & 9, 11, Background Study, NFRAP 2, 3, 5, 6, 9, 10 & 12	The WPNSTA Yorktown/CAX Partnering Team empowers the ecological technical support team to address and resolve ecological issues for various sites at WPNSTA Yorktown/CAX (see table below) to meet the dates and priority specified by the WPNSTA Yorktown/CAX Team, with Ed Corl to take the lead on meeting the schedule determined by the Team. WPNSTA: SSAs 3-24 SSP; 23-26 DF RI; 2, 8, 18 & SSA 14 DF RI; GWOU I Draft WP; 27-30 Draft RI CAX: 1 DF RI; 4 & 9 Draft RI (SERA); 11 Draft RI, Draft Background Study; 2, 3, 5, 6, 9, 10 & 12 Draft NFRAP
18	12/5/2002-18	12/5/2002	WPNSTA/CAX	21, 22	WPNSTA Sites 21 & 22	Based upon EPA Region III comments, Sites 21 and 22 RODs will be rewritten as No Further Action (NFA) RODs with no institutional controls (ICs) because they were remediated to residential levels.
19	12/5/2002-19	12/5/2002	WPNSTA/CAX		Site Action Status Report	The Team agrees to use the SASR as a tracking tool and add it to the standard meeting format.
20	12/5/2002-20	12/5/2002	WPNSTA/CAX		Action Item List	The Team agreed that the Action Item List will be addressed during the Agenda Building Call with respect to whether or not the Action Item has been completed. If completed, a "C" will be put in the Outcome column of the Action Item list and the item will not be addressed during the subsequent Partnering Team Meeting.

Table 2-3. NWS Yorktown/CAX Partnering Team Consensus Statement Summary
 FY 2022 - 2023 SMP
 Naval Weapons Station Yorktown, Yorktown, Virginia

Number	Consensus Statement Number	Date	Facility	Site	Topic	Consensus Statement
21	1/29/2003-21	1/29/2003	WPNSTA/CAX		CAX Site 1 Baseline Risk Assessment	The eco subgroup discussed the issues for the CAX Site 1 RI and determined that a baseline risk assessment was warranted for the wetland area based upon a conference call prior to the December Partnering Meeting. The Navy RPM determined that based upon the existing ROD schedule and funding execution for the site, the ROD and funding schedule could not be met. Therefore, the Navy recommended that an EECA for soils/debris removal at CAX Site 1 would be the best approach. The Team agrees upon this approach.
22	3/13/2003-22	3/13/2003	WPNSTA	23	Confirmation sampling during removal action	At Yorktown Site 23, the Team agrees that the removal action should meet the following goals: Areas A and C are large areas and confirmation sampling will include multiple bottom samples as proposed in the confirmation sampling plan. All other sample locations that exceed cleanup goals at this time will be removed as hot spots.
24	3/13/2003-24	3/13/2003	WPNSTA	4	Site clean-up goals	The team agrees that the ROD for Site 4 should be drafted upon completion of the on-going non-time critical removal action (NTCRA) to ensure that the ROD will be most appropriate in light of final conditions following the NTCRA. The team understands that \$600,000 will be committed in March 2003 to fund the NTCRA and that the Navy RPM projects that the NTCRA may require additional funding at the start of FY04 to complete the clean up.
26	6/17/2003-26	6/17/2003	WPNSTA	24	Groundwater investigation at WPNSTA Site 24 – Aviation Field	Based upon past sample results and the reported solid waste disposed of at WPNSTA Site 24 – Aviation Field, the Partnering Team agrees that a groundwater investigation is not warranted at this time unless the planned removal action at WPNSTA Site 24 can not meet human health or ecological clean-up goals that have yet to be determined for sediment and soil.
30	6/19/2003-30	6/18/2003	WPNSTA	12	Long term monitoring program at WPNSTA Site 12	Based upon the information presented on June 19, 2003 at the Partnering Meeting on the long term monitoring program at WPNSTA Site 12 (years one through five), the Partnering Team agreed to the following: 1. Eliminate LTM monitoring at wells 12GW13 and 12GW4 (located upgradient of site) and collect one round of samples during the next 5 year LTM period at wells 12GW8, 12GW19, 12GW18 and 12GW 18A and analyze for 8 RCRA metals (total metals only). 2. The team agreed to install a new monitoring well, 12GW20, down gradient of well 12GW07 at the site to identify the migration pathway for VOCs. 3. Eliminate sampling at wells 12GW01A, 12GW06 for VOCs because: a. 12GW01A is screened in the deeper aquifer and has no history of detections; b. 12GW06 – concentrations have decreased over time and it is recommended that monitoring at 12GW01 will adequately monitor groundwater pathway. 4. Collect samples from at 10 wells (12GW01, 12GW05, 12GW07, 12GW09, 12GW13, 12GW14, 12GW17, 12GW15, 12GW16, and 12GW20 (new well) every two years and analyze for all VOCs. 5. The team agreed to collect 4 or 5 sediment samples at locations 12SDCW1, 12SD32, 12SD34, 12SD37, and RI sample location SD17 and analyze for the 8 RCRA metals once (in year 9 or 10) in the next 5-year review cycle.
32	12-2-03-32	Dec. 2, 2003	WPNSTA	WPNSTA OB/OD Range	OB/OD Groundwater Monitoring Program	The Partnering Team agrees that the RCRA groundwater monitoring program conducted at the OB/OD Range Site should be discontinued as the CERCLA program will be conducting a media-wide investigation of the site.
33	1-07-04-33	1/7/2004	WPNSTA	23	Site 23 TCRA	With respect to zinc-contaminated soil at Site 23, the Team agrees to stop excavating at Grids 1 through 6, and to place a minimum of 2 feet of clean backfill. We agree that with a minimum of 2 foot of clean fill, there are no current unacceptable ecological risks presented by the soils. With respect to grids 4, 5, and 6, confirmation sampling indicates that zinc concentrations at the bottom of the excavated grids exceed the cleanup goal of 200 mg/kg. The Team agrees that based on the current mission of the WPNSTA, and the location of Site 23 within the blast arc of the pier, it is unlikely that the site would be redeveloped. However, should the soil at grids 4, 5, and 6 be excavated in the future, there is a chance of future ecological risks from zinc in the soil, should this soil be brought back to the surface. However, this potential risk ecological risk is small, given that the overall size of grids 4 5, and 6 is relatively small, and given that if excavation occurred, soil would be mixed with clean fill, and this mixing with the clean fill would lower the overall zinc concentrations. Therefore, the actual chance of potential future ecological risks is minimal, and acceptable.
34	3-9-04-34	3/9/2004	WPNSTA	4	Site 4 Draft ROD	The team will move forward with the preparation of the Draft ROD for WPNSTA Site 4 as cited in the FY 2004 team goals. The document will be for internal team review only pending completion of removal activities at WPNSTA Site 4.
35	3-9-04-35	3/11/2004	CAX	12	Site 12 NFRAP	The team agrees with the NFA remedy for CAX Site 12 – Disposal Site Water Tower based upon the no further action remedy recommended in the Technical Memorandum submitted for review on January 12, 2004. A No Further Response Action Planned (NFRAP) Decision Document with a Final Technical Memorandum as an appendix will be prepared for submittal by March 31, 2004 in accordance with the annual team 2004 goals.
36	3-22-04-36	3/22/2004	CAX	7	CAX Site 7	Based upon the field investigation conducted at CAX Site 7N, as summarized in the Draft Trenching Letter Report dated 19 March 2004, the team has agreed to move forward with a TCRA Action Memorandum as an interim action that will recommend appropriate erosion control and shoreline stabilization for the site. The team also agrees that removal of the CAX Site 7N landfill will be accomplished under an Engineering Evaluation/Cost Analysis (EE/CA) when funding is available. While the team agreed that an esthetic clean up of the beach in the vicinity of the landfill does little to mitigate risk, the team agreed to move forward with a beach cleanup at the request of the Navy.

Table 2-3. NWS Yorktown/CAX Partnering Team Consensus Statement Summary
 FY 2022 - 2023 SMP
 Naval Weapons Station Yorktown, Yorktown, Virginia

Number	Consensus Statement Number	Date	Facility	Site	Topic	Consensus Statement
37	5-18-04-37	5/18/2004	WPNSTA	SSA 25	Planned action for SSA 25	The team agrees, based upon the 2003 limited field investigation, to develop a work plan for the continued investigation of mercury associated with the former STP 2 area, when funding becomes available. The team agrees that the proposed continued investigation is a high priority. The work plan will include a sampling program of sediment and tissue samples of small fish and amphibians or frogs to further assess nature and extent (vertical and lateral) of mercury in Ballard Creek from the Beaver Dam to the next downstream impoundment structure.
38	5-19-04-38	5/19/2004	WPNSTA/CAX		BTAG	The Yorktown/CAX Partnering Team agrees that the role of USEPA BTAG members will be changed from Adjunct Member to Technical Member.
39	6-24-04-39	6/24/2004	WPNSTA	18	Site 18 NFA	Team agrees with No Further Action for WPNSTA Yorktown Site 18.
40	6-24-04-40	6/24/2004	WPNSTA	2, 8, SSA 14	Planned action for Sites 2, 8, SSA 14	Team agrees to perform pre-characterization sampling for WPNSTA Yorktown Sites 2 and 8 and SSA 14. If the sampling shows that the extent of contamination at the sites can be well defined, then the Navy will complete an EE/CA with a removal action and go for a NFA ROD. However, if the sampling indicates that extent of contamination at the sites cannot be well defined, then the Team agrees to go forward with a BERA and follow on FS/PRAP with a ROD with remedy.
41	5-18-05-41	5/18/2005	WPNSTA	OB/OD	Path forward for sampling for planned RI	As presented on May 18, 2005, the Team agrees with Sampling Option 2 for the upcoming field investigation. Sampling Option 2: collect 15 surface soil and 15 subsurface soil samples from within the tree line area, and collect 30 surface soil samples outside the tree line. This option will capture the greatest extent of exposure points for ecological receptors.
42	8-17-05-42	9/26/2005	WPNSTA	SSA 25	Team approval of Draft Work Plan for SSA 25 Mercury Investigation	The Team agrees that the Work Plan for the SSA 25 investigation can be finalized and that field work can be scheduled.
43	4-4-06-43	4/4/2006	WPNSTA	1, 3, 11	Team approval of post-ROD documentation that addresses minor changes in the remedies at Sites 1, 3 and 11 at WPNSTA Yorktown.	<p>The Team understands that the selected remedy documented in the Sites 1 and 3 ROD (Baker, 1999) and the Site 11 ROD (Baker, 2000) estimate an amount of soil that would be removed during the execution of the selected remedies, as noted above. The remedial action closeout reports (OHM, 2001a and 2001b) document that the actions resulted in the removal of 413 tons (260 cy) of soil from Site 1, 284 tons (800 cy) of soil from Site 3, and 655 tons (400 cy) of soil from Site 11.</p> <p>While these increases in quantity constitute changes in the remedy, they are considered minor changes in terms of USEPA guidance on post-ROD changes (USEPA, 1999). A minor change is considered a change that does not have a significant impact on scope, performance, or cost of the remedy, such as a small volume change or a change in the long term monitoring frequency.</p> <p>The Team, therefore, agrees that a Memo to File is appropriate to document these minor changes for Sites 1, 3 and 11. The Memo to File will become part of the WPNSTA Yorktown Administrative Record.</p>
44	7-24-06-44	7/24/2006	WPNSTA	GWOUs	Elimination of GWOU designations	Groundwater at WPNSTA Yorktown will be addressed on a site-specific basis.
45	9-1-06-45	9/1/2006	WPNSTA	12	LTM at Site 12	Elimination of VOC sampling from LTM sampling program at Site 12.
46		3/14/2008	WPNSTA	3	LUC not necessary	<p>The Partnering Team agrees to the following:</p> <ol style="list-style-type: none"> 1. Residual levels of cPAHs in the PAH hot-spot are below clean up levels that are protective of human health (4.1 mg/kg) and the environment (44 mg/kg) for UUUE. 2. Soils at the entire site poses no unacceptable risks to human health or the environment 3. No waste material remains at the site and 4. The entire site meets the criteria for UUUE <p>Therefore land use controls are not necessary to protect human health and the environment from exposure to soil at Site 3.</p>
47		5/15/2008	WPNSTA	8	NFA for soil and sediment	The Partnering team agrees that, based on the removal action and post-removal confirmation sampling results, no further action for soil or sediment is required at Site 8.
48		5/20/2008	WPNSTA	11 and 17	NFA for groundwater	The Partnering team agrees groundwater poses no unacceptable human health or ecological risks, therefore NFA is warranted for groundwater at Sites 11 and 17.
49	9-23-09-1	9/26/2009	WPNSTA	Site 16/SSA 16	Withdrawal of ESD and continuation of ICs	The partnering team agreed that the Site 16/SSA 16 Risk Management Technical Memorandum and ESD will be withdrawn and the Institutional Controls, along with Five-Year Reviews, will continue at the site.
50	8-19-14-1	8/19/2014	WPNSTA	Site 3	Draft Final ROD will not be finalized	The Partnering team agreed that the Site 3 Draft Final ROD would not be finalized, as additional evaluation of groundwater at Site 3 to better understand the nature of arsenic and manganese concentrations in groundwater was warranted prior to completion of the ROD.



Legend

- | | | | |
|--|--|--|-------------------------------------|
| | Response Complete IRP Site with LTM | | NFA IRP Site Screening Area or Site |
| | Remedial Design/Remedial Action IRP Site | | RI/FS MRP Site |
| | PP/ROD IRP Site | | PA/SI MRP Site |
| | RI/FS IRP Site | | NFA MRP Site |
| | Installation Boundary | | |

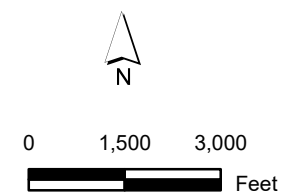


Figure 2-1
ER Program Locations and Status
Site Management Plan for FY 2022 to 2023
NWS Yorktown
Yorktown, Virginia

NWS Yorktown Site Descriptions

This section provides a summary of basewide studies, a brief history of CERCLA activities (chronology of significant CERCLA documents and milestones), and a summary of the nature and extent of contamination, potential unacceptable risks, RAs, and CERCLA path forward for each of the active sites at NWS Yorktown. Schedules for this SMP illustrate ongoing and planned CERCLA activities for FY 2022 and FY 2023.

3.1 Basewide Studies

NWS Yorktown initiated its environmental investigation and restoration efforts in 1984 under the NACIP program by conducting an Initial Assessment Study (IAS). The purpose of the IAS was to identify and assess sites posing a potential threat to human health and/or the environment due to contamination from past operations. A total of 19 sites were identified based on information from historical records, aerial photographs, field inspections, and personnel interviews. The IAS concluded that 15 of the 19 sites posed a sufficient threat to human health or the environment to warrant Confirmation Studies (C. C. Johnson/CH2M, 1984).

Confirmation Studies included the collection and analysis of groundwater, sediment, and soil in 1986 and 1988. In 1986, samples were collected from the 15 sites identified in the IAS (Dames & Moore, 1986). The 1988 sampling effort consisted of additional analyses of groundwater, sediment, and soil (Dames & Moore, 1988). In 1992, an RI Interim Report summarized confirmation study results and recommended further RI activities at 14 of the 15 sites (Versar, 1991).

A Focused Biological Sampling and Preliminary Risk Evaluation was completed in 1993 summarizing results of a limited biological tissue, surface water, and sediment sampling effort to evaluate the potential human health risk associated with consumption of fish and shellfish taken from select waters within NWS Yorktown, including Lee Pond, Roosevelt Pond, Felgates Creek, and Indian Field Creek (Baker and Weston, 1993a). A Habitat Evaluation was completed at NWS Yorktown in 1995 that characterized the aquatic and terrestrial habitats at Sites 1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 16, 17, 18, 19, and 21. The evaluation described the major habitat types on or surrounding each site, provided an inventory of vegetative species, and recorded any animal species encountered or suspected to be present (Baker, 1995).

Five-Year Reviews were conducted in 2002, 2007, 2013, and 2018 to evaluate the effectiveness of the remedies at sites for which there was a Record of Decision (ROD) or Decision Document in place to determine if the remedies continued to be protective of human health and the environment. The 2002 and 2007 Five-Year Reviews included an evaluation of Sites 1, 6, 7, 12, 16/SSA 16, and 19 (Baker, 2002a; CH2M, 2007b). The 2007 Five-Year Review also included an evaluation of Sites 3, 11, and 17. Both documents concluded that all site remedies were properly implemented and protective of human health and the environment. The 2007 Five-Year Review recommended the preparation of Explanations of Significant Differences (ESDs) documenting the changes in scope, performance, and cost of the remedies selected in the RODs for Sites 3, 6, 12, 16/SSA 16, and 17. The 2013 Five-Year Review included evaluations of Sites 1, 6, 7, 12, 16/SSA 16, and 19 (CH2M, 2013a), and concluded that remedies for Sites 7, 12, and 16/SSA 16 were protective of human health and the environment, and that remedies for Sites 1, 6, and 19 were protective of human health and the environment in the short term. The 2013 Five-Year Review recommended that additional investigations be completed for Sites 1, 6, and 19 to evaluate long-term protectiveness. The 2018 Five-Year Review included evaluations of Sites 1, 6, 7, 12, 19, and 22 (CH2M, 2018a), and concluded that remedies for Sites 1, 7, 12, and 19 are currently protective of human health and the environment and that remedies for Sites 6 and 22 are protective of human health and the environment in the short term. Additional investigations for Sites 6 and 22 are currently in progress to evaluate long-term protectiveness. The next Five-Year Review will be completed in 2023; projections of the sites that will be evaluated are identified in this SMP within individual site CERCLA path forward sections.

In November 2014, an update to the NWS Yorktown and CAX CIP was prepared to assist the Navy in meeting the needs of the local community for information about, and participation in, the ongoing investigation and remedial processes (CH2M, 2014g). The CIP identifies community concerns about the investigation and restoration of potentially contaminated sites at NWS Yorktown and CAX and outlines community involvement activities to be conducted during the ongoing and anticipated future restoration activities. In general, the local populace trusts the Navy and feels that the Navy has a good relationship with the community. The CIP is currently being updated.

In 2015, a monitoring well inventory and inspection of all existing ERP groundwater monitoring wells at NWS Yorktown was conducted. Field work was conducted in January 2015 and included an overall inventory and condition assessment of existing groundwater monitoring wells and updating the monitoring well database. In addition, water levels were collected from all of the monitoring wells to provide information on aquifer groundwater flow for each ERP site. Information collected during this basewide investigation is included in the Well Inventory and Inspection Technical Memorandum (TM) (CH2M, 2015d).

In 2016, NAVFAC Headquarters released a directive to conduct a comprehensive compilation of existing information about known or potential releases and potential migration pathways for per- and polyfluoroalkyl substances (PFAS), an emerging contaminant, at naval facilities (Navy, 2016). As part of the NAVFAC Headquarters directive, a Navy-wide review of records was conducted to establish an inventory of locations where PFAS may have been used, stored, released, or disposed of at Navy installations. In response to this direction, a Preliminary Assessment (PA) Work Plan for PFAS at NWS Yorktown was completed in 2019 and the PA Report is being developed and is scheduled to be finalized in FY 2022. PFAS PA Reports are being developed for NWS Yorktown special areas in Virginia (New Kent) and West Virginia (Sugar Grove) and are scheduled to be finalized in FY 2022.

The aforementioned documents and ongoing basewide work are listed, along with the author, date, and AR document number, in **Table 3-1**.

Table 3-1. Basewide Studies

Document Title/Milestone	Author/Date	AR Document Number
IAS of NWS Yorktown	C. C. Johnson/ CH2M, 1984	000247
Confirmation Study Step 1A (Verification), Round One	Dames and Moore, 1986	000256
Confirmation Study Step 1A (Verification), Round Two	Dames and Moore, 1988	000259
RI Interim Report	Versar, 1991	000812
Focused Biological Sampling and Preliminary Risk Evaluation	Baker and Weston, 1993a	000310
Five-Year Review Report for Sites 1, 6, 7, 12, 16, and 19	Baker, 2002a	001310
Five-Year Review Report for Sites 1, 3, 6, 7, 11, 12, 16/SSA 16, 17, and 19	CH2M, 2007b	002155
CIP	CH2M, 2009b	000007
Five-Year Review Report for Sites 1, 6, 7, 12, 16/SSAs 16 and 19	CH2M, 2013a	002568
CIP	CH2M, 2014g	002765
Well Inventory and Inspection TM	CH2M, 2015d	002766
Five-Year Review Report for Sites 1, 6, 7, 12, 19, and 22	CH2M, 2018a	003446
CIP	CH2M, 2021	Pending
PFAS PA Report for NWS Yorktown	In progress	
PFAS PA Report for NWS Yorktown Special Areas – Virginia	In progress	
PFAS PA Report for NWS Yorktown Special Areas – West Virginia	In progress	

3.2 Installation Restoration Program Sites

An overview for each active IRP site at NWS Yorktown is provided in the following subsections, and includes the site description, a summary of previous investigations, media and potential risks identified, activities to be completed in FYs 2021–2022, and the CERCLA path forward. Active IRP sites included in this section, that are currently undergoing investigation and have not been closed, are Sites 1, 3, 6, 7, 8, 9 and 19, 12, 22, 23, 24, 25, 26, 31, 33, and 34.

Summaries of the sites, including those with no action or NFA decisions since 2007, are included in **Table 2-1**. Detailed background information for sites, SSAs, and AOCs with no action or NFA decisions prior to 2007 is provided in the “baseline” FY 2008–2009 SMP (CH2M, 2008b).

3.2.1 Site 1—Dudley Road Landfill

Site 1 Summary	
Status:	Proposed Plan (PP)/ROD Phase: PP for Groundwater, Surface Water, and Sediment
Media Investigated:	Soil: ROD – Navy Operable Unit (OU) VIII, EPA OU 6 – engineered cover/land use controls (LUCs) Groundwater: EPA OU 33 – PP Surface Water: EPA OU 33 – PP Sediment: EPA OU 33 – PP
Removals and RAs:	Surface Debris Removal and Soil Excavation/Cover – 1999 (Baker, 1999b; OHM, 2001)
Media Closed with NFA:	No
Waste and/or Debris Present Onsite:	Yes (asbestos from insulation on steam piping; empty oil, grease, paint, and solvent containers; nitramine-contaminated carbon; household appliances; scrap metal banding; construction debris; tree limbs; lumber; packaging wastes; electrical wires; waste oil; and plastic lens grinding waste); Soil Cover In Place

3.2.1.1 Site Description

Site 1 is a landfill located in the northern portion of NWS Yorktown, west of Indian Field Creek and north of an unnamed tributary to the creek (**Figure 3-1**). Based on the extent of study area boundary, Site 1 is approximately 29 acres in size. Site 1 is generally level and grassy with topography that gently slopes to the east with more pronounced slopes east and south toward Indian Field Creek and the unnamed tributary to Indian Field Creek. The area surrounding the soil-covered landfill is wooded and acts as a riparian buffer for the adjacent Indian Field Creek. Depth to groundwater is between 3 and 10 feet below ground surface (bgs). Groundwater in both the Columbia and Yorktown-Eastover aquifers flows primarily toward Indian Field Creek and its tributary. Indian Field Creek discharges to the York River (approximately 1 mile) downstream of Site 1.

Site 1 was historically used for sand mining activities, resulting in the construction of two borrow pits, which were subsequently filled with waste materials. Between 1965 and 1979, Site 1 was operated as a landfill under a VDEQ Conditional Permit (No. 287) for disposal of solid waste materials in the borrow pits. Disposed waste included asbestos from insulation on steam piping; empty oil, grease, paint, and solvent containers; nitramine-contaminated carbon; household appliances; scrap metal banding; construction debris; tree limbs; lumber; packaging wastes; electrical wires; waste oil; and plastic lens grinding waste. These wastes were estimated at combined disposal quantities of 17 tons per year for approximately 15 years. In 1979, the landfill was closed except for the disposal of plastic lens grinding residues, which continued for 2 years after the closure of the main landfill. In 1985, the landfill was closed to the receipt of all waste materials. A summary of relevant documents and action milestones is presented in **Table 3-2**.

Table 3-2. Site 1 Key Documents

Document Title/Milestone	Summary
Final Round One RI Report for Sites 1–9, 11, 12, 16–19, and 21 (Baker and Weston, 1993b) – AR # 000313	The field investigation for the Round One RI was conducted from June to October 1992, and soil, groundwater, surface water, and sediment samples were collected and analyzed. In addition, a soil cover survey was conducted. Results indicated that landfill activities had affected groundwater quality, as the presence of tetrachloroethene (PCE), TCE, cis-1,2-dichloroethene (cis-1,2-DCE), and other volatile organic compounds (VOCs) and metals were detected in groundwater. VOCs and metals were detected in sediment, and metals were detected in surface water. The report recommended an expanded geophysical investigation to define the boundaries of waste disposal and additional groundwater investigation to delineate the extent of groundwater contamination.
Round Two RI Report for Sites 1 and 3 (Volumes I and II) (Baker, 1998e) – AR # 000998 and 000999	Additional groundwater monitoring wells were installed and test pits were excavated to delineate the extent of waste disposal at Site 1. Surface and subsurface soil, sediment, surface water, and groundwater samples were collected and analyzed. A Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA) were completed and potential unacceptable risks were identified for potential future adult and child residents from exposure to VOCs in groundwater, and potential risk to the aquatic environment was identified due to several metals in sediment and surface water. The report concluded that groundwater at Site 1 had been fully delineated and recommended implementing LUCs to prohibit groundwater as a potable water source, and concluded that NFA was required for Site 1 soils.
FS for Sites 1 and 3 (Baker, 1997a) – AR # 001158	The FS delineated an arsenic “hot spot” in Site 1 soil, where elevated levels of arsenic posed potential risk to human receptors, and established a final remediation goal (RG) of 63 milligrams per kilogram (mg/kg) for arsenic in Site 1 soil. The remedial action objective (RAO) identified was to mitigate the potential for direct contact with arsenic-contaminated soil exceeding the RG. Alternatives evaluated for Site 1 soil were: (1) No Action, (2) Soil Cover and Surface Debris Removal, and (3) Soil Cover, Surface Debris Removal, and Excavation with Offsite Disposal.
PP for Site 1 – Dudley Road Landfill and Site 3 – Group 16 Magazines Landfill (Baker, 1999a) – AR # 001840	The PP was completed to document the proposed RA of soil cover, surface debris removal, and excavation with offsite disposal of soil posing unacceptable risks to human health.
ROD for OU Nos. VIII and IX Site 1 – Dudley Road Landfill and Site 3 – Group 16 Magazines Landfill (Baker, 1999b) – AR # 001000	The ROD for Site 1 identified Alternative 3, soil cover, surface debris removal, and excavation and offsite disposal of soil posing potential unacceptable risks to human health as the selected remedy for Site 1 soil. The major components of the remedy were removal of surficial debris, excavation and offsite disposal of arsenic-contaminated soil within the hot spot area, and restoration of portions of the existing soil cover with eighteen inches of soil cover material followed by 6 inches of topsoil. In addition, LUCs to prevent residential land use were implemented.
RA Report for Sites 1 and 3, and SSA 22 (OHM, 2001) – AR # 001091	The Final RA report documented the completion of the selected remedial alternative, surface debris removal, excavation and offsite disposal of arsenic-contaminated soil from the hot spot at Site 1, and restoration of the soil cover.
Final Long-term Monitoring (LTM) Report for Sites 1, 3, and 7 (Baker, 2006b) – AR # 002075	The LTM Report documented and evaluated the five rounds of LTM samples collected at Site 1. Following the completion of the soil RA, LTM of groundwater, surface water, and sediment was initiated to monitor concentrations of VOCs in groundwater and potential impacts from groundwater discharging to surface water bodies. LTM was initiated based on concurrence of the Yorktown Partnering Team, as LTM was not stipulated in the ROD for Site 1. Round 1 of LTM at Site 1 was conducted in May 2000, and four wells (MW04A, MW05A, MW12, and MW12B) and 10 co-located surface water and sediment locations (SW/SD18 through SW/SD27) were sampled and analyzed for VOCs. Rounds 2 through 5 were conducted in September/October 2004, February 2005, May 2005, and August 2005, respectively. During LTM Rounds 2 through 5, seven monitoring wells (MW04, MW04A, MW05, MW05A, MW12, MW12B, and MW20) and nine co-located surface water and sediment locations (SW/SD19 through SW/SD27) were sampled and analyzed for VOCs. The 2006 Report concluded that LTM should cease at Site 1, given that LTM was not stipulated as the final remedy for groundwater, and additional investigation of groundwater was being conducted.

Table 3-2. Site 1 Key Documents

Document Title/Milestone	Summary
Phase I RI Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25 (CH2M, 2007a) – AR # 002158	The Phase I RI for Groundwater at OU I was completed to assess the nature and extent of groundwater contamination at several NWS Yorktown sites, including Site 1, based on comparison of available data to maximum contaminant levels (MCLs) and maximum background concentrations. Phase I RI field activities were conducted in September and October 2004 and included groundwater sampling. Chlorinated volatile organic compounds (CVOCs), specifically TCE and its daughter products, were identified as primary contaminants in Site 1 groundwater. It was concluded that contaminants in Site 1 groundwater migrate vertically downward and laterally toward Indian Field Creek; however, the extent of CVOc contamination was not fully delineated. The Phase I RI recommended additional investigation, including conducting a membrane interface probe (MIP) investigation, groundwater/surface water interface sampling, further investigation of the aquifers at Site 1, and quantifying potential unacceptable risks.
Phase II RI Report for Sites 1 and 3 (Volumes I, II, III, and IV) (CH2M, 2012b) – AR # 002630, 002631, 002632, 002633	Phase II RI activities were performed between January and September 2009, and consisted of MIP logging, direct-push technology (DPT) sampling, monitoring well installation and sampling, hydraulic conductivity testing, and surface water, sediment, and sediment pore water sampling from the southwestern branch of Indian Field Creek. Using the Phase II RI results, an HHRA was conducted to evaluate potential risks from constituents in groundwater at Site 1 and surface water and sediment in the creek and the tributary. An ERA was conducted to assess potential risks to the environment from constituents in surface water, sediment, and pore water. Groundwater constituents of concern (COCs) identified as posing potential unacceptable risks to human receptors warranting remediation were PCE, TCE, cis-1,2-DCE, and vinyl chloride (VC). While the collected data were determined to be adequate for the purpose of risk assessment, the report recommended further investigation to support the FS. Report conclusions indicated data gaps with regard to VOC concentrations in areas where the plume was delineated only with MIP and components of discharge to surface water bodies under potentially varying base flow conditions.
Final TM for Site 1 Dudley Road Landfill, Extent of Landfill Waste and Soil Cover (CH2M, 2014b) – AR # 002739	The landfill cover investigation was completed to confirm the lateral extent of landfill waste, to confirm the vertical and lateral extent of the soil cover over the landfill, and to delineate waste within the landfill potentially not covered by the existing soil cover. Both the extent of landfill waste material and the soil cover were delineated using historical aerial photographs, historical and recent soil borings and test pit locations, the 2013 field observations and test pit and hand-dug locations, and topography to address uncertainties identified in the 2013 Third Five-Year Review Report. All areas of landfilled waste were found to be covered by at least 2 feet of soil, and the boundaries of the landfill cover could be determined with confidence from the available data. Based on these conclusions, the Navy recommended a LUC Remedial Design (RD) for Site 1 with continued annual site inspections (SIs).
Site 1 RD for LUCs (NAVFAC, 2014a) – AR # 002664	The LUC RD was issued to satisfy the ROD requirement related to LUCs to prevent unacceptable risk from exposure to soil and landfill waste at Site 1. The LUC RD does not pertain to site groundwater, surface water, or sediments since these media were still under investigation. LUCs associated with Site 1 soil and waste (OU VIII) will be maintained within the landfill soil cover boundary until concentrations of hazardous substances within the soils are reduced to levels that allow for unlimited use and unrestricted exposure. These LUCs include prohibiting disturbance of the soil cover, intrusive activities, construction, residential development, and placement of new wells for any purpose other than environmental monitoring, within the boundary of the soil cover.
Phase III RI Report for Site 1 (CH2M, 2016b) – AR # 003228	Phase III RI activities were performed between March and June 2013 and consisted of waste delineation, monitoring well installation and sampling, and surface water, sediment, seep, and sediment pore water sampling. The results from the Phase II HHRA were re-evaluated based on the additional data collected in the Phase III RI. No new groundwater COCs were identified during the Phase III HHRA. An ERA was conducted on the Phase III data only. No unacceptable risks to ecological receptors were identified. The report conclusions indicated that the data gaps identified in the Phase II report were addressed and the COCs were confirmed. An FS was recommended for groundwater to develop and evaluate remedial alternatives.
FS for Site 1 (CH2M, 2018h) – AR # 003348	The FS evaluated remedial alternatives to address potentially unacceptable risks to human health associated with CVOc contamination in groundwater. Four remedial alternatives were retained for detailed evaluation and comparative analysis against National Contingency Plan criteria. The four remedial alternatives were no action; monitored natural attenuation (MNA) and LUCs; in situ chemical reduction, MNA, and LUCs; and source removal and subgrade biogeochemical reactor, biobarrier, performance monitoring, and LUCs.

3.2.1.2 Current Activities

The PP for groundwater, surface water, and sediment is being developed and will be finalized in FY 2022. In addition, and as a result of incorporation of the Adaptive Management strategy into the remediation strategy, a supplemental remedial alternative summary is being developed concurrently with the PP. The supplemental remedial alternative summary describes a remedial alternative developed by the Tier I Team during Adaptive Management strategy negotiations held during review of the PP. LUCs are ongoing for soil, including annual inspections of the landfill soil cover.

3.2.1.3 Nature and Extent of Contamination

The buried waste at Site 1 is the source of contamination to soil and groundwater. Previous investigations included analyses of soil, groundwater, sediment, and surface water samples for target compound list (TCL) VOCs, TCL semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), explosives, and target analyte list (TAL) inorganic constituents. Sediment pore water was also sampled for TCL VOCs. Surface water and sediment samples were collected near Site 1 as part of an overall evaluation of surface water related to Sites 1 and 3, as they are adjacent to each other and contribute runoff and groundwater discharge to Indian Field Creek. The current nature and extent of contamination for each medium at Site 1, as documented in the previously presented reports, are summarized in **Table 3-3**.

Table 3-3. Site 1 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Soil	Human Health	Arsenic	An RA was conducted that consisted of restoration of portions of the existing soil cover over the remaining waste and contaminated soils, surface debris removal, excavation and offsite disposal of arsenic-contaminated soil. Soil confirmation samples were collected, and the arsenic RG was achieved (OHM, 2001).
Groundwater	Human Health	TCE, cis-1,2-DCE, 1,1,2-trichloroethane (TCA), and VC	A PP is being developed to present the preferred RA to address the potential unacceptable risks/COCs, which were identified in the Phase II RI (CH2M, 2012b) and the Phase III RI (CH2M, 2016b). The PP will be supplemented by a TM describing a new remedial alternative developed by the Tier I Team.
Surface Water	None Identified	None Identified	A PP is being developed to present no action as the preferred RA since no potential unacceptable risks or COCs associated with surface water were identified based on the results of the Phase III RI (CH2M, 2016b).
Sediment	None Identified	None Identified	A PP is being developed to present no action as the preferred RA since no potential unacceptable risks or COCs associated with sediment were identified based on the results of the Phase III RI (CH2M, 2016b).

3.2.1.4 CERCLA Path Forward

- Routine annual LUC inspection of landfill soil cover area
- PP (groundwater, surface water, and sediment)
- ROD (groundwater, surface water, and sediment)
- LUC RD (groundwater)
- Pre-RD investigation work plan, field work, and reporting (groundwater)
- RD (groundwater)
- Remedial Action Work Plan (RAWP) (groundwater)
- RA field work (groundwater)
- Construction Completion Report (CCR) (groundwater)

- Interim Remedial Action Completion Report (iRACR)
- Groundwater LTM Work Plan, field work, and reporting
- Remedial Action Completion Report (RACR)

Schedule 3-1 presents the FY 2022–2023 schedule for Site 1.

3.2.2 Site 3—Group 16 Magazine Landfill

Site 3 Summary	
Status:	PP/ROD Phase – ROD for Groundwater, Surface Water, and Sediment
Media Investigated:	Soil: ROD – Navy OU IX, EPA OU 6 – closed with NFA (removal) Groundwater: EPA OU 35 – PP Surface Water: EPA OU 35 – PP Sediment: EPA OU 35 – PP
Removals and RAs:	Soil and Waste/Debris Excavation – 1999 (OHM, 2001)
Media Closed with NFA:	Soil
Waste and/or Debris Present Onsite:	No

3.2.2.1 Site Description and History

Site 3, the Group 16 Magazines Landfill, is an open field and wooded area behind the former Group 16 Magazines, located in the northern portion of NWS Yorktown west of Indian Field Creek (**Figure 3-2**). Based on the extent of study area boundary, Site 3 is approximately 6 acres in size. Site 3 is named for its proximity to the Group 16 Magazines; however, the history of this landfill is unrelated to operations at the magazines. Surface water and groundwater flow is to the north/northeast toward Indian Field Creek. The area adjacent to Indian Field Creek is covered by woods that act as a riparian buffer for surface water runoff. North and south of Site 3 are two unnamed tributaries that lead into Indian Field Creek.

The site was originally used for sand mining and consisted of one 10-foot-deep borrow pit. Between 1940 and 1970, Site 3 was operated as a landfill. Approximately 90 tons of waste were disposed of in the borrow pit and reportedly included solvents, sludge from boiler cleaning operations, grease trap wastes, Imhoff tank skimmings (containing oil and grease), and animal carcasses. The Site 3 waste boundary was estimated as part of previous investigations that included a geophysical survey. Test pit investigations performed in 1997 confirmed the presence of scrap metal, 55-gallon metal drums, grease, wax, lumber, banding, concrete blocks, plastic sheeting, and surface debris. A summary of relevant documents and action milestones is presented in **Table 3-4**.

Table 3-4. Site 3 Key Documents

Document Title/Milestone	Summary
Round One RI Report for Sites 1–9, 11, 12, 16–19, and 21 (Baker and Weston, 1993b) – AR # 000313	The field investigation for the Round One RI was conducted from June to October 1992, and soil, groundwater, surface water, and sediment samples were collected. Results indicated that landfill activities had affected groundwater quality, as the presence of TCE and other VOCs and metals were detected in groundwater. The report recommended a geophysical investigation to define the boundaries of waste disposal, and additional groundwater investigation to evaluate potential seasonal variation in TCE concentrations.
Round Two RI Report for Sites 1 and 3 (Volumes I and II) (Baker, 1998e) – AR # 000998 and 000999	A polycyclic aromatic hydrocarbon (PAH)-contaminated soil hot spot was identified, and HHRAs and ERAs were completed that considered two separate areas: Site 3 proper, and the PAH hot spot. Site 3 proper included all sample locations except the PAH hot spot area. No potential risks were identified for soil associated with Site 3 proper. Potential unacceptable human health and ecological risks were identified for soil associated with the Site 3 PAH hot spot.
FS for Sites 1 and 3 (Baker, 1997a) – AR # 001158	The FS established a final RG of 10 mg/kg for total carcinogenic polycyclic aromatic hydrocarbons (cPAHs) in Site 3 soil. the RAO for Site 3 was to mitigate the potential for direct contact of PAHs in soil exceeding the RG. Alternatives evaluated were: (1) No Action, (2) No Action with Institutional Controls and Debris Removal, (3) Soil Excavation with Onsite Treatment and Debris Removal, and (4) Soil Excavation with Offsite Disposal and Debris Removal.

Table 3-4. Site 3 Key Documents

Document Title/Milestone	Summary
PP for Site 1 – Dudley Road Landfill and Site 3 – Group 16 Magazines Landfill (Baker, 1999a) – AR # 001840	The PP was completed to document the proposed RA of removal and offsite disposal of soil posing unacceptable risks to human health and the environment (Alternative 4).
ROD OU Nos. VIII and IX Site 1 – Dudley Road Landfill and Site 3 – Group 16 Magazines Landfill (Baker, 1999b) – AR # 001000	The ROD for Site 3 identified Alternative 4, removal and offsite disposal of debris and soil posing unacceptable risks to human health and the environment, as the selected remedy. The major components of the remedy were removal of surface debris, excavation and offsite disposal of PAH-contaminated soil within the hot spot area, and LUCs to prevent residential land use.
RA Report for Sites 1 and 3, and SSA 22 (OHM, 2001) – AR # 001091	The Final RA report documented the completion of the selected remedial alternative, excavation and offsite disposal of contaminated soil from Site 3. Although the selected remedy identified in the ROD was to remove PAH-contaminated soil that exceeded commercial/industrial levels (10 mg/kg) within the PAH hot spot area, as excavation progressed during the RA, buried waste was encountered, and the 2000 action was expanded to remove all waste at the Site (Site 3 proper and PAH hot spot). Approximately 432 tons of PAH-contaminated soil, drums, and dry batteries were removed. In addition, approximately 4,700 tons of galley waste (cardboard, glass bottles, metals cans) were also removed. Areas where contaminated soil and waste were removed received 3 to 8 feet of backfill.
LTM Report for Sites 1, 3, and 7 (Baker, 2006b) – AR # 002075	The LTM Report documented and evaluated the five rounds of LTM samples collected at Site 3. Following the completion of the soil RA, LTM of groundwater was initiated to monitor concentrations of VOCs. LTM was initiated based on concurrence by the Yorktown Partnering Team, as LTM was not stipulated in the ROD for Site 3. Round 1 of LTM at Site 3 was conducted in May 2000, and three wells (MW08A, MW19, and MW19A) were sampled and analyzed for VOCs. Rounds 2 through 5 were conducted in September/October 2004, February 2005, May 2005, and August 2005, respectively. During LTM Rounds 2 through 5, six monitoring wells (MW08A, MW08B, MW19, MW19A, MW20, and MW20A) were sampled and analyzed for VOCs. The 2006 Report concluded that LTM should cease at Site 3, given LTM was not stipulated as the final remedy for groundwater, and additional investigation of groundwater was being conducted.
Phase I RI Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25 (CH2M, 2007a) – AR # 002158	The Phase I RI for Groundwater at OU I was completed to assess the nature and extent of groundwater contamination at several NWS Yorktown sites, including Site 3, based on comparison of available data to MCLs and maximum background concentrations. Phase I RI field activities were conducted in September and October 2004 and included groundwater sampling. CVOCs, specifically TCE and its daughter products, were identified as primary contaminants in Site 3 groundwater. It was concluded that contaminants in Site 3 groundwater migrate vertically downward and laterally toward Indian Field Creek; however, the extent of CVOC contamination was not fully delineated. The Phase I RI recommended additional investigation, including conducting an MIP investigation, groundwater/surface water interface sampling, and quantifying potential unacceptable risks.
Final TM Documentation of Post-RA Site Conditions at Site 3 – Group 16 Magazines Landfill (Baker, 2008a) – AR # 002200	The TM was completed to establish the post-RA site conditions at Site 3. The report documented that the RA completed in 2000 resulted in removal of all waste and PAH-contaminated soil to levels below a residential land use RG. Therefore, the LUC component of the remedy identified in the ROD to prevent future residential use with a requirement to conduct Five-Year Reviews no longer applied, as the action implemented resulted in removal of all waste sources and residual soil concentrations that allow for unlimited use/unrestricted exposure (UU/UE).
ESD for Site 3 (CH2M, 2008e) – AR # 002351	An ESD was signed in 2008 to document removal of all waste and associated soil contamination to levels acceptable for UU/UE at Site 3 and removing the need for LUCs and Five-Year Review of the site regarding soil.

Table 3-4. Site 3 Key Documents

Document Title/Milestone	Summary
Phase II RI Report for Sites 1 and 3 (Volumes I, II, III, and IV) (CH2M, 2012b) – AR # 002630, 002631, 002632, 002633	Phase II RI activities were performed between January and September 2009, and consisted of MIP logging, DPT sampling, monitoring well installation and sampling, hydraulic conductivity testing, and surface water, sediment, and sediment pore water sampling from the southwestern branch of Indian Field Creek and the tributary to the creek north of Site 3. Groundwater COCs identified as posing potential unacceptable risks to human receptors and potentially warranting remediation were TCE, cis-1,2-DCE, VC, arsenic, and manganese. The Phase II RI report did not identify any COCs for surface water, sediment, or sediment pore water because the human health and ecological risks were within or below acceptable risk ranges.
Final FS Report for Groundwater at Site 3 (CH2M, 2014a) – AR # 002723	The RAOs outlined in the groundwater FS were to reduce TCE, cis-1,2-DCE, VC, arsenic, and manganese concentrations in groundwater to risk-based cleanup levels, prevent future human receptors from exposure to groundwater until cleanup levels are met, and prevent unacceptable risk to ecological receptors from exposure to COCs in groundwater that discharges to Indian Field Creek. The MCL was established as the preliminary remediation goal (PRG) when available (for TCE, cis-1,2-DCE, VC, and arsenic). Because no MCL has been established for manganese, a risk-based PRG was calculated. Alternatives evaluated were: (1) No Action, (2) MNA and LUCs, (3) Enhanced In Situ Bioremediation, MNA, and LUCs, (4) In Situ Chemical Reduction (ISCR), MNA, and LUCs, and (5) In Situ Chemical Oxidation (ISCO), MNA, and LUCs.
Pre-RD Investigation Sampling and Analysis Plan (SAP) (CH2M, 2020b) – NA ^a	To support the RD, a SAP was prepared to: <ul style="list-style-type: none"> • Refine the understanding of the VOC groundwater plume and evaluate current COC concentrations to support the enhanced in situ bioremediation (EISB) RD, including refining the target treatment zones. • Establish baseline geochemical and microbial conditions to support the RA. • Determine the presence or absence of the emerging contaminant, 1,4-dioxane, at the site and whether it needs to be incorporated into the RD. • Refine the understanding of the hydraulic characteristics of the Yorktown-Eastover aquifer to support the RD. • Refine the site geology to facilitate the RD.
PP (CH2M, 2020d) – AR # 003468	The PP described the preferred remedial alternatives for groundwater. The preferred alternatives for groundwater are 1) EISB with baseline groundwater sampling prior to treatment, 2) groundwater monitoring after bioremediation, and 3) LUCs for groundwater. The PP documented no action is required for sediment and surface water.

^a Documents that are not relevant to the response action decision are not added to the AR.

3.2.2.2 Current Activities

A ROD for groundwater, surface water, and sediment and RD are being developed. The RD will include the results of the pre-RD investigation, which was conducted in FY 2021. The ROD is planned to be finalized in FY 2022.

3.2.2.3 Nature and Extent of Contamination

The waste at Site 3 was the source of potential contamination to soil and groundwater. Previous investigations included analyses of soil, groundwater, sediment, and surface water samples for TCL VOCs, TCL SVOCs, pesticides, PCBs, explosives, and TAL inorganic constituents. Sediment pore water was also sampled for TCL VOCs. Surface water and sediment samples were collected near Site 3 as part of an overall evaluation of surface water related to Sites 1 and 3, as they are adjacent to each other and contribute runoff and groundwater discharge to Indian Field Creek. Potential unacceptable risks identified for each medium at Site 3, as documented in the previously presented reports, are summarized in **Table 3-5**.

Table 3-5. Site 3 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Soil	Human Health Ecological	cPAHs	An RA was conducted consisting of excavation and offsite disposal of contaminated soil and waste/debris. Confirmation samples were collected, and all RGs were achieved. An ESD to the ROD was subsequently signed in December 2008 to document the removal of LUCs for soil and the determination that NFA was required to achieve UU/UE for soil at Site 3 (CH2M, 2012b).
Groundwater	Human Health	TCE, cis-1,2-DCE, VC, arsenic, and manganese	A ROD is being developed to document the selected remedy to address the unacceptable risks. An RD for groundwater is being developed.
Surface Water	None Identified	None Identified	A ROD is being developed to document no potential unacceptable risks or COCs associated with surface water were identified in the Phase II RI and no further action for surface water is necessary .
Sediment	None Identified	None Identified	A ROD is being developed to document no potential unacceptable risks or COCs associated with exposure to sediment were identified in the Phase II RI and no further action for sediment is necessary .

3.2.2.4 CERCLA Path Forward

- ROD (groundwater, surface water, and sediment)
- LUC RD (groundwater)
- RD (groundwater) (Pre-RD Investigation Report to be included as an attachment.)
- RAWP (groundwater)
- RA field work (groundwater)
- CCR (groundwater)
- iRACR
- LTM Work Plan, field work, and reporting
- RACR

Schedule 3-2 presents the FY 2022–2023 schedule for Site 3.

3.2.3 Site 6— Explosives-Contaminated Wastewater Impoundment

Site 6 Summary	
Status:	RI/FS Phase: RI for Soil, Groundwater, Surface Water, and Sediment Ongoing
Media Investigated:	Soil: Flume Area Navy ROD OU XIII, EPA OU 34 and Excavation Area Navy ROD OU XIV, EPA OU 34 –LUCs/RI Groundwater: Navy ROD OU XV, EPA OU 17, 34, and 37 – RI Surface Water: Impoundment Area Navy ROD OU XV, EPA OU 34 – LUCs/RI Sediment: Flume Area Navy ROD OU XIII, EPA OU 34 and Impoundment Area Navy ROD OU XV, Soil, groundwater, surface water, and sediment: Expanded Plant 2 footprint OU 37 EPA OU 34 and 37 – LUCs/RI
Removals and RAs:	Debris Removal and Soil Excavation, Treatment, and Disposal– 1999 to 2006 (OHM, 1999; Shaw, 2008)
Media Closed with NFA:	No
Waste and/or Debris Present Onsite:	No

3.2.3.1 Site Description

Site 6 is located in the northern portion of NWS Yorktown. The original 3-acre site consisted of three operational units: an Impoundment Area, a Flume Area, and an Excavation Area. The expanded study area boundary also encompasses the Plant 2 complex, consisting of the area surrounding former Buildings 110 and 501 (**Figure 3-3**). The current (expanded) Site 6 study area boundary is approximately 85 acres in size.

Site 6 is generally wooded with some open areas near the former buildings. Site 6 topography generally slopes from highs on the northern and southern areas downward toward the Impoundment Area, with ground surface elevations from approximately 40 feet above mean sea level (amsl) near Main Road to less than 10 feet amsl at the Impoundment Area. An unnamed tributary and the Eastern Branch of Felgates Creek are located on the western side of the site. Surface water runoff from the site is conveyed to Felgates Creek either directly by overland flow or via tributaries located adjacent to Site 6.

The surface geology at Site 6 is consistent with Yorktown-Eastover aquifer lithology. The depth to groundwater mimics topography and ranges from 1 to 35 feet bgs. Groundwater generally flows from the northern, westward, and southern areas toward the Impoundment Area and Felgates Creek. The Yorktown-Eastover aquifer is approximately 80 feet thick in the vicinity of Site 6 and is underlain by the Eastover-Calvert confining unit (Brockman et al., 1997).

The Flume Area consisted of two concrete flumes that transported wastewater from the Explosive Reclamation Facilities at Building 109 to a downgradient wetland area. The wastewater, containing explosive constituents (TNT, hexahydro-1,3,5-trinitro-1,3,5-triazine [RDX], and 2,4-dinitrotoluene [2,4-DNT]) and solvents (TCE, 1,1,1-TCA, and cyclohexanone), was discharged between 1942 and 1975. The wastewater was generated from explosives reclamation at Building 109 and from explosives loading, mixing, and loading operations at Building 110 (part of Plant 2).

In 1975, a carbon adsorption tower was installed to treat the contaminated wastewater prior to discharge into the drainage way. A National Pollutant Discharge Elimination System (NPDES) permit was granted to allow the discharge of effluent from the carbon adsorption tower containing acceptable concentrations of nitramines/nitroaromatics. In 1986, the effluent from the carbon adsorption tower was diverted to the sanitary sewer and ultimately to the Hampton Roads Sanitation District (HRSD) (Baker, 1998d).

The Impoundment Area is the wetland area located behind the coffer dam along a small tributary to the main branch of Felgates Creek. The surface impoundment was created by building a coffer dam across the headwaters of the small tributary. Wastewater (containing explosives constituents and solvents) was discharged to this area

from the flume area between 1942 and 1975. After 1986, the surface impoundment collected only surface runoff from the area around Buildings 109 and 110. Wastewater discharges ceased in 2003 when operations in Buildings 109 and 110 terminated (Baker, 1998d).

The Excavation Area was originally identified via aerial photography where concrete rubble and other debris was evident (Baker, 1994c). However, there were no records to document historical activities or former use. Previous reports suggest that the area may have been: 1) used as the soil borrow pit for construction of the coffer dam, 2) used to contain packed explosives, or 3) used for disposal of unknown types of materials and debris (Baker, 1998d; CH2M, 2007a). Based on historical photographs, soil boring logs, and analytical soil and groundwater data collected during SIs, the Excavation Area was most likely used only for surface storage and not for any of the previously suggested uses.

While refining the OU boundaries, a cleared area was identified to the west of the Excavation Area in historical aerial photographs and subsequent site visits (CH2M, 2012c). Initially, it was suspected that this might have been the actual location of the Excavation Area instead of the area specified in the ROD. However, after further review of historical photographs, the location of the Excavation Area is believed to have been defined correctly in the ROD. There is no documentation or photographs to suggest that disposal or storage activities were conducted at the cleared area.

In addition to these areas, the current investigation at Plant 2 also includes the footprint of one former building (Building 109) that has been demolished. Building 109 was decontaminated and demolished in 2012, and existing surface soil was evened out across the area of the former building, including the Flume Area. Currently, the Impoundment Area only collects surface runoff from the area between the former buildings, and the coffer dam is still in place. All of these areas are currently being investigated as part of Site 6, Plant 2.

Plant 2 is currently under investigation as part of the Site 6 Phase II RI Data Gap Investigation, and is located to the east of the Impoundment Area and includes the footprint of several buildings that have been demolished. The former buildings are summarized below.

- Building 110 Cast Hi Explosive Fill Plant #2
- Building 118 Boiler House
- Building 500 Inert Case Prep Building
- Building 500A Conveyor (between former Buildings 110 and 500)
- Building 501 Cooling/Shipping Building
- Building 501A Conveyor (between former Buildings 110 and 501)
- Building 612 Heating Plant
- Building 627 TNT screening Building
- Building 628 Aluminum Screening Building
- Building 629 Conveyor (between former Buildings 110 and 627/628)
- Building 1605 Coal Storage for Building 118 Boiler Plant

Plant 2 was constructed during World War II, and was used for loading TNT, RDX, Composition B, H-6, and Tritanol explosives (NEESA, 1984). During the loading process, water would be used minimally for equipment washout and washdown of the floor, screens, and hoppers for cleaning. Wastewater from the Plant 2 (and former Building 109) were directed toward the Impoundment Area in order to allow the finer explosive particles suspended in the wastewaters to settle out. The larger particles of explosives were removed from the waste streams by a system of catch basins or trenches; sludge would be periodically removed from these. The catch basin located at former Building 110 was approximately 50 feet long, 3 feet wide and 18 inches deep. Catch basins may also have been used for the disposal of solvents used during cleaning of the explosive mixing and handling systems located at Plant 2 (NEESA, 1984). Additional environmental concerns associated with loading plants (filling of warheads) include pink water, other dissolved explosives and/or dust and chips, and chromium and other heavy metals from paints, corrosion, and metal cleaning.

In 1943, there was a large explosion at former Building 501, which eliminated the building, adjacent trucks, and railroad flat cars and left only two craters, roughly 25 feet deep and 150 feet wide each. At that time, the cooling

building was being used to store torpedo warheads and mines that had recently been loaded with the explosive torpex. It was assumed that one of the craters represented the warehouse and the other crater represented a TNT storage area. Because of the surrounding earthen barricades, most of the explosion went upwards and confined the impacts.

A boiler house (former Building 118) was located to the south of Plant 2. Before the use of oil at the Base, coal was stored in a 50-ton hopper (former Building 1605) adjacent to the former Building 118. In addition, an area of soil approximately 20 feet by 40 feet was identified that was formerly used to store coal to the east of former Building 118. Other features near the former building include an underground waste oil tank, an oil/water separator that treated discharge from the boiler house, a 55-gallon drum connected to a pipe running from Boiler House that may have been some sort of bleed line (RCRA AOC D, Boiler House Condensate Accumulation Drum), and a 55-gallon drum containing an unknown substance along with an area of stained soil onto which absorbent cloth had been placed (AOC E, Fuel Spill Area). During a visual inspection, black residue was present on the ground and the side of the building in the area of the AOC D drum and stained soil appeared to run from the area of the AOC E drum into a drain about 30 feet down gradient. Former Building 612 is identified as a former heating plant.

A summary of relevant documents and action milestones is presented in **Table 3-6**.

Table 3-6. Site 6 Key Documents

Document Title/Milestone	Summary
Round One RI Report for Sites 1–9, 11, 12, 16–19, and 21 (Baker and Weston, 1993b) – AR # 000313	The field investigation for the Round One RI was conducted from June to October 1992, and soil, groundwater, surface water, and sediment samples were collected. Based on the results of the investigation, it was recommended that Site 6 be a candidate for an accelerated RA for soil and sediment under a Focused Feasibility Study (FFS). The Round One RI recommended that additional surface soil and sediment samples be collected in the area north of Building 109 to confirm that contamination was localized in the upstream portion of the ditch and that additional groundwater sampling be conducted to delineate the extent of VOC and explosives-contaminated groundwater in the area.
Round Two RI Report for Sites 6 and 7 (Volumes I, II, III, and IV) (Baker, 1998d) – AR # 001294, 001295, 001346, 001347	A Round Two RI and Supplemental Investigation were conducted between 1994 and 1996. Field activities at Site 6 consisted of the installation of three groundwater monitoring wells, groundwater sampling at eight temporary points and four permanent monitoring wells, and surface and subsurface soil sampling. Surface water and sediment samples were collected within Site 6 and Felgates Creek.
FS, v2, for Sites 6 and 7 (Baker, 1998b) – AR #001077	Based on the results of the Round One RI and Round Two RI, an FFS was conducted to identify remedial action alternatives (RAAs) to address soil and sediment contamination at Site 6. Although concentrations in surface water in the Impoundment Area were identified as posing potential risks to ecological receptors, this medium was not included in the alternative evaluation. Sediment and soil in the Flume Area were considered to pose the greatest risks.
PP, v2, for Sites 6 and 7 (Baker, 1998c) – AR # 001838	The PP was prepared to document the selected remedy for Site 6 for surface water and sediment in the Impoundment Area, soil and sediment in the Flume Area, and soil in the Excavation Area.
ROD, OU Nos. XII, XIII, XIV, and XV, Sites 6 and 7 (Baker, 1998f) – AR # 001001	A ROD outlining the selected remedy for Site 6 was signed in 1998 by the Navy and USEPA Region 3, with concurrence from VDEQ, to address soil, sediment, and surface water contamination within the OUs. In the Impoundment Area, surface water and sediment were identified as media of concern; however, because a sediment removal action would result in the destruction of wetland habitat and potentially cause greater harm to ecological receptors than the observed level of contamination, and because remediation of surface water would also be difficult, LTM was selected as the remedy for surface water and sediment in the Impoundment Area. No LUCs were included in the ROD for the Impoundment Area. Excavation and <i>ex situ</i> bioremediation of contaminated soil and sediment and LUCs to prevent residential land use were selected as the remedy for soil and sediment in the Flume Area. A soil cover and LUCs to prevent disturbance of the soil cover were selected as the remedy for soil associated with the Excavation Area.

Table 3-6. Site 6 Key Documents

Document Title/Milestone	Summary
Contractor Closeout Report for Site 6 Remediation (OHM, 1999) – AR # 001221	Implementation of the selected remedy was initiated in 1999. The initial phase of remediation consisted of the construction of a bioremediation cell (bio-cell) at Site 24, excavation of PAH- and explosives-contaminated soil to approximately 4 feet bgs, disposal of PAH-contaminated soil/sediment, transportation of explosives-contaminated soil to the bio-cell, flume and drain decontamination, and site restoration (OHM, 1999). A soil cover was also planned to be placed over the Excavation Area. Soil and sediment from the Flume Area that exceeded the RGs, and sediment from the Impoundment Area that exceeded the RGs, were excavated and transported to the bio-cell where they were treated by ex situ biological treatment. Although the ROD only stipulated soil excavation from the Flume Area as part of the selected remedy, during the RA, additional contaminated sediment was also excavated from the eastern portion of the Impoundment Area due to the exceedances of the RGs detected during the removal. To allow for adequate treatment time in the bio-cell, implementation of the remedy (removal of soil and sediment and treatment in the bio-cell) continued into 2006.
RD for NWS Sites 6 and 7 (Baker, 2006a) – AR # 002268	The RD documented the implementation and maintenance of LUCs at Site 6, which included prohibiting residential land use in the Flume Area and prohibiting disturbance of the soil cover in the Excavation Area.
Phase I RI Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25 (CH2M, 2007a) – AR # 002158	The Phase I RI for Groundwater at OU I was completed to assess the nature and extent of groundwater contamination at several NWS Yorktown sites, including Site 6, based on comparison of available data to MCLs and maximum background concentrations. Nine additional monitoring wells were installed at Site 6. Groundwater samples were collected from new and existing monitoring wells. Based on the results, additional groundwater investigation within the Impoundment Area was recommended. Additional surface water, sediment, and sediment pore water samples were also recommended to further evaluate groundwater discharge to surface water. The Phase I Groundwater RI also recommended that the next investigation only include those constituents of potential concern (COPCs) that were identified in the Phase I Groundwater RI.
Final CCR for Site 6 Bioremediation (Shaw, 2008) – AR # 002354	Approximately 11,800 tons of sediment and soil were treated between 1999 and 2006 in the bio-cell (Shaw, 2008). Treatment was deemed complete once two consecutive sampling events confirmed soil and sediment contained VOC and explosives concentrations below RGs.
Site 6 Phase II RI Report (CH2M, 2011b) – AR # 002488	A Phase II Groundwater RI was conducted in 2009. Field activities at Site 6 consisted of installing 10 new monitoring wells, groundwater sampling at 25 monitoring wells, hydraulic conductivity testing, dense non-aqueous phase liquid (DNAPL) field testing, surface water and sediment sampling, and sediment pore water sampling. A baseline HHRA was conducted and concluded that potential risks above USEPA's acceptable levels were present. Exposure scenarios associated with surface water and sediment were found to be within the acceptable risk levels. A Screening ERA was conducted for aquatic and wetland habitats at Site 6, and no unacceptable ecological risks were identified. It was concluded that no further evaluation was warranted for ecological receptors. The Phase II RI recommended that an FS of potential remedial alternatives was needed to address potential unacceptable human health risks in groundwater at Site 6. However, additional sampling was also needed to resolve uncertainties in the conceptual site model before proceeding with an FS for groundwater at the site.
Suspension of Site 6 LTM Requirements for OU XV Identified in the 1998 ROD, TM (CH2M, 2012g) – AR # 002527	LTM of the Impoundment Area surface water and sediment and Site 6 groundwater began in May 2000. Following the baseline round of sampling, LTM at Site 6 was suspended pending completion of the RA and additional investigation activities, as documented in the TM.
Memorandum to File Documentation of Non-significant Difference to ROD for Site 6 and 7 ROD, Clarification of Site 6 Areas (CH2M, 2012c) – AR # 002518	A memorandum to file was completed to document and define the different areas of Site 6, including the Impoundment Area, Flume Area, and Excavation Area. The memorandum clarified and clearly defined the delineation of the different areas of Site 6.

Table 3-6. Site 6 Key Documents

Document Title/Milestone	Summary
Site 6 – Explosives Contaminated Wastewater Impoundment Clarification of OUs and Approach for Implementing CERCLA Memorandum to File (NAVFAC, 2013d) – AR # 003235	A memorandum to file was completed to document the OUs that comprise Site 6, the CERCLA approach for each OU to achieve closure, and the status of LUCs.
Memorandum to File Documentation of LUCs for Site 6 and Site 7 (CH2M, 2014e) – AR # 002838	A memorandum to file was completed to document that the LUCs identified in the ROD for Site 6 and Site 7 will be documented in a LUC RD document, and will include all items required for inclusion as specified in the ROD and meets the intent of the LUC Implementation Plan. According to the 2018 Five-Year Review, although not formally signed by USEPA with written concurrence by VDEQ, LUCs to prevent development (both residential and industrial) are annotated in the Navy geographic information system database and real estate summary map for the installation and are being implemented, and therefore, the LUC portion of the ROD is functioning as intended (CH2M, 2018a).
Site 6 Phase I Data Gap RI Report (CH2M, 2019d) – AR # 003400	A test pit investigation, monitoring well installation, water-level and spatial surveys, and sampling of soil, groundwater, surface water, and sediment were completed in 2014 and 2015. The results of the test pitting activities show that the soil cover was not installed at the Excavated Area. The results of the HHRA identified potentially unacceptable risks for future residents and construction workers exposed to soil and groundwater at the site and for terrestrial and aquatic ecological receptors exposed to soil, surface water, and sediment. Data gaps were identified including the need for an aquatic habitat survey and delineation of contamination in soil and sediment. Additional investigation was also recommended for the uninvestigated Plant 2 area (former Buildings 110, 118, 500, 501, 612, 627, 628, and 1605 and associated conveyors) since the buildings had been demolished.
Site 6 Phase II Data Gap RI SAP (CH2M, 2019a) – AR # 003377	A SAP was prepared to outline the collection of additional data and information to determine whether a release occurred from the remaining uninvestigated Plant 2 buildings at Site 6, resolve data gaps that were identified during the Phase I data gap investigation for Site 6 (CH2M, 2019d), and investigate the source of PCE in groundwater upgradient of Site 7 (CH2M, 2017a).

3.2.3.2 Current Activities

Fieldwork to investigate data gaps identified in the Phase I RI and the Plant 2 area was completed in June 2020. The Phase II RI report is being developed. LUCs to prevent development (both residential and industrial) in the Impoundment Area are being implemented. A LUC RD is being developed and will be revised, as needed, following completion of the ROD. The results of the most recent Five-Year Review indicated that the remedy at Site 6 is short-term protective of human health and the environment because LUCs are enforced at the site to restrict residential and industrial uses, and prohibit intrusive activities (CH2M, 2018a). Issues and recommendations were identified to verify future protectiveness of ecological receptors. The issues, recommendations, milestones, and the current status of the issues are presented in **Table 3-7**.

Table 3-7. Site 6 Five-Year Review Summary

Issue	Recommendation	Milestone	Status
Site 6 Excavated Area: There is no evidence (based on test pitting conducted in 2014) that a soil cover was constructed as prescribed by the ROD.	Evaluate potential risk as part of ongoing RI activities, and evaluate the need for modifications to the ROD.	9/30/2021	The 1998 ROD identified a soil cover to address potential ecological risk from exposure to cadmium and zinc in soil in the Excavated Area. The Phase I RI Report re-evaluated this area and concludes no unacceptable risk from cadmium in Excavated Area soil. The FS will evaluate whether the remedy identified in the 1998 ROD (soil cover) is still warranted/appropriate and if any modifications to the ROD are needed. The final FS Report is scheduled for April 2023.

Table 3-7. Site 6 Five-Year Review Summary

Issue	Recommendation	Milestone	Status
Sediment concentrations within impoundment area exceed industrial remediation goals initially identified for the Flume Area	Enforce residential and industrial LUCs in the impoundment area	12/31/2021	Since a LUC RD was never finalized, the Navy will draft a LUC RD for review/concurrence from USEPA and VDEQ.
Site 6 Impoundment Area: There is uncertainty that the Impoundment Area is fully protective of ecological receptors.	Collect additional sediment samples and evaluate potential risk as part of ongoing RI activities, and evaluate the need for modifications to the ROD.	4/30/2020	The 1998 ROD identified LTM to address potential ecological risk from exposure to inorganics and TNT in the Impoundment Area. The Phase II RI Report will evaluate potential risk associated with additional sediment samples that were collected during fieldwork conducted in August 2019. The FS will evaluate whether the remedy identified in the 1998 ROD is still warranted/appropriate and if any modifications to the ROD are needed. The final FS is scheduled for April 2023.

3.2.3.3 Nature and Extent of Contamination

The sources of potential contamination within the original Site 6 boundary are related to the wastewater discharge from the network of flumes at the site associated with former Buildings 109 and 110 and the possible storage of materials within the Excavation Area. Potential risks identified for each medium at Site 6, as documented in the previously presented reports, including the Data Gap RI report (CH2M 2019d), are summarized in **Table 3-8**.

Table 3-8. Site 6 Contamination and Risks Summary

Medium	Potential Risk	COC ^a	Status
Soil	Human Health	2,4,6-TNT, arsenic, chromium, antimony, and iron in surface and subsurface soil in the former Building 109 area	An RA was conducted in the Impoundment and Flume Areas consisting of excavation and removal of debris, and excavation, treatment, and offsite disposal of contaminated soil. Confirmation samples were collected and all RGs were achieved (OHM, 1999). Following the RA, LUCs were implemented prohibiting residential development of Site 6 and disturbance of the soil cover at the Excavation Area. However, the Data Gap RI (CH2M 2019d) found that the soil cover was not installed in the Excavation Area. Exceedances of TNT, lead, zinc, and mercury associated with Building 109 were spatially-limited. Additional sampling was recommended to confirm the area of concern (CH2M 2019d). The recommended sampling is being conducted as part of the ongoing phase II data gap RI.
	Ecological	Zinc in surface soils in the Excavation Area; TNT, lead, zinc, and mercury in shallow surface soil in the former Building 109 area	
Groundwater	Human Health	VOCs, 1,4-dioxane, 2,4-dinitrotoluene, explosives, arsenic, iron, manganese, zinc for groundwater used as a potable water supply and/or during construction/excavation activities. TCE and VC based on VI from groundwater to indoor air.	Potentially unacceptable risks to future residents and construction workers were identified from exposures to two groundwater plumes. Although the pathway from groundwater to ecological receptors is complete, the level of contaminant transport observed does not result in an unacceptable risk to ecological receptors in media where direct exposures first become possible (CH2M 2019d). The recommended sampling is being conducted as part of the ongoing phase II data gap RI.
	Ecological	CVOCs, explosives, and zinc	

Table 3-8. Site 6 Contamination and Risks Summary

Medium	Potential Risk	COC ^a	Status
Surface Water	Human Health	None Identified	Surface water was not present in the upper portions of some drainages during the RI and the inorganic results are considered to be naturally occurring. Re-evaluation of the COPCs is recommended once the results of the Plant 2 investigation are available (CH2M 2019d).
	Ecological	Inorganics in the Impoundment Area and drainages. Inorganics and explosives associated with the Building 110 Flume Area.	
Sediment	Human Health	None Identified	An RA was conducted consisting of excavation, treatment, and off-site disposal of contaminated sediment from within the Flume Area (OHM, 1999). Additional sampling was recommended to assess the extent of the spatially-limited contaminant exceedances. An aquatic habitat survey was also recommended to confirm whether conditions in the north-central drainage are terrestrial or aquatic, which may impact the risk assessment (CH2M 2019d). The recommended sampling and survey are being conducted as part of the ongoing phase II data gap RI.
	Ecological	Inorganics in the north-central and north-west drainages. Acetone and trichlorofluoromethane in the eastern drainage. TNT and inorganics in the Impoundment Area. Copper and mercury for food web exposures.	
Pore Water	Ecological	None Identified	

^a The COCs shown potentially posing potentially unacceptable risks are based on data collected from within a limited area of the original site boundary. Characterization of the expanded Plant 2 study area is ongoing.

3.2.3.4 CERCLA Path Forward

- LUC RD (Impoundment Area and Excavated Area)
- Phase 2 RI reporting
- FS
- PP (soil, groundwater, surface water, and sediment)
- ROD (soil, groundwater, surface water, and sediment)
- LUC RD (Sitewide)
- RD
- RAWP
- RA field work
- CCR
- iRACR
- LTM Work Plan, field work, and reporting
- RACR

Schedule 3-3 presents the FY 2022–2023 schedule for Site 6.

3.2.4 Site 7—Plant 3 Explosives-Contaminated Wastewater Discharge Area

Site 7 Summary	
Status:	RI/FS Phase: Pre-FS Investigation for Groundwater and LTM for Groundwater Ongoing
Media Investigated:	Soil: Navy ROD OU XII, EPA OU 2 and 29 – LUCs/RI Groundwater: Navy ROD OU XV, EPA OU 2, 17 and 29 – RI Surface Water: Navy ROD OU XV, EPA OU 2, 17 and 29 – RI Sediment: Navy ROD OU XII, EPA OU 2, 17 and 29 – RI
Removals and RAs:	Drainage Area Soil and Sediment – 1997 (Baker, 1998e)
Media Closed with NFA:	No
Waste and/or Debris Present Onsite:	No

3.2.4.1 Site Description

Site 7 is located in the northern portion of NWS Yorktown in the vicinity of Poe Road and adjacent to an unnamed tributary leading to Felgates Creek (**Figure 3-4**), approximately one mile upstream from the confluence of Felgates Creek and the York River. Based on the extent of study area boundary, Site 7 is approximately 33 acres in size. The site consists of the Plant 3 Explosives-Contaminated Discharge Area, including an approximately 300-foot long drainage area located adjacent to wetlands surrounding an unnamed tributary to Felgates Creek. The current investigation has expanded the site to include the footprints and surrounding area of the former Plant 3 buildings upgradient of the discharge area. Depths to groundwater (Yorktown-Eastover aquifer) at the site are variable with topography and range between approximately 15 and 25 feet bgs and groundwater generally flows westward toward the tributary and Felgates Creek.

Plant 3 was used as a weapons loading facility beginning in 1945. Between 1945 and 1975, wastewater from the Plant was discharged directly into the drainage area. The wastewater possibly contained RDX, TNT, cyclohexane, and chlorinated solvents (C. C. Johnson/CH2M, 1984). Between 1975 and 1986, the wastewater was treated in an activated carbon unit, which was designed to remove dissolved explosives from the wastewater prior to discharge. After 1986, the carbon treated wastewater was directed to the sanitary sewer system and ultimately to HRSD. The site has reverted to a natural drainage area and received no discharge from the Plant 3 complex after 1986. In 2009, all buildings at Site 7 were demolished; however, the earthen berms adjacent to the former buildings remain in place, resulting in uneven, and in places, steep terrain, ranging from 20 to 50 feet amsl. The expanded RI (ERI) further evaluated the nature and extent of CERCLA-related contamination in the vicinity of the former buildings associated with Plant 3. A summary of relevant documents and action milestones is presented in **Table 3-9**.

Table 3-9. Site 7 Key Documents

Document Title/Milestone	Summary
Final Round One RI Report for Sites 1–9, 11, 12, 16–19, and 21 (Baker and Weston, 1993b) – AR # 000313	The field investigation for the Round One RI was conducted from June to October 1992, and was completed to determine the nature and extent of contamination and identify potential migration pathways. One hydropunch groundwater, two surface soil, four surface water, and five surface/subsurface sediment samples were collected from Site 7. Based on the results of the sampling activities, Site 7 was determined to be a candidate for an accelerated RA if the identified groundwater impacts were determined to be localized. To support the accelerated RA, the installation and sampling of three shallow monitoring wells, the re-sampling of surface water, and the completion of a risk assessment and FFS were recommended.
Report for Field Scale Treatability Study for Site 7 and 22 (OHM, 1997a) – AR # 000887	The treatability study report documented the completion of the field-scale treatability study for Site 7. The treatability study consisted of excavating approximately 770 cubic yards (yd ³) of explosives-contaminated soil from Site 7 and transporting it to the bio-cell at Site 22, where the soil was treated. The site was re-graded and re-vegetated following the treatability study.

Table 3-9. Site 7 Key Documents

Document Title/Milestone	Summary
Round Two RI Report for Sites 6 and 7 (Volumes I, II, III, and IV) (Baker, 1998d) – AR # 001294, 001295, 001346, 001374	The Round Two RI was completed to assess the nature and extent of contamination, identify data gaps preventing an adequate understanding of site conditions, and to assess potential unacceptable human health and ecological risks associated with contamination at Site 7. As part of the Round Two RI, a soil, groundwater, surface water, sediment and biota investigation was conducted. Based on the results of the sampling activities, potential unacceptable risks to human health and the environment were identified due to exposure to site media.
FS, v2 for Sites 6 and 7 (Baker, 1998b) – AR #001077	Following completion of the pilot study, an FS was completed to develop and evaluate potential RAAs that are protective of human health and the environment, attain Federal and state requirements that are applicable or relevant and appropriate, and are cost-effective. However, in order to conduct the field-scale pilot study, all the contaminated sediment was removed in order to evaluate the biological remediation of explosives-contaminated soils. As a result, the FS recommended NFA for soil, surface water, and sediment at Site 7, since these media no longer posed a potential threat to human health or the environment.
PP, v2 for Sites 6 and 7 (Baker, 1998c) – AR # 001838	The PP presented the proposed remedy for Site 7 soil, sediment, and surface water within the drainage area following the completion of the Site 7 drainage area soil and sediment excavation and treatment. The proposed remedy consisted of LTM and LUCs.
ROD, OU Nos. XII, XIII, XIV, and XV, Sites 6 and 7 (Baker, 1998f) – AR # 001001	Following completion of the pilot study and FS, a ROD was prepared for Site 7. As outlined in the ROD, as a result of the pilot study removal action and offsite treatment, the soil and sediment within the drainage area had been remediated to levels protective of future industrial land use and no additional action was necessary for ecological receptors, as soil, surface water, and sediment within the drainage area no longer posed an unacceptable ecological risk. The ROD, however, did state that LTM would be necessary for groundwater. However, a final remedy for groundwater would be addressed as a separate OU.
LTM Report for Sites 1, 3, and 7 (Baker, 2006b) – AR # 002075	LTM of surface water and sediment in Felgates Creek and groundwater associated with the site was conducted between 2000 and 2005 and included VOCs, explosives constituents, and inorganic constituent analyses. Although groundwater monitoring was included in the LTM program, further investigations of groundwater were ongoing and LTM was suspended until additional investigation activities were completed.
RD for NWS Yorktown Sites 6 and 7 (Baker, 2006a) – AR # 002268	Following the completion of the pilot study in January 1997, concentrations of all COCs in the drainage area soil and sediment were found to be below established treatment goals. The RD documents LUC implementation and maintenance at Site 7. The selected remedy for Site 7 included LTM and LUCs, and the RAO to prohibit residential land use in the area surrounding the Site 7 Drainage area was stipulated and implemented in accordance with this RD.
Phase I RI Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25 (CH2M, 2007a) – AR # 002158	The Phase I RI for Groundwater at OU I was completed to assess the nature and extent of groundwater contamination at several NWS Yorktown sites, including Site 7, based on comparison of available data to MCLs and maximum background concentrations. As part of the Phase I RI for Groundwater, groundwater samples from three Site 7 monitoring wells were collected and analyzed for explosives constituents, TAL total and dissolved metals, and cyanide. Based on the results of the sampling activities, the concentrations of explosives constituents detected in the well (7GW02) in the area where the historical discharges took place and where the 1997 removal action took place had steadily declined since the 1997 removal action, suggesting that the source removal activities were successful not only for soil contamination, but for groundwater contamination as well.
Final LTM Report for Site 7 (CH2M, 2010b) – AR #000148	LTM at Site 7 was conducted to confirm concentrations of explosives constituents in groundwater were continuing to decline following the 1997 soil and sediment removal action, and to evaluate current concentrations of explosives and solvents in groundwater. One additional monitoring well was installed, and groundwater samples were collected from both the existing and new monitoring wells. The Site 7 LTM report concluded that based on the generally decreasing trends in groundwater concentrations, the remedy was effective, and it was recommended to continue LTM on an annual basis until groundwater concentrations are below the corresponding criteria or until it is determined other measures are necessary.
Suspension of Site 7 LTM Requirements for OU XV Identified in the 1998 ROD, TM (CH2M, 2012h) – AR # 002529	Although groundwater monitoring is included in the LTM program, further investigations of groundwater are currently ongoing as part of the ERI. The TM documents the suspension of LTM until the additional investigation activities are completed.

Table 3-9. Site 7 Key Documents

Document Title/Milestone	Summary
TM for Site 7, Clarification of OUs and Approach for Implementing CERCLA (NAVFAC, 2013c) – AR # Pending	The TM documented and clarified the OUs that comprise Site 7, and the CERCLA approach for each OU to achieve closure, and the status of LUCs. OU XII consists of the Plant 3 wastewater discharge area, and OU XV consists of the Plant 3 former operation area. In 2011 and 2012 all buildings and structures associated with Plant 3 were demolished. Subsequently, the Navy completed an ERI at Site 7 OU XV to verify all CERCLA releases are identified and managed to ensure protection of human health and the environment. Post-ROD investigations at OU XV included extensive soil and groundwater sampling within and adjacent to the footprint of former Plant 3, and sediment, pore water and surface water sampling in the tributary of Felgates Creek. Data are currently being evaluated; findings will be documented in a supplemental RI report. Following completion of all post-ROD investigation evaluations and findings, the need for modifications to the ROD and LUCs for the overall site will be evaluated to ensure protection of human health and the environment and compliance with CERCLA and the National Contingency Plan.
Memorandum to File Documentation of LUCs for Site 6 and Site 7 (CH2M, 2014e) – AR # 002838	A memorandum to file was completed to document that the LUCs identified in the ROD for Site 6 and Site 7 will be documented in a LUC RD document, and will include all items required for inclusion as specified in the ROD and meets the intent of the LUC Implementation Plan.
Site 7 LUC RD (NAVFAC, 2015a) – AR # 002836	A LUC RD was completed to document the LUCs identified in the ROD for Site 7, which included prohibiting residential use in the Site 7 Drainage area.
Final ERI Report for Site 7 (CH2M, 2017a) – AR # 003276	An ERI was completed to further assess the levels of contamination and need for remediation throughout the site. The Site 7 ERI concluded that potentially unacceptable risks to human health and the environment existed due to exposure to site media. In soil, arsenic, chromium, lead, and zinc were determined to pose a potentially unacceptable risk. TCE, perchlorate, RDX, and 2,6-DNT were identified as groundwater COCs. There were no potentially unacceptable risks identified for either surface water or sediment.
Site 7 Pre-FS and LTM Report (CH2M, 2021a) – NA ^a	<p>A report was completed to document the results of a Pre-FS investigation and LTM groundwater sampling, which was conducted to collect additional data and information to assist in developing a FS for soil and groundwater at Site 7 and to resume the LTM requirements outlined in the 1998 ROD for groundwater. The report included the following conclusions:</p> <ul style="list-style-type: none"> <li>• The extent of lead and zinc in soil was adequately defined to evaluate remedial alternatives in the FS. <li>• Hexavalent chromium will be retained as a human health COC for soil for evaluation in the FS. <li>• The vertical and horizontal extent of TCE in groundwater was adequately defined for evaluation in the FS. <li>• The deeper zone of the Yorktown-Eastover aquifer will be included in target treatment zone for RDX in the FS. <li>• 1,4-dioxane will be retained as a human health groundwater COC in the FS. <li>• Natural attenuation can be considered as a viable treatment technology for TCE, 4-amino-2,6-DNT, and perchlorate during the remedial alternative evaluation in the FS; should be considered along with other treatment technologies for 1,4-dioxane during the FS; and is not recommended for consideration as a standalone remedy for RDX during the FS. <p>The report recommended the following:</p> <ul style="list-style-type: none"> <li>• Discontinue LTM for bromodichloromethane and PCE; continue LTM for 1,1-dichloroethane (1,1-DCA), 2-amino-4,6-DNT, and 4-amino-2,6-DNT until concentrations have not been detected above the USEPA Tapwater Regional Screening Levels (RSLs) for two consecutive monitoring events or until a groundwater ROD is in place. <li>• Prior to completion of the FS, further evaluate the presence of RDX in the deeper zone of the Yorktown-Eastover aquifer and further delineate the extent of 1,4-dioxane in groundwater.

^a The document has yet to be assigned an AR number.

3.2.4.2 Current Activities

A supplemental Pre-FS SAP for groundwater is being developed. Groundwater LTM is ongoing.

3.2.4.3 Nature and Extent of Contamination

The wastewater discharged from Plant 3 was the original source of potential contamination at Site 7. Previous investigations included analysis of soil, surface water, sediment, and groundwater samples for VOCs, SVOCs, explosives constituents, and inorganic constituents. In addition, soil and groundwater samples collected prior to the ERI were analyzed for pesticides and PCBs. Primary contaminants that are associated with Site 7 are explosives and inorganics in soil and sediment, and explosives, TCE, and 1,4-dioxane in groundwater. Potential unacceptable risks identified for each medium at Site 7, as documented in the previously presented reports, are summarized in **Table 3-10**.

Table 3-10. Site 7 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Soil	Human Health Ecological	Explosives constituents (drainage area only), hexavalent chromium, lead, arsenic, and zinc	Explosives-contaminated soil from the drainage area of Site 7 was excavated and sent to a bio-cell for biological remediation (Baker, 1997b). The excavation resulted in remediation of the soil in the drainage area to levels protective of future industrial land use and no additional action necessary for ecological receptors, as soil within the drainage area no longer posed an unacceptable ecological risk (Baker, 1998f). Soil within and surrounding the footprint of the former Plant 3 buildings was evaluated as part of the ERI (CH2M, 2017a), and chromium, lead, arsenic, and zinc were identified as COCs. A pre-FS investigation was conducted in part to delineate lead and zinc and determine whether the chromium was present in the hexavalent form and should be retained as a COC. The pre-FS investigation found that the extents of lead and zinc were adequately defined, and chromium was present in the hexavalent form and would be retained as a human health COC.
Groundwater	Human Health	TCE, perchlorate, RDX, 2,6-DNT, 1,4-dioxane	Groundwater LTM is being conducted in accordance with the 1998 ROD and recent SAP (CH2M 2018c). Potential risks were identified in the ERI (CH2M, 2017a). A pre-FS investigation to address data gaps identified in the ERI has been conducted. The pre-FS investigation found that the vertical and horizontal extent of TCE was adequately defined, the deeper zone of the Yorktown-Eastover aquifer will be included in the target treatment zone for RDX in the FS, and 1,4-dioxane will be identified as a human health COC.
Surface Water	None Identified	None Identified	Potential unacceptable risks associated with surface water possibly impacted by the building areas were evaluated as part of the ERI (CH2M, 2017a), and no unacceptable risks were identified.
Sediment	Human Health Ecological	Explosives constituents (drainage area only)	Explosives-contaminated sediment from the drainage area of Site 7 was excavated and sent to a bio-cell for biological remediation (Baker, 1997b). The excavation resulted in remediation of the sediment in the drainage area to levels protective of future industrial land use and no additional action necessary for ecological receptors, as sediment within the drainage area no longer posed an unacceptable ecological risk (Baker, 1998f). Sediment downgradient from the footprint of the former Plant 3 buildings was evaluated as part of the ERI (CH2M, 2017a), and no unacceptable risks were identified.

3.2.4.4 CERCLA Path Forward

- Routine annual LUC inspections
- Supplemental Pre-FS Investigation workplan, fieldwork, and reporting (groundwater)
- LTM fieldwork and reporting (groundwater)
- FS (soil, groundwater, surface water, and sediment)
- PP (soil, groundwater, surface water, and sediment)
- ROD Amendment (soil, groundwater, surface water, and sediment)
- LUC RD
- RD
- RAWP
- RA field work
- CCR
- iRACR
- LTM Work Plan, field work, and reporting
- RACR

Schedule 3-4 presents the FY 2022–2023 schedule for Site 7.

3.2.5 Site 8—NEDED Explosives-Contaminated Wastewater Discharge Area

Site 8 Summary	
Status:	RI/FS Phase: Pre-FS Investigation for Groundwater Ongoing
Media Investigated	Soil: EPA OU 18 and 25 – RI Groundwater: EPA OU 25 – RI Surface Water: EPA OU 25 – RI Sediment: EPA OU 25 – RI
Removal Actions and RAs:	Drainage Area Soil and Sediment – 2007 (Shaw, 2009)
Media Closed with NFA:	No
Waste and/or Debris Present Onsite:	No

3.2.5.1 Site Description

Site 8 consists of a 150-foot drainage way and its surrounding area (including former Building 456), located along the Eastern Branch of Felgates Creek, approximately 1.5 miles from the confluence of Felgates Creek and the York River (**Figure 3-5**). Based on the extent of study area boundary, Site 8 is approximately 3 acres in size. The drainage way lies east of the Naval Explosives Development Engineering Department (NEDED) complex (former Building 456). The topography is generally level around former Building 456, but slopes steeply into the drainage way, which is situated in a ravine. Surface water run-off at the site flows from around former Building 456 into the drainage channels that eventually discharge into the Eastern Branch of Felgates Creek. The drainage channel contains standing water and has a soft ground surface. The remaining ground surface is paved with the exception of the wooded western and northern portions of the site. The surficial aquifer beneath the drainage way at the site generally flows towards Felgates Creek. With the exception of Building 621, all buildings that make up Site 8 were demolished in 2016. The roadway and parking areas were left in place and soils were regraded over the former Building 456 footprint.

The Site 8 discharge area received wastewater from the NEDED complex (former Building 456) from 1940 until 1986. Prior to 1975, the wastewater reportedly contained solvents (including TCE), spent/neutralized acids, and explosives constituents. After 1975, a carbon adsorption tower was used to treat the contaminated wastewater prior to discharge into the drainage area. An NPDES permit was granted to allow this discharge. In 1986, the effluent from the tower was diverted to the sanitary sewer and ultimately to HRSD. Since 1986, the discharge area has reverted to a natural drainage area. In 2012, the operations at Building 456 were terminated. A summary of relevant documents and action milestones is presented in **Table 3-11**.

Table 3-11. Site 8 Key Documents

Document Title/Milestone	Summary
Final Round One RI Report for Sites 1–9, 11, 12, 16–19, and 21 (Baker and Weston, 1993b) – AR # 000313	The field investigation for the Round One RI was conducted from June to October 1992, and soil, groundwater, surface water, and sediment samples were collected and analyzed. The Round One RI concluded that the source at Site 8 (Building 456 discharge) no longer existed, and the main concerns remaining were explosives and VOCs in surface soil and groundwater. Site 8 was recommended as a candidate for the accelerated RA category, if the contaminants at Site 8 could be confirmed to be localized. The report recommended additional soil sampling to delineate the extent of contamination and confirm if it was localized or not, and additional groundwater samples to delineate the extent of contamination.
Round Two RI Report for Sites 2, 8, 18, and SSA 14 (Baker, 2004) – AR # 001548	Objectives for the Round Two RI were to assess potential unacceptable human health and ecological risks associated with contamination in soil, groundwater, and sediment. COPCs were identified for Site 8 as follows: PAHs, nitramines, Aroclor-1260, and inorganics in surface soil; inorganics in subsurface soil; and VOCs, explosives constituents, and inorganics in groundwater. Soil contamination was concentrated in the drainage way leading from Building 456 to Felgates Creek. The Eastern Branch of Felgates Creek was investigated in association with Site 8 and SSA 14. The RI determined that organic constituents from Site 8 and SSA 14 did not appear to be affecting surface water; however, explosives constituents, VOCs, and SVOCs, and inorganics were potentially impacting sediment.

Table 3-11. Site 8 Key Documents

Document Title/Milestone	Summary
Engineering Evaluation and Cost Analysis (EE/CA) for Contaminated Soil and Sediment at Site 8 and SSA 14 (Baker, 2005b) – AR # 002076	This EE/CA provided the basis for a non-time-critical removal action (NTCRA) for contaminated soil and sediment at Site 8. Removal action alternatives evaluated included: (1) excavation with offsite incineration; and (2) excavation with offsite disposal. The two alternatives were evaluated based on effectiveness, implementability, and cost. Alternative 2, excavation with offsite disposal, was recommended to mitigate potential unacceptable human health and ecological risks. Cleanup goals were developed as part of the EE/CA for bis(2-ethylhexyl)phthalate (BEHP), Aroclor-1260, amino-DNTs, octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX), RDX, 2,4,6-TNT, chromium, iron, mercury, vanadium, and zinc in soil, and BEHP and Aroclor-1260 in sediment, to protect human health and ecological receptors.
Action Memorandum (AM) for Contaminated Soil and Sediment at Site 8 and SSA 14 (Baker, 2005c) – AR # 001871	This AM documented approval for the NTCRA. The proposed removal action at Site 8 included the removal and disposal of contaminated soil and sediment, transportation of contaminated soil and sediment to an approved disposal facility, backfilling and grading the excavated areas to the approximate original elevations prior to excavation, placement of riprap as erosion control in steep areas, placement of 6 inches of topsoil over the remaining disturbed areas, and re-vegetation with native grasses and wetland plants.
Site 8 Removal Action and Post-Removal Confirmation Sampling Summary TM (CH2M, 2008a) – AR # 002202	A total of 765 non-hazardous yd ³ (1,147 tons) of contaminated soil and sediment were excavated from the drainage area and 29 yd ³ (44 tons) of hazardous soil were excavated from Site 8. Post-removal confirmation samples were collected to confirm contaminant concentrations were below the PRGs. NFA was recommended at Site 8 for explosives constituents, metals, and PCBs in soil or sediment.
Consensus Statement (May 2008)	It was determined that, based on removal action and post-removal confirmation sampling results, NFA for soil or sediment was required at Site 8. The Navy and the USEPA, in partnership with the VDEQ, reached consensus in May 2008 that NFA for soil was required.
CCR for Site 8 (Shaw, 2009) – AR # 002589	The Final CCR summarized the activities associated with soil and sediment removal, treatment, and disposal of impacted soil at Site 8.
Final RI Report for Groundwater at Sites 8 and 34 (CH2M, 2011c) – AR # 000246	The Final RI presents data, results, and conclusions of activities conducted to support characterization of groundwater, and adjacent Felgates Creek surface water, and sediment. PCE, VC, BEHP, 2,4,6-TNT, RDX, 3,5-dinitroaniline (3,5-DNA), 4-amino-2,6-DNT and 2-amino-4,6-DNT were identified as human health COCs or MCL exceedances for groundwater at Site 8. Additional action was determined to be necessary to address three of these chemicals: PCE, VC, and RDX and a FS was recommended. No unacceptable human health or ecological risks were identified for surface water and sediment in the Eastern Branch of Felgates Creek.
Site 8 Supplemental RI Report (CH2M, 2020f) – AR # 003491	<p>An RI was completed to assess the potential of an upland source of contamination to soil and groundwater, determine whether soil at Site 8 poses an unacceptable risk that requires further action, investigate the hydrogeology at the site, and evaluate the potential for natural attenuation of contaminants as a viable component of the groundwater remedy in the FS. The RI Report included the following conclusions/recommendations:</p> <ul style="list-style-type: none"> • The nature and extent of site contaminants in soil and groundwater has been adequately defined. • Concentrations of COCs in soil and groundwater present unacceptable risks to potential future residents. • There are no unacceptable risks to ecological receptors from exposure to chemicals in soil or groundwater. • The RI recommended collection of additional groundwater data to evaluate COC concentration trends and viability of MNA and an FS for soil and groundwater to address unacceptable risks to potential future residents.

3.2.5.2 Current Activities

A Pre-FS SAP for groundwater is being developed to evaluate the viability of MNA as a remedial alternative for evaluation in the FS.

3.2.5.3 Nature and Extent of Contamination

Historical wastewater discharges from the NEDED complex (former Building 456) were the source of potential contamination to soil, sediment, surface water, and groundwater at Site 8. Previous investigations have included analysis of soil, groundwater, sediment, and surface water samples for TCL VOCs, TCL SVOCs, explosives constituents, pesticides, PCBs, and TAL metals. Surface water and sediment samples were collected near Site 8 as part of an overall evaluation of surface water related to Sites 8 and 34, as they are adjacent to each other and contribute runoff and groundwater discharge to the Eastern Branch of Felgates Creek. Potential unacceptable risks identified for each medium at Site 8, as documented in the previously presented reports, are summarized in **Table 3-12**.

Table 3-12. Site 8 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Soil	Human Health	Aluminum, arsenic, chromium, cobalt, thallium, vanadium	A removal action to excavate and dispose of contaminated soil was completed in 2008. Post-removal confirmation samples indicated that concentrations of all COCs were below established RGs (CH2M, 2008a). Following building demolition activities, a more extensive investigation of site soil has been conducted and found aluminum, arsenic, chromium, cobalt, thallium, and vanadium to be COCs in soil (CH2M, 2020f).
	Ecological	None Identified	
Groundwater	Human Health	TCE, 1,4-dioxane, 2,4,6-TNT, 2-amino-4,6-DNT, 4-amino-2,6-DNT, perchlorate, RDX, arsenic, chromium, and manganese	Although potential unacceptable risks from exposure to PCE, VC, BEHP, 2,4,6-TNT, RDX, 3,5-DNA, 4-amino-2,6-DNT and 2-amino-4,6-DNT were identified, the RI (CH2M, 2011c) determined additional action was only necessary to address PCE, VC, and RDX. A more extensive investigation of site groundwater in the building area has been conducted and found TCE, 1,4-dioxane, 2,4,6-TNT, 2-amino-4,6-DNT, 4-amino-2,6-DNT, perchlorate, RDX, arsenic, chromium, and manganese as COCs (CH2M, 2020f).
Surface Water	None Identified	None Identified	No potential unacceptable risks or COCs associated with surface water have been identified. Based on the results of the Supplemental RI, no action is warranted for surface water.
Sediment	Human Health Ecological	BEHP and Aroclor-1260	A removal action to excavate and dispose of contaminated sediment was completed in 2008. Post-removal confirmation samples indicated that concentrations of the COCs were below established RGs (CH2M, 2008a). Based on the results of the removal action confirmation sampling and Supplemental RI, no additional action is warranted for sediment.

3.2.5.4 CERCLA Path Forward

- Pre-FS work plan, fieldwork, and report (groundwater)
- FS (soil and groundwater)
- PP (soil, groundwater, surface water, and sediment)
- ROD (soil, groundwater, surface water, and sediment)
- LUC RD
- RD
- RAWP
- RA implementation
- CCR
- iRACR
- LTM Work Plan, field work, and reporting
- RACR

Schedule 3-5 presents the FY 2022–2023 schedule for Site 8.

3.2.6 Sites 9 and 19—Plant 1 Explosives-Contaminated Wastewater Discharge Area and Conveyor Belt Soils at Building 10

Sites 9 and 19 Summary	
Status:	RI/FS Phase: RI for Soil, Groundwater, Surface Water, and Sediment Ongoing
Media Investigated:	Soil: Site 9 ROD – Navy ROD OU VII, EPA OU 3/Site 19 Navy ROD OU VI, EPA OU 3 – RI/LUCs Groundwater: Site 9 EPA OU 32/Site 19 EPA OU 32 – RI Surface Water: Navy ROD OU VII, Site 9 EPA OU 32/Site 19 EPA OU 32 – RI Sediment: Navy ROD OU VII, Site 9 EPA OU 32/Site 19 EPA OU 32 – RI
Removals and RAs:	Surface and Subsurface Debris Excavation and Offsite Disposal – 1994 (IT Corporation, 1995)
Media Closed with NFA:	No
Waste and/or Debris Present Onsite:	No

3.2.6.1 Site Description

Site 9 and Site 19 are both part of the former Plant 1 operations area. Although these sites were originally identified as two separate sites, Site 9 and Site 19 are currently being investigated together as one overall study area. Based on the extent of the combined study area boundary, Site 9 and 19 is approximately 28 acres in size.

Site 9 is a discharge area that consists of a 600-foot drainage way and the immediate surrounding area (**Figure 3-6**). Site 9 is located east of Lee Pond and topographically downgradient of Site 19. The drainage way flows from the northwest portion of former Building 10 westward, underneath Bollman Road, and discharges to Lee Pond. Wooded areas immediately surround the drainage way and rip-rap is present along the top of the relatively steep slope leading down into the site.

Site 19 includes soil beneath and surrounding a 500-foot long conveyor belt formerly used to transport packaged TNT from former Building 10 to former Building 98. Site 19 is located west of Building 10 and 300 feet south of Site 9 (**Figure 3-6**). The topography of Site 19 slopes downward to the north towards Site 9. A topographic low formed by a trench beneath the former conveyor belt bisects the site and receives surface water runoff that either infiltrates to the subsurface or flows through drainage channels connecting Site 19 to Site 9 and ultimately discharges to nearby Lee Pond.

Groundwater at Sites 9 and 19 is encountered at depths of 10 to 29 feet bgs within the shallow Cornwallis Cave aquifer and flows to the southwest toward Lee Pond. Within the deeper Yorktown-Eastover aquifer, groundwater is encountered between approximately 39 and 51 feet bgs and flows west/southwest, also toward Lee Pond.

Between the late 1930s and 1975, Site 9 was used as a drainage way for Plant 1 (Building 10) explosives-contaminated wastewater and (possibly) organic solvents. A carbon adsorption tower was installed in 1974 to treat the wastewater prior to discharge in accordance with a NPDES permit. In 1986, the effluent from the carbon adsorption tower was diverted to the sanitary sewer and ultimately to HRSD. Wastes including weapons casings and railroad ties were discarded along the drainage way bank upstream of where it flows under Bollman Road. In addition, on the downstream side of Bollman Road, several drums were discarded along the drainage way. No information is available regarding the date(s) this material was disposed (Baker, 1994a). The conveyor belt at Site 19 was used for transport of packaged TNT between the 1940s and the 1970s. As documented in the Round Two RI, holes were observed along the floors and walls of the conveyor belt and in the conveyor belt enclosure. The walls and floor of the conveyor belt were periodically sprayed with water to control dust. Although the area has not been active for any other land use since operations ceased in the 1970s, the site remains relatively cleared and has not been excessively overgrown with vegetation.

The weapon casings, railroad ties and drums at Site 9 were removed along with contaminated soil and sediment in 1994. Between 2010 and 2012, all of the buildings located at Sites 9 and 19 were demolished. Currently, Site 9

has reverted to a natural drainage way for surface runoff from surrounding areas and receives no wastewater discharge from the former Plant 1 complex.

A summary of relevant documents and action milestones is presented in **Table 3-13**.

Table 3-13. Sites 9 and 19 Key Documents

Document Title/Milestone	Summary
Final Round One RI Report for Sites 1–9, 11, 12, 16–19, and 21 (Baker and Weston, 1993b) – AR # 000313	The field investigation for the Round One RI was conducted from June to October 1992, and soil, groundwater, surface water, and sediment samples were collected and analyzed from Sites 9 and 19. Results indicated that wastewater discharges from Building 10 have resulted in the presence of elevated levels of explosives compounds in soil at the site and adjacent to the drainage ditch leading to Lee Pond, in groundwater, and in surface water in the ditch and in Lee Pond, at Site 9. TNT was the primary explosive constituent detected at elevated levels at Site 9. The report recommended Site 9 as a good candidate for accelerated RA if the explosives constituent detections were confirmed to be localized, in which case it was recommended that an accelerated RA be conducted. At Site 19, the report documented primarily TNT-contaminated soil in the vicinity of the conveyor belt. Site 19 was also recommended for an accelerated RA based upon the limited contamination within the small area. Additional sampling was recommended at both sites to further delineate the soil contamination.
AM and EE/CA for Site 9 (Baker, 1994a) – AR # 000615	The AM and EE/CA for Site 9 documented a proposed NTCRA at Site 9 to remove surface and subsurface debris consisting of railroad ties and drums disposed of along the drainage way at Site 9.
Closeout Report, Sites 2 and 9 and SSA 4, Mine Casing and Debris Removal Action (IT Corporation, 1995) – AR # 000646	A removal action was completed in December 1994 to address surface and subsurface debris. The removal action included the concurrent removal of ordnance and railroad ties to a depth of 4 feet bgs at the lower end of the drainage way before it crosses Bollman Road. The excavation area was backfilled with on-base borrow topsoil and re-graded.
Site 19 and Composites of Site 9, Site 19, SSA 6 and SSA 7 Independent Sampling and Risk Screening Report (Black & Veatch, 1996a) – AR #000781	The Independent Sampling and Risk Screening Report for Sites 9 and 19 consisted of collecting, analyzing and evaluating grab soil samples from Site 19, composite soil samples from Site 9 and Site 19, and performing risk assessments using the data collected. Several constituents were detected at Sites 9 and 19 that exceeded the USEPA human health risk-based screening values for residential soil and ecological screening values (ESVs) for soil, and were identified as COPCs, including explosives constituents, VOCs, SVOCs, and inorganics. The report concluded some potential unacceptable risk to sensitive communities was present, due in particular to the concentrations of metals and nitramine.
Round Two RI Report for Sites 9 and 19 (Baker, 1997d) – AR #000889	The Round Two RI concluded that Site 9 contamination was confined to the drainage way from Building 10 to Lee Pond, and COCs included PAHs, nitramines, and inorganic constituents found in soils, nitramines in shallow groundwater, and nitramines and inorganic constituents in surface water and sediment. All site media were recommended for the FS at Site 9. At Site 19, PAHs, nitramines, and inorganic constituents in surface soil were identified as posing potential risk to human health and/or ecological receptors, with nitramines being the primary concern. The RI concluded that detected COCs were generally concentrated along the conveyor belt and in shallow groundwater, and soil and groundwater were recommended to be evaluated in the FS.
FS for Sites 9 and 19 (Baker, 1997f) – AR #000966	An FS for Sites 9 and 19 was conducted to identify the RAAs. The report documented that lead and vanadium in surface soil at Site 9 and iron in sediment at Site 9, and nitramines/nitroaromatics, aluminum, iron, and lead in surface soil at Site 19 contributed to unacceptable human health and/or ecological risk. Final RGs were established for surface soil at Site 19; however, it was determined that no action for soil, sediment, and surface water was necessary to protect human health at Site 9, as a RA would do greater harm to the environment than the no action alternative. In addition, it was documented that no action was necessary for groundwater associated with Sites 9 and 19. For surface soil at Site 19, the following alternatives were evaluated: (1) no action, (2) no action with institutional controls, (3) capping, (4) excavation and biological treatment, (5) excavation, soil washing, and incineration, and (6) excavation and incineration.

Table 3-13. Sites 9 and 19 Key Documents

Document Title/Milestone	Summary
PP and ROD, v3, OU Nos. VI and VII, Sites 9 and 19 (Baker, 1997h; Baker, 1998a) – AR #000889 and 002077	An NFA PP and ROD for soil, surface water, and sediment at Site 9 was signed in March 1998. The ROD also included a remedy for soil at Site 19 to mitigate the potential for direct contact of 2,4,6-TNT and RDX by human receptors, to prevent ecological effects to terrestrial receptors from exposure to aluminum, and to eliminate the potential migration of these contaminants to other environmental media. The proposed remedy for Site 19 included removing the conveyor belt, excavating site soil beneath the belt, excavating aluminum-contaminated soil near Building 527, and backfilling the area beneath the conveyor belt with the aluminum-contaminated soil from Building 527 topped with clean fill.
Closeout Report for Site 19 Bioremediation (OHM, 2000) – AR #001556	The remedy at Site 19 was initiated in April 1998 and included dismantling and disposal of the conveyor system, excavation of explosives-contaminated soil, and confirmation sampling. Approximately 1,000 yd ³ of explosives-contaminated soil were excavated to a depth of 4 feet bgs within the conveyor belt trench. The excavated soil was transported to the bio-cell located at Site 22 for treatment. Following treatment, this soil was distributed to the ground surface surrounding the bio-cell. Approximately 60 yd ³ of soil with elevated aluminum concentrations were excavated and placed in the conveyor belt trench excavation and covered with clean fill. The site was then restored with topsoil and re-vegetated to prevent ecological exposure to elevated aluminum in soil.
Loading Plant No. 1 (including Site 9 and Site 19) RI SAP and SAP Addendum (CH2M, 2014f, 2018e) – AR # 002712 and #003335	Demolition of all site buildings at Sites 9 and 19 provided access to potentially affected areas that could not be sampled during previous site investigations. A SAP was prepared to address portions of Former Loading Plant No. 1 that had not been previously investigated and to fill gaps in the current dataset within the Site 9 and Site 19 boundaries to help determine the nature and extent of potentially affected groundwater, soil, surface water, and sediment. The SAP Addendum addressed data gaps identified during analysis of the initial RI data.

3.2.6.2 Current Activities

Fieldwork supporting the RI was completed in 2019 and the RI report is being developed. LUC inspections of the former conveyor belt area are performed on an annual basis.

3.2.6.3 Nature and Extent of Contamination

At Site 9, the Plant 1 wastewater discharge was the source of potential contamination to soil, sediment, surface water, and groundwater. Previous investigations have included analyses of soil, groundwater, sediment, and surface water samples for TCL VOCs, TCL SVOCs, explosives constituents, pesticides, PCBs, and TAL metals.

At Site 19, fine particulates released through the holes and the rinse water sprayed on the conveyor belt were a source of potential contamination to soil and groundwater proximal to the conveyor belt, and sediment located in the concrete drainage way west of the conveyor belt. Previous investigations have included analysis of soil and groundwater samples for TCL VOCs, TCL SVOCs, explosives constituents, pesticides, PCBs, and TAL inorganic constituents.

The nature and extent of contamination associated with these sites is currently being reevaluated during the development of the RI Report, and potential risks will be reassessed based on the 2014 through 2019 data. Potential risks identified for each medium at Sites 9 and 19, as documented in the previously presented reports, are summarized in **Table 3-14**.

Table 3-14. Sites 9 and 19 Contamination and Risks Summary

Medium	Potential Risk	COC ^a	Status
Site 9			
Soil	Human Health Ecological	Nitramines	In March 1998, a ROD was signed indicating that NFA was required for site soil within the original site boundary, as potential human health and ecological risks were considered acceptable or manageable for this medium (Baker, 1998g). Soil in the vicinity of the former building footprints has been investigated. The results of that investigation are being documented in the RI report.

Table 3-14. Sites 9 and 19 Contamination and Risks Summary

Medium	Potential Risk	COC ^a	Status
Site 9			
Groundwater	Human Health	2,4,6-TNT, 1,3,5-TNB, arsenic	Potential unacceptable risks were identified associated with 2,4,6-TNT, 1,3,5-trinitrobenzene (1,3,5-TNB), and dissolved arsenic in limited downgradient wells (Baker, 1997h). Groundwater in the source area has been more thoroughly investigated and the results of that investigation are being documented in the ongoing RI report.
Surface Water	None Identified	None Identified	In March 1998, a ROD was signed indicating that NFA was required for site surface water within the original site boundary, as potential human health and ecological risks were considered acceptable or manageable for this medium (Baker, 1998a). Surface water in and around drainage ditches in the vicinity of the former building footprints has been investigated and the results of that investigation are being documented in the ongoing RI report.
Sediment	Ecological	arsenic, lead, iron, and vanadium	In March 1998, a ROD was signed indicating that NFA was required for site sediment within the original site boundary, as potential human health risks were considered acceptable or manageable for this medium (Baker, 1998a). Although conservative modeling predicted some potential for unacceptable ecological risk at Site 9, it was determined that remediation of the site would generate more harm to the surrounding ecology by destroying habitat and potentially creating erosion problems in the Site 9 drainage ditch. Accordingly, it was agreed that NFA was required for ecological receptors. Sediment in and around drainage ditches in the vicinity of the former building footprints has been investigated and the results of that investigation are being documented in the ongoing RI report.
Site 19			
Soil	Human Health Ecological	2,4,6-TNT, RDX, and aluminum	A removal action was conducted beginning in April 1998 to remove and dispose of contaminated soil. Post-removal confirmation samples indicated that concentrations of all COCs were below established RGs following the completion of removal activities in July 1998 (OHM, 2000). Because contaminants were not reduced to a level allowing unrestricted land use, LUCs were implemented prohibiting residential development or disturbance of the soil at Site 19. Soil in the vicinity of the former building footprints has been investigated and the results of that investigation are being documented in the ongoing RI report.
Groundwater	Human Health	1,3,5-TNB and 2,4,6-TNT	Potential unacceptable risks were identified in limited downgradient wells (Baker, 1997a). Groundwater in the source area has been more thoroughly investigated and the results of that investigation are being documented in the RI report.
Surface Water	Pending Evaluation	Pending Evaluation	Surface water in and around drainage ditches in the vicinity of the former building footprints has been investigated and the results of that investigation are being documented in the ongoing RI report.
Sediment	Pending Evaluation	Pending Evaluation	Sediment in and around drainage ditches in the vicinity of the former building footprints has been investigated and the results of that investigation are being documented in the ongoing RI report.

^a The COCs shown potentially posing unacceptable risks are based on data collected from within the original areas of the Site 9 and 19 boundaries. Additional characterization was determined to be necessary following these initial investigations, based on the decommissioning and demolition of site buildings. Characterization samples of the current, expanded study area boundary were collected in 2014 and 2018 through 2019.

3.2.6.4 CERCLA Path Forward

- Routine annual LUC inspections of the former conveyor belt area
- RI Data Gap Report (soil, groundwater, surface water, and sediment)
- FS (soil, groundwater, surface water, and sediment)
- PP (soil, groundwater, surface water, and sediment)
- ROD Amendment (soil, groundwater, surface water, and sediment)

- LUC RD
- RD
- RAWP
- RA field work
- CCR
- iRACR
- LTM Work Plan, field work, and reporting
- RACR

Schedule 3-6 presents the FY 2022–2023 schedule for Site 9/19.

3.2.7 Site 12—Barracks Road Landfill

Site 12 Summary	
Status:	Long-term Management Phase: LTM of Groundwater Ongoing
Media Investigated:	Soil: Navy ROD OU III and IV, EPA OU 4 – Long-Term Management (landfill cap/LUCs) Groundwater: Navy ROD OU V, EPA OU 4 – LTM/LUCs Surface Water: Navy ROD OU V, EPA OU 4 – LTM (CH2M, 2012f) Sediment: Navy ROD OU V, EPA OU 4 – LTM (CH2M, 2012f)
Removals and RAs:	Soil Excavation and Disposal, Area A – Lead (OHM, 1998)
Media Closed with NFA:	Area B/C and Wood Debris Disposal Area
Waste and/or Debris Present Onsite:	Yes (incinerator ash) (Soil Cover in Place)

3.2.7.1 Site Description

Site 12, the Barracks Road Landfill, is located in the eastern portion of NWS Yorktown and consists of three areas - Area A, Area B/C, and the Wood Debris Disposal Area (WDDA) (**Figure 3-7**). The soil cap constructed at Area A is approximately 4 acres and the groundwater LUC boundary of Area A covers approximately 10 acres. An incinerator building and smokestack were formerly located in Area A; ash from the incinerator was disposed of in the topographic low area immediately southwest of the building, adjacent to Ballard Creek. Area B/C covers approximately 1.6 acres and consists mostly of an open field, but also has wooded areas with steep slopes and ravines; ash may have been disposed of in this area. The WDDA consists of a ravine near Ballard Creek in which wood and construction debris were formerly disposed, and covers approximately 3.3 acres. The ROD, ESD, and AR file demonstrate that only Area A (OUs III and V) requires a remedy. A summary of relevant documents and action milestones is presented in **Table 3-15**.

Table 3-15. Site 12 Key Documents

Document Title/Milestone	Summary
Final Round One RI Report for Sites 1–9, 11, 12, 16–19, and 21 (Baker and Weston, 1993b) – AR # 000313	The field investigation for the Round One RI was conducted from June to October 1992, and soil, groundwater, surface water, and sediment samples were collected and analyzed. Based on the analytical results, the report recommended additional groundwater and surface water sampling, a test pit investigation, and additional investigation into the WDDA.
Round Two RI Report for Site 12 (Baker, 1996e) – AR #000640	A Round II RI was conducted to delineate landfill materials within the vicinity of Site 12. The Round II RI recommended an evaluation of Area A soil and groundwater, and surface water, and sediment within Ballard Creek in an FS.
AOC 22, Site 12, and SSA 2, SSA 19 and King Creek Independent Sampling and Risk Screening Report (Black & Veatch, 1996b) – AR #000669	The Ecological Risk Screening identified potential risk to the benthic community due to pesticides/PCBs in sediments.
FS Report for Site 12 (Baker, 1996c) – AR #000647	The FS determined that only lead-contaminated soil in Area A required remediation. The RAOs established were to prevent soil erosion in Area A at Site 12, prevent the potential for direct contact with lead-contaminated soil, and remediate the soil to meet the RG. The following six remedial alternatives for Site 12 were evaluated: (1) no action, (2) institutional controls, monitoring, and erosion control, (3) soil and clay cover, (4) excavation and landfill disposal, (5) in situ solidification and stabilization, and (6) excavation and soil washing. In addition, an RAO to ensure that the quality of groundwater and surface water at Site 12 do not deteriorate over time was established.

Table 3-15. Site 12 Key Documents

Document Title/Milestone	Summary
PP and ROD, OU Nos. III, IV, and V, Site 12 (Baker, 1996d; Baker, 1997e) – AR #000654 and 000871	A ROD was signed in April 1997 to document the selected RA for the COCs in Area A soil. The selected remedy included limited surface debris removal, installation of a clay cover, land and groundwater use restrictions, and LTM. Because no potential unacceptable risks were identified for Area B/C and the WDDA, no action was required to address soil at these areas. The ROD also required LTM of sediment in order to ensure that the remedy in place (RIP) remains protective of human health and the environment. As part of the remedy selected in the 1997 ROD, LUCs are maintained for groundwater throughout Area A to prohibit the use of groundwater as a potable source and to prohibit disturbance of the landfill cover. In addition, groundwater LTM was specified for the Site 12 Study Area.
CCR for Site 12 – Area A (OHM, 1998) – AR #001154	Three buildings at Site 12 (the incinerator, incinerator stack, and maintenance shed) were demolished during the removal action. Following the demolition, soil sampling was conducted to delineate the extent of lead contaminated soil. All soil exceeding the RG of 400 mg/kg was included within the boundaries of the proposed landfill cover. Following the delineation sampling, the area was re-graded and a clay liner was installed followed by a 1-foot fill material cover. The RA conducted at Site 12 eliminated exposure to lead above established RGs to be protective of future industrial/commercial land use receptors. Because contaminants were not reduced to a level allowing unrestricted land use, LUCs were implemented prohibiting residential development or disturbance of the soil cover at Site 12. Annual inspections of LUCs and yearly reporting are required in order to ensure that the RIP remains protective of human health and the environment.
Site 12 LTM Report (Baker, 2000) – AR # 001219	The report analyzed groundwater and sediment samples collected as part of the LTM effort, and concluded that LTM should continue, consisting of groundwater, surface water, and sediment sampling.
Site 12 LTM Report – 1998 – 2003 (Baker, 2005d) – AR #002078	The LTM Report evaluated groundwater and sediment LTM data collected from 1998 to 2003; prior to the monitoring the Partnering Team agreed surface water LTM was not needed. The report noted no discernable trends in sediment COC concentrations. There were no exceedances of sediment target values. Although not associated with a release from Site 12, VOC concentrations in groundwater were evaluated and showed no significant increases or decreases. There were no exceedances of the threshold TCE concentration established in the Final ROD for Site 12 that would trigger additional action for groundwater. The LTM report recommended eliminating some wells from the sampling network and eliminating all sediment monitoring.
Partnering Team Consensus Statement 9-1-06-45	The consensus statement documented that the Partnering Team agreed that VOCs in groundwater at Site 12 were not attributable to Site 12, and that existing data and historical site use indicate the source of VOCs is upgradient of Site 12, potentially the result of a release from former tanks located in the industrial area west/southwest of the site. Therefore, it was agreed that sampling for VOCs would no longer be included in the LTM program at Site 12, but would be addressed as part of an investigation of the area upgradient of the site. The team agreed that LTM at Site 12 would continue with sampling for RCRA 8 metals only.
Site 12 LTM Report (CH2M, 2008d) – AR #002272	LTM of groundwater and sediment was completed at Site 12 for select RCRA 8 metals. Concentrations of the select metals were below screening values in all groundwater samples with the exception of a slightly turbid total metals sample. Decreasing concentrations indicated the clay cover installed on the landfill continues to be effective in preventing leaching of contaminants to groundwater and sediment. It was recommended that groundwater samples be analyzed for select RCRA 8 metals (total and dissolved metals) and sediment samples be analyzed for RCRA 8 metals once in the next Five-Year Review cycle in accordance with the Final ROD for Site 12 (Baker, 1997e). Because waste is left in place at the landfill, LTM should continue indefinitely to ensure the effectiveness of the clay cover.

Table 3-15. Site 12 Key Documents

Document Title/Milestone	Summary
Site 12 ESD (CH2M, 2012f) – AR #000157	The ESD documented a significant difference to the LTM and LUC requirements prescribed in the ROD by removing the details of the LTM requirements from the ROD and putting them in an LTM Work Plan, clarifying that LTM is required only for the Area A portion of Site 12 (not Area B/C or the WDDA), and removing groundwater use restriction requirements for all areas of Site 12 (including Area B/C and the WDDA) except for Area A. Because LTM data do not show any significant increases in concentrations, and because there are no exceedances of screening values for dissolved metals in groundwater (exceedances of total metals were attributed to sampling turbidity), the ESD documented that the Site 12 remedy is protective of human health and the environment.
Site 12 LUC RD (NAVFAC, 2013a) – AR # 002594	The LUC RD was issued to document the 1997 ROD and 2011 ESD requirements related to LUCs for soil and groundwater. The LUCs will be implemented, maintained, monitored, enforced, and documented to prevent potential unacceptable risk exposure until RAOs are met, with 5-year statutory reviews to ensure protection of human health and the environment. Area A LUCs include prohibiting disturbance of the soil cover, intrusive activities (digging, trenching, jackhammering), construction, residential development, placement of new wells for any purpose other than environmental monitoring, preventing potable use of groundwater throughout the area, and prohibiting tampering with monitoring wells.
Site 12 Long Term Management Report, 2009–2013 (CH2M, 2015a) – AR # 002781	The Long Term Management Report for Site 12 documented the results and evaluation of the groundwater results conducted from 2009 to 2013. The concluded that 2013 LTM data for Area A COCs (1,3,5-TNB, antimony, cadmium, manganese, and lead) are consistent with the results from previous LTM events and demonstrate that there has not been a release from the landfill adversely impacting groundwater. The report recommended that Area A LTM should be continued to monitor the current LTM network of wells for the COCs identified in the ROD once every five years during the CERCLA Five-Year Review period. In addition, in accordance with the decision tree documented in the SAP, because the results of the non-COC constituents were nondetected or detected at levels that do not pose a potential risk to human health or ecological receptors, future monitoring of these constituents will not be conducted.
Site 12 RACR (NAVFAC, 2015b) – AR # 002905	The RACR documents the construction activities associated with the implementation of the selected remedy at Site 12. Soil and groundwater LUCs remain in place for Site 12 Area A. Area A LTM will be continued to monitor the current LTM network of wells for the COCs identified in the ROD once every five years during the CERCLA Five-Year Review period.
Site 12 LTM SAP (CH2M, 2017b) – AR # NA ^a	A SAP was prepared to outline the actions required to continue LTM at Site 12, and to help determine whether the current remedy at Site 12 is still effective as part of the Five-Year Review.
LTM Report, 2014–2017 (CH2M, 2019e) – AR # NA ^a	The LTM Report for Site 12 documented the results of the groundwater investigation conducted in May 2017. The report documented that the Area A clay cap is functioning properly and that the groundwater results are consistent with previous LTM events. The report concluded that cadmium can be removed from the list of COCs, manganese should continue to be monitored after utilizing ORC socks to determine if the concentrations are coming from the landfill or from natural releases, and the remaining COCs should be monitored on an annual frequency to determine if they can be eliminated from the LTM program.
Site 12 LTM SAP (CH2M, 2021b) – AR # NA ^a	A SAP was prepared to outline the approach for continued LTM at Site 12, confirm a release has not occurred, and if a release has occurred, determine whether it poses potential unacceptable risk.

^a Documents that are not relevant to the response action decision are not added to the AR.

3.2.7.2 Current Activities

Annual LUC inspections and groundwater LTM for Area A are ongoing. Although NFA was determined for the WDDA in the 2012 ESD (CH2M, 2012f), during recent investigations into the upgradient Barracks Road Industrial Area (Site 31) to evaluate the groundwater VOC plume extending from Site 31 into the WDDA portion of Site 12, elevated concentrations of manganese were identified in groundwater in the WDDA at monitoring well YS12-GW20.

The highest dissolved manganese concentrations were observed in samples collected from YS12-GW20 within the WDDA in November 2007 and April 2014 at concentrations of 4,340 µg/L and 4,950 µg/L, respectively, which significantly exceed the Tapwater RSL (Hazard Quotient of 0.1) of 43 µg/L and the Cornwallis Cave background value of 49.5 µg/L. Concentrations of dissolved manganese in YS12-GW20 were much greater than those observed at groundwater monitoring wells around Area A and an evaluation of the potential source of these concentrations was determined to be warranted by the NWS Yorktown Partnering Team. Therefore, to identify signs of potential contamination at the ground surface in the WDDA, a site walk was performed on July 3, 2019.

During the 2019 site walk of the Site 12 WDDA, protruding waste, including debris primarily consisting of bricks, concrete, scrap metal, plastic sheeting, scrap wood, and decomposing drums, was identified along the southern portion of the WDDA. Based on the results of the site walk, further investigation was recommended to evaluate whether waste within the WDDA is a potential source of contamination to site media (soil, groundwater, surface water, and sediment).. A SAP is being developed for the WDDA investigation.

3.2.7.3 Nature and Extent of Contamination

The waste materials burned/disposed of in the Site 12 disposal areas are the sources of potential contamination to site media. Previous investigations have included analysis of soil, groundwater, sediment, and surface water for TCL VOCs, TCL SVOCs, explosives constituents, pesticides, PCBs, and TAL metals. Potential unacceptable risks identified for each medium at Site 12, as documented in the previously presented reports, are summarized in **Table 3-16**.

Table 3-16. Site 12 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Soil (Area A)	Human Health	1,3,5-TNB, Antimony, Cadmium, Lead, and Manganese	The removal action conducted and soil cover installed at Site 12 eliminated the exposure pathways to COCs in soil. Because contaminants were not reduced to a level allowing unrestricted land use, LUCs were implemented.
Soil (Areas B/C and WDDA)	None Identified	None Identified	Because no potential unacceptable risks were identified for Area B/C and the WDDA, no action is required to address soil at these areas (CH2M, 2012f).
Groundwater	Human Health	None Identified	Elevated concentrations of VOCs and explosives constituents were detected in groundwater samples collected at Site 12; however, the VOCs have been attributed to past operations at Site 31. Explosives constituents were not determined to pose potential unacceptable risks. LTM continues in accordance with the ROD (CH2M, 2012f, CH2M, 2015a).
Surface Water	None Identified	None Identified	Following a review of the available data, the NWS Yorktown Partnering Team agreed that current concentrations of VOCs in surface water did not present a potential unacceptable risk to human health or the environment. The ESD defers requirements for future surface water monitoring to the LTM program (CH2M, 2012f).
Sediment	Ecological	Pesticides/PCBs	Potential unacceptable risk to the benthic community due to pesticides/PCBs in sediments was identified. LTM data show concentrations in sediment were decreasing and the Site 12 remedy has been determined to be protective of human health and the environment. The ESD defers requirements for future sediment investigation to the LTM program (CH2M, 2012f).

3.2.7.4 CERCLA Path Forward

- Routine annual LUC inspections of the landfill cover area (Area A)
- Continuation of the LTM program

- WDDA investigation workplan, fieldwork, and reporting (additional actions may be necessary as a result of this investigation, but will not be projected until results of the investigation have been evaluated)
- RACR

Schedule 3-7 presents the FY 2022–2023 schedule for Site 12.

3.2.8 Site 22—Burn Pad

Site 22 Summary	
Status:	RD/RA Phase: Remedy Optimization Ongoing
Media Investigated:	Soil: Navy ROD OU XVII, CERCLIS 7 – closed with NFA (Baker, 2003a) Groundwater: Navy ROD (CH2M, 2012e), EPA OU 15 - RD Surface Water: Navy ROD (CH2M, 2011d), EPA OU 15 - NFA Sediment: Navy ROD (CH2M, 2011d), EPA OU 15 - NFA
Removals and RAs:	Soil Excavation – 2002 (Shaw, 2003)
Media closed with NFA:	Soil (Baker, 2003a) Surface Water (CH2M, 2011d) Sediment (CH2M, 2011d)
Waste and/or Debris Present Onsite:	No

3.2.8.1 Site Description

Site 22 (**Figure 3-8**), the Burn Pad, consists of a 10-acre area (based on the study area boundary) located south of Site 4. The site is on a flat, elevated plateau with topography sloping moderately to the east, south, and southwest toward the Eastern Branch of Felgates Creek. An access road runs north to south along the west side of Site 4 and provides vehicle access to Site 22 from the north. The site consists of a grassy field surrounded by woods.

Site 22 once contained a 150-foot-diameter circular array of 11 steel burning pans which were used for burning waste plastic explosives and spent solvents. Open burning operations at the burn pads ceased in 1994. In addition, Site 22 was also used for the treatment of nitramine-contaminated soil and TNT-contaminated soil from Sites 7 and 19 in a 153-foot by 86-foot bio-cell constructed onsite. Bio-cell operations ceased in 1998 and treated (clean) soil was dewatered by being pumped into an impoundment area in a topographical low area directly southeast of the existing bio-cell. A summary of relevant documents and action milestones is presented in **Table 3-17**.

Table 3-17. Site 22 Key Documents

Document Title/Milestone	Summary
Pilot Study Report for the Explosives-Contaminated Soil (Baker, 1997c) – AR #001088	Several sites at NWS Yorktown contained explosives-contaminated soil, which was excavated and treated in a bio-cell that was constructed at Site 22. Following completion of the treatability study for explosives-contaminated soil, when the soil met the RGs, the bio-cell was removed from Site 22 and the site was restored by re-grading and vegetating the site.
Round Two RI Report for Sites 4, 21, and 22 (Volume I and II) (Baker, 2001a) – AR #001296; 001297	From August to November 1996, groundwater, soil, surface water, and sediment samples were collected to evaluate potential unacceptable risks to human health and the environment. For groundwater, the HHRA indicated no unacceptable non-cancer hazards or cancer risks to current or future receptors under a beneficial use scenario for groundwater, and the ERA indicated aquatic receptors would potentially be at risk from exposure to 1,1-DCE, TCE, di-n-butylphthalate, aldrin, several explosives constituents, and metals if groundwater were to discharge to a surface water body without dilution or natural attenuation. Potential unacceptable ecological risk was also identified for surface soil from potential exposure to PAHs, 2,4,6-TNT, HMX, amino-DNTs, RDX, 1,3,5-TNB, and several organic constituents. For surface water and sediment, the HHRA indicated no unacceptable non-cancer hazards or cancer risks to current or future receptors and the ERA indicated potential unacceptable risk to ecological receptors from exposure to several pesticides, explosives constituents, and metals in sediment.
FS for Sites 4, 21, and 22 (Baker, 2001b) – AR # 001160	The FS identified RAOs for Site 22 to prevent the exposure of ecological receptors to HMX and inorganics in surface soil exceeding the RGs, and to close the existing bio-cell according to RCRA closure requirements. RGs were established for site COCs, including HMX, cadmium, copper, lead, mercury, silver, and zinc. The following RAAs were evaluated for Site 22: (1) no action, (2) capping and bio-cell closure, (3) ex situ phytoremediation and bio-cell closure, (4) excavation with offsite disposal and bio-cell closure, and (5) soil washing and bio-cell closure.

Table 3-17. Site 22 Key Documents

Document Title/Milestone	Summary
Closeout Report Sites 21 and 22 (Shaw, 2003) – AR #001779	An RA conducted in 2002 consisted of excavation and disposal of 3,540 yd ³ of contaminated soil. Based on the RA and confirmation sampling results, the Partnering Team agreed that all potential unacceptable human health and ecological risks for soil at Site 22 were mitigated.
ROD, Site 22 – Burn Pad (Baker, 2003a) – AR #001375	Based on the previous removal action and the achievement of the RA goals, an NFA ROD for soil was signed in September 2003.
RI Report for Groundwater at Sites 4, 21, and 22 (CH2M, 2009d) – AR #000024	From March 2007 to April 2008, groundwater, groundwater seep, surface water, and surface and subsurface sediment samples were collected to evaluate potential risks to human health and the environment. Upstream surface water and sediment samples were also collected to assess site-specific background conditions. Based on the final results of the RI, the COCs identified in groundwater at Site 22 for action were TCE, VC, and RDX. The RI concluded that development of an FS for Site 22 groundwater was warranted. The RI also concluded that no unacceptable risks to human health or the environment from exposure to surface water or sediment were present at Site 22; therefore, no additional action was recommended to address surface water and sediment adjacent to the site.
Final FS for Groundwater at Site 22 (CH2M, 2011e) – AR #000181	An FS was generated to evaluate alternatives for remediation of TCE, VC, and RDX present at unacceptable levels in the groundwater. The preferred alternative was Alternative 2 – Hot Spot Treatment of RDX using Enhanced In Situ Bioremediation and Associated Performance Monitoring; MNA of TCE, VC and RDX; and LUCs.
Final ROD at Sites 4, 21, and 22 (CH2M, 2011d) – AR # 000262	An NFA ROD for surface water and sediment was signed in August 2011. Based on reasonable maximum exposure calculations, no unacceptable human health risks were identified to any receptor from exposure to sediment or surface water at Site 22, and because any potential sources of contamination related to the waste and soil were removed in previous removal actions, the ROD concluded that NFA was warranted.
PP and ROD for Site 22 Groundwater (CH2M, 2012d; CH2M, 2012e) – AR #002532	A PP and ROD for groundwater at Site 22 were completed and finalized in July 2012 and September 2012, respectively. The PP and ROD documented the selected remedy of Hot Spot Treatment of RDX using Enhanced In Situ Bioremediation and associated performance monitoring; MNA of TCE, VC and RDX; and LUCs. The ROD included a pre-RD investigation to further define the extent of the COCs and evaluate the effectiveness of MNA at the site.
Site 22 LUC RD (NAVFAC, 2013b) – AR # 002596	The LUC objectives identified in the 2012 ROD are to prohibit activities that would result in contact with groundwater, prohibit the withdrawal of groundwater, prohibit the construction and occupation of any future buildings within the groundwater LUC boundary without a vapor mitigation system in place, and maintain the integrity of the current or future remedial or monitoring system. The LUC RD documented the LUCs for Site 22 and the implementation actions that would be conducted to implement, operate, maintain, and enforce them.
Pre-Design Investigation Summary Report, Site 22, the Burn Pad (CH2M, 2020a) – AR # 003453	<p>An initial pre-RD investigation was conducted May through August 2014 to collect data about natural attenuation and the extent of the RDX, TCE, and VC plumes to help refine the RD. Following an initial evaluation of the results of the pre-RD investigation and an emerging contaminant policy review, the NWS Yorktown Partnering Team agreed to perform an additional pre-RD investigation to complete the evaluation of the nature and extent of contamination in support of the RD at Site 22. The additional investigation was conducted March through December 2017. The investigations consisted of DPT groundwater sampling, monitoring well installation and sampling, seep water sampling, and pore water sampling. The investigations concluded the following:</p> <ul style="list-style-type: none"> • The vertical and lateral extents of TCE and VC in groundwater were not fully delineated, • The extent of RDX was adequately delineated and that concentrations were below the threshold identified in the ROD for active treatment, • 1,4-dioxane was a potential risk driver in groundwater and that the extent of 1,4-dioxane was sufficiently delineated for RA, • Perchlorate was a potential risk driver in groundwater and that the extent of perchlorate was not fully delineated, and • Perfluorooctane sulfonate (PFOS) was a potential risk driver in groundwater and that the extent of PFOS was adequately delineated. <p>Remedy optimization was recommended to evaluate active treatment options for TCE, VC, 1,4-dioxane, and perchlorate and further delineate TCE, VC, and perchlorate.</p>

3.2.8.2 Current Activities

A SAP is being developed to collect data to optimize the RA. The results of the most recent Five-Year Review indicated that the remedy at Site 22 is short-term protective of human health and the environment because LUCs are enforced at the site to restrict activities that would result in contact with groundwater and restrict construction and occupation of future buildings within the LUC boundary (CH2M, 2018a). Issues and recommendations were identified to ensure the future protectiveness of the remedy. The issues, recommendations, milestones, and the current status of the issues are presented in **Table 3-18**.

Table 3-18. Site 22 Five-Year Review Summary

Issue	Recommendation	Milestone	Status
There is uncertainty as to the nature, extent, and magnitude of groundwater COC concentrations and the effectiveness of the existing MNA remedy for VOCs in groundwater has to be evaluated	Conduct additional investigation of the groundwater to verify elevated contaminant concentrations, and evaluate the need for modification to the ROD	11/30/2018	Nature, extent, and magnitude of groundwater COCs were documented in the Final Pre-Design Investigation Summary Report TM (CH2M, 2020a). A need for a modification to the ROD will be documented in the Final Remedy Optimization Report expected in July 2024.
There is uncertainty as to the extent and magnitude of 1,4-dioxane groundwater concentrations	Conduct additional investigation to determine the extent of contaminant concentrations, and evaluate the need for modification to the ROD	11/30/2018	Extent and magnitude of 1,4-dioxane groundwater concentrations were documented in the Final Pre-Design Investigation Summary Report TM (CH2M, 2020a). A need for a modification to the ROD will be documented in the Final Remedy Optimization Report expected in July 2024.
There is uncertainty as to the presence and extent of perchlorate and PFAS in groundwater	Conduct additional investigation to determine if perchlorate and PFAS are present in site groundwater, and if so, evaluate the need for modification to the ROD	11/30/2018	Presence and extent of perchlorate and PFAS in groundwater were documented in the Final Pre-Design Investigation Summary Report TM (CH2M, 2020a). A need for a modification to the ROD will be documented in the Final Remedy Optimization Pilot Study Report expected in July 2024.

3.2.8.3 Nature and Extent of Contamination

Historical burning operations are the source for potential contamination of site media. Investigations have consisted of analyses of samples of groundwater, soil, surface water, sediment, seep water, and pore water for VOCs, SVOCs, pesticides, PCBs, inorganic constituents, explosives constituents, and/or PFAS. Surface water and sediment samples were collected near Site 22 as part of an overall evaluation of surface water related to Sites 4, 21, and 22, as they are adjacent to each other and contribute runoff and groundwater discharge to the Eastern Branch of Felgates Creek. Potential unacceptable risks identified for each medium at Site 22, as documented in the previously presented reports, are summarized in **Table 3-19**.

Table 3-19. Site 22 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Soil	Ecological	HMX, cadmium, copper, lead, mercury, silver, zinc	An RA was conducted to excavate and dispose of contaminated soil. Post-removal action confirmation samples indicated that concentrations of all COCs were below established RGs. An NFA ROD for soil was signed in September 2003 (Baker, 2003a).
Groundwater	Human Health	RDX, TCE, 1,1-DCE, VC, 1,4-dioxane, perchlorate, PFOS	TCE, VC, and RDX identified as COCs in the ROD (CH2M, 2012e). 1,4-dioxane, perchlorate, and PFOS identified as potential risk drivers during the pre-RD investigation (CH2M, 2020a).

Table 3-19. Site 22 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Surface Water	None Identified	None Identified	No unacceptable risks were identified for surface water. An NFA ROD for surface water was signed in August 2011 (CH2M, 2011d).
Sediment	None Identified	None Identified	No unacceptable risks were identified for sediment. An NFA ROD for sediment was signed in August 2011 (CH2M, 2011d).

3.2.8.4 CERCLA Path Forward

- Routine annual LUC inspections
- Remedial optimization workplan, implementation, and reporting (groundwater)
- ESD or PP/ROD Amendment (groundwater)
- LUC RD
- RD
- RAWP
- RA implementation
- CCR
- iRACR
- LTM workplan, field work, and reporting
- RACR

Schedule 3-8 presents the FY 2022–2023 schedule for Site 22.

3.2.9 Site 23—Building 428 Teague Road Disposal Area

Site 23 Summary	
Status:	RI/FS Phase: RI Data Gap investigation for Soil, Groundwater, Surface Water, and Sediment Ongoing
Media Investigated:	Soil: EPA OU 10 – RI Groundwater: EPA OU 10 – RI Surface Water: EPA OU 10 – RI Sediment: EPA OU 10 – RI
Removals and RAs:	Soil and Debris Removal (OHM, 1996; J.A. Jones, 2003; UNITEC, 2006; Shaw, 2011)
Media Closed with NFA:	No
Waste and/or Debris Present Onsite:	Yes (debris from pier fire, concrete, metals, drums)

3.2.9.1 Site Description

Site 23 (formerly SSA 1), the Building 428 Teague Road Disposal Area, is located northeast of Building 428 along the York River (**Figure 3-9**). The study area boundary encompasses approximately 26 acres based on the extent of site investigation and is bisected by a former railroad track. The railroad track was constructed in 1919 and operated until 1989. The track has since been removed and only the ballast and a gravel road that parallels the former track remain. The site south of the base fence line is a combination of mixed hardwood/pine forest and open areas where materials were disposed of. To the northeast of the fence line is wetland that is fed by surface runoff and tributaries from the rest of Site 23. The wetland is not tidally influenced and eventually discharges to the York River. Depth to groundwater (Cornwallis Cave aquifer) is between 8 and 15 feet bgs, with flow directed toward the York River.

Disposal activities at the site reportedly began in 1940, ceased in 1960, and included the disposal of debris from a pier fire in the mid-1950s. Aerial photography suggests the area was also used for waste storage in 1945. In 1993, a land survey was conducted, where discrete piles of surface and partially buried debris were identified (concrete rubble; scrap metal; wooden pilings and railroad ties; empty fuel cans; empty, open, and corroded drums; asbestos pipe insulation; and shingles). A summary of relevant documents and action milestones is presented in **Table 3-20**.

Table 3-20. Site 23 Key Documents

Document Title/Milestone	Summary
Waste Characterization Sampling at SSAs 1, 2, and 5 (Baker, 1993) – AR #000313	Waste characterization sampling was conducted at SSA 1 (currently Site 23) in order to characterize the types of waste materials present and to support the engineering and design activities associated with a proposed removal action, consisting of excavation and disposal of surface debris and associated soil.
EE/CA and AM for SSA 1, 2, and 5 (Baker, 1994d) – AR #000625	The EE/CA and AM documented the proposed NTCRA at SSA 1 (Site 23) to remove miscellaneous surface debris piles.
Soil and Debris Removal Action at SSAs 1, 2, and 5 (OHM, 1996) – AR #000648	A removal action was conducted during the summer and early fall of 1994 by OHM to address surface debris present at SSA 1 (Site 23). Items removed from the site during the removal action included two 55-gallon drums of paint cans/spilled paint; 443 tons of wooden creosote timbers (remains of the burnt pier); 763 tons of ordinary nonhazardous debris; 1,119 tons of debris containing non-friable asbestos; 1,680 pounds of pipe wrapped with friable asbestos; 31 tons of recyclable metal; and two truck batteries. Approximately 5,815 tons of TNT- and TNB-contaminated ash/soil were also removed from an area north of the railroad tracks at the northeast portion of the site. Confirmatory soil samples were collected and the excavation area was backfilled and re-graded.

Table 3-20. Site 23 Key Documents

Document Title/Milestone	Summary
SSP Report for SSAs 1, 6, 7, and 15 (Baker, 1996a) – AR #000663	An SSP report was developed to determine whether SSA 1 warranted an RI/FS. Soil, groundwater, sediment, and surface water samples were collected, and detections of carcinogenic PAHs, VOCs, explosives constituents, pesticides, and inorganics in site media warranted additional investigation, and SSA 1 (Site 23) was recommended for an RI/FS.
Draft Final Round One RI Report for Sites 23, 24, 25, and 26 (Baker, 2002b) – AR # N/A ^a	In 1997, soil, groundwater, surface water, and sediment samples were collected and analyzed for TCL organics, TAL metals, cyanide, and explosives. Based on a review of the results, the NWS Yorktown Partnering Team determined that a second removal action to address TNT-, PAH-, N-nitrosodi-n-propylamine, and metals-contaminated soil should be conducted to mitigate potential risk from soil prior to finalizing the RI report.
Final Ecological Cleanup Goals for Soil, Site 23, Teague Road Disposal Area (Baker, 2003b) – AR #002269	The Final cleanup goals were established for PAHs, N-nitrosodi-n-propylamine, and arsenic associated with potential human health risk, and arsenic, mercury, and zinc, associated with potential risk to ecological receptors. The following cleanup goals were established: carcinogenic PAHs (1 part per million [ppm]), non-carcinogenic PAHs (10 ppm), N-nitrosodi-n-propylamine (0.0613 ppm), arsenic (14.8 ppm), mercury (0.24 ppm), and zinc (199 ppm).
CCR for Site 23 (J.A. Jones, 2003) – AR #002415	A second removal action was conducted by J.A. Jones in the spring of 2003 to address eight identified hotspots (Areas A through H). During the March 2003 Yorktown Partnering Meeting, the Partnering Team agreed not to include Area G because the concentration of arsenic at this location was consistent with background concentrations. In total, the removal action included the excavation and offsite disposal of approximately 1,025 tons of contaminated soil and buried debris from seven areas.
Site 23 Excavation and Offsite Landfill Disposal (UNITEC, 2006) – AR #002283	A third removal action was conducted by Universe Technologies, Inc., in January 2004 to address approximately 2,816 tons of zinc-contaminated soil and debris that remained in Area F following the 2003 action. Floor composite confirmation samples were collected from six grid cell areas prior to backfilling. Confirmation samples indicated that the zinc cleanup goal was met in the western three grid cells, but was slightly exceeded in the eastern three grid cells. This area was backfilled and on January 7, 2004, the NWS Yorktown Partnering Team agreed (Consensus Statement 1-07-04-33) that there were no unacceptable ecological risks from exposure to zinc that remained in eastern grid cells.
Revised Draft Final Round One RI Report for Sites 23, 24, 25, and 26 (Baker, 2008b) – AR # N/A ^a	A review of the 2003 Draft Removal Action CCR (J.A. Jones, 2003) was conducted and determined that a further investigation of soil remaining within the footprint of the 2003 removal action areas (Areas A–F and H) was warranted. In July 2006, an investigation of surface and subsurface soil was conducted in order to re-characterize the footprint of the 2003 removal actions areas (Areas A–F and H) and to investigate a small depression in the central portion of the site. Samples were analyzed for total metals, low-level PAHs, N-nitrosodi-n-propylamine, and 2, 4, 6-TNT. The results of this soil investigation indicated that contaminants exceeded cleanup goals within Areas A–C (Grid cells 1–28) and within the small depression. All other former 2003 removal areas (D, E, F, and H) were confirmed to have met cleanup goals. However, due to data quality issues, inappropriate collection procedures and sample locations, and inappropriate quality control procedures, the document associated with the RI was not finalized, and the team agreed that only slug test data could be used to support future decisions. In accordance with Partnering Team agreement, this document will not be finalized and is not discussed further.
CCR at Site 23 (Shaw, 2011) – AR # 000167	In June 2009, Shaw Environmental conducted an additional soil removal action to address the remaining contaminated soil left in place. A total of 4,513 yd ³ (6,770 tons) of contaminated soil were excavated from eighteen grid cells and disposed of offsite. Confirmation samples indicated that COCs remained in exceedance of RGs; however, due to funding constraints, excavation activities were discontinued. Excavation walls that had not yet been addressed were covered with plastic as an interface between the clean backfill and existing sidewall. Additional waste was identified during the removal action, consisting of concrete pieces, whole trees, wood, metal pieces, and roofing material.

Table 3-20. Site 23 Key Documents

Document Title/Milestone	Summary
Site 23 RI Report (CH2M, 2020c) – AR # 003480	<p>An RI was conducted to determine the nature and extent of contamination resulting from historic site activities and address data gaps associated with the removal actions. The RI Report included the following conclusions:</p> <ul style="list-style-type: none"> • PAH and metal COCs and COPCs were present in surface and subsurface soil in areas outside former soil removal areas where surface debris was present. • Several backfilled areas contained constituents (primarily metals) at concentrations posing potentially unacceptable human health and/or ecological risks. • Human health and/or ecological COCs/COPCs were widely distributed throughout the wetland located on National Park Service Property. • Dioxins/furans are the only COCs in groundwater posing potentially unacceptable human health risks. Under the aerobic conditions present in groundwater at Site 23, dioxins and furans are not expected to degrade naturally. • COCs and COPCs identified for Site 23 media are primarily present in soil and sediment that are generally likely to remain in the solid phase in the future. <p>The RI recommended a Pre-FS Investigation (later changed to an RI Data Gap Investigation) be conducted.</p>

^a Report will not be finalized, no AR number

3.2.9.2 Current Activities

An RI Data Gap SAP is currently being developed.

3.2.9.3 Nature and Extent of Contamination

Disposed waste material at Site 23 was the source of potential contamination to soil, groundwater, sediment, and surface water. Previous investigations have included analysis of soil, groundwater, surface water, and sediment samples for TCL VOCs, TCL SVOCs, explosives constituents, pesticides, PCBs, and TAL metals. In accordance with Partnering Team agreement, the Round One RI document was not finalized in 2008 and the nature and extent of contamination in groundwater, surface water, and sediment, remaining debris, residual soil contamination, and contaminated backfill (if present) following the removal actions, will be determined during the ongoing RI. Potential risks identified for each medium at Site 23, as documented in the previously presented reports, are summarized in **Table 3-21**.

Table 3-21. Site 23 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Soil	Human Health Ecological	Benzo(a)pyrene, arsenic, barium, hexavalent chromium, copper, lead, mercury, and zinc	Removal actions have addressed most of the known soil risks. Areas not previously investigated and backfill areas have been investigated as part of the RI. Data gaps identified in the RI Report are being addressed in the forthcoming investigation and will be documented in the RI Data Gap Report.
Groundwater	Human Health	Dioxins/furans	Groundwater has been investigated as part of the RI. Data gaps identified in the RI Report are being addressed in the forthcoming investigation and will be documented in the RI Data Gap Report.
Surface Water	Ecological	Iron and manganese	Surface water has been investigated as part of the RI. Data gaps identified in the RI Report are being addressed in the forthcoming investigation and will be documented in the RI Data Gap Report.
Sediment	Human Health Ecological	Arsenic, beryllium, barium, cyanide, hexavalent chromium, iron, lead, mercury, thallium, and zinc	Sediment has been further investigated as part of RI. Data gaps identified in the RI Report are being addressed in the forthcoming investigation and will be documented in the RI Data Gap Report.

3.2.9.4 CERCLA Path Forward

- RI Data Gap investigation workplan, field work, and reporting (soil, groundwater, surface water, and sediment)
- FS (soil, groundwater, surface water, and sediment)
- PP (soil, groundwater, surface water, and sediment)
- ROD (soil, groundwater, surface water, and sediment)
- LUC RD
- RD
- RAWP
- RA implementation
- CCR
- iRACR
- LTM workplan, field work, and reporting
- RACR

Schedule 3-9 presents the FY 2022–2023 schedule for Site 23.

3.2.10 Site 24—Aviation Field

Site 24 Summary	
Status:	RD/RA Phase: Removal Action Ongoing
Media Investigated:	Soil: EPA OU 19 – Removal Action/RI Groundwater: EPA OU 19 – RI Surface Water: Not Present Sediment: Not Present
Removals and RAs:	Soil/Waste Removal (2016–ongoing)
Media Closed with NFA:	No
Radiological Concerns:	Radiological survey conducted in the Summer of 2018 for all recovered munitions material documented as safe and residual soil accumulated during the NTCRA activities that had occurred. Approximately 20 tons of material documented as safe (mine components) were determined to be radiologically impacted and are being stored in a locked Conex box onsite until proper disposal is coordinated.
Waste and/or Debris Present Onsite:	Yes (miscellaneous debris, including batteries and cables, and munitions components)

3.2.10.1 Site Description

The Site 24, the Aviation Field (formerly Site 14, SSA 6, and SWMU 27), study area boundary is approximately 34 acres, and includes approximately 14 acres of an open, grassy field surrounding the helicopter landing pad in the northern portion of NWS Yorktown, just south of the York River (**Figure 3-10**). The site is bounded by the NWS Yorktown installation fence line to the north, former railroad tracks to the east and Main Road to the south. A Joint Improvised Explosive Device Defeat Organization battle course is located in the western portion of the site and along the western perimeter of the site in former storage areas. The depth to first encountered groundwater is between 11 and 14 feet bgs. The surface water bodies surrounding the site (the York River, Felgates Creek, and Indian Field Creek) influence the groundwater flow directions across the site, and groundwater flow within the Columbia aquifer generally flows toward the closest water body. A topographic divide runs north to south through the middle of the site, causing surface water runoff to flow towards drainage ditches to the east and west. Due to the small elevation change across the site, surface runoff is minimal even after a storm event.

Historically, the site was utilized as an aviation field until 1927, after which it was used for storage of munitions on the surface and in underground caches. The site was also used for storage of miscellaneous debris, including batteries and cables. A review of aerial photographs indicates that peak surface storage occurred in 1968. Areas of surface debris are no longer evident at the site. In addition, the area where the helicopter landing pad is currently located may also have been used briefly as an explosives burning area. Sludge from NWS Sewage Treatment Plant #1 was reportedly dried in the eastern portion of the site. A Daramend greenhouse/bio-cell was constructed in 1999 to treat explosives-contaminated soil and sediment from Site 6, and was removed in August 2006 once treatment was complete. A summary of relevant documents and action milestones is presented in **Table 3-22**.

Table 3-22. Site 24 Key Documents

Document Title/Milestone	Summary
SSP Report for SSAs 1, 6, 7 and 15 (Baker, 1996a) – AR #000663	An SSP was conducted to determine if conditions at the site warranted initiation of the RI/FS process. In 1994, a geophysical survey was conducted to identify areas of buried debris and fill material. Utilizing electromagnetic terrain conductivity, magnetometry, and ground penetrating radar techniques, four major disposal areas (Areas B, C, E, and F), one minor disposal area (Area G), and one area of black sludge-like material (Area D) were identified within the SSA 6 Helicopter Landing Pad Area (currently Site 24). Test pits were conducted and buried materials, including metal banding, pipes, metal grating, wire, and inert ordnance components (activating devices and rocket motor casings), were identified between 2 and 13 feet bgs within the Helicopter Landing Pad Area (Areas B, C, E, and F). Potential unacceptable risks were identified within the SSA 6 Helicopter Pad Landing Area (currently Site 24) and an RI/FS was recommended.

Table 3-22. Site 24 Key Documents

Document Title/Milestone	Summary
Revised Draft Final Round One RI Report for Sites 23, 24, 25, and 26 ^a (Baker, 2008b) – AR # N/A	The Round One RI at Site 24 was conducted in September 1997. Five surface soil samples were collected. However, due to data quality issues, inappropriate collection procedures and sample locations, and inappropriate quality control procedures, the document associated with the RI was not finalized, and the team agreed that only slug test data could be used to support future decisions. In accordance with Partnering Team agreement, this document will not be finalized and is not discussed further. Consequently, the team recommended the collection of additional soil and groundwater data.
Site 24 RI Report (CH2M, 2014d) – AR # 002660	The RI was conducted to characterize the nature and extent of buried debris and the potential contamination of soil and groundwater and to assess the potential unacceptable risks posed by exposure to contamination by human and ecological receptors. The extent of buried debris has been delineated and is limited to six small (each less than 2,000 square feet), discontinuous disposal areas (Disposal Areas B [north and south], C, E, and F [north and south]). Waste debris consists of miscellaneous metal debris, metal banding material, inert ordnance debris, and three empty and rusted 55-gallon drums; no ash was observed. The HHRA concluded that the only potential unacceptable human health risks at Site 24 are associated with the possible future child and lifetime resident from exposure to waste and soil within the waste disposal areas (primarily Aroclor-1254, aluminum, cadmium, chromium, and copper), soil across the entire site (primarily Aroclor-1254, arsenic, and chromium), and soil outside the waste area (primarily arsenic and chromium). The ERA concluded that risks from terrestrial food web exposures are acceptable; however, for terrestrial habitats, a few small, isolated areas with high concentrations of mercury and arsenic in surface soil were identified that may present spatially limited, localized risks to some lower-trophic-level receptors.
Site 24 EE/CA and AM (CH2M, 2015c, 2016a) – AR # 002824	The EE/CA provided the basis for a NTCRA for contaminated soil at Site 24. Removal action alternatives evaluated included: (1) excavation with offsite incineration; and (2) excavation with offsite disposal. The two alternatives were evaluated based on effectiveness, implementability, and cost. Alternative 2, excavation with offsite disposal, was recommended to mitigate potential unacceptable human health and ecological risks. Cleanup goals were developed as part of the EE/CA for BEHP, Aroclor-1260, amino-DNTs, HMX, RDX, 2,4,6-TNT, chromium, iron, mercury, vanadium, and zinc in soil, and BEHP and Aroclor-1260 in sediment, to protect human health and ecological receptors. The AM is the Decision Document for selection of Alternative 2 for the NTCRA at Site 24.
Site 24 NTCRA Work Plan and Explosives Safety Submission (Sealaska Environmental Services-Tetra Tech EC, Inc, 2016 and 2018) – AR # 0003048/pending	A work plan was developed to outline the technical approach for conducting the NTCRA to excavate and dispose of impacted soil and debris from six discontinuous disposal areas and impacted surface soil from three isolated hot spot areas ranging from 2 to 14 ft bgs. The NTCRA was initiated in 2016 but was placed on hold following discovery of potential munitions during the NTCRA. The NTCRA was reinitiated following development of an Explosives Safety Submission to address the potential munitions. After receiving approval of the ESS, removal activities resumed in November 2017. On April 5, 2018, a roll-off containing munitions material documented as safe (MDAS) was rejected from an off-site destruction/recycling facility and returned to the site due to the observation of elevated radiation measurements detected by the portal monitor at the facility. Upon notification of the rejected roll-off, soil removal activities ceased, and radiological work instructions were developed to facilitate radiological survey activities. Numerous MDAS items and residual soil collected from the bottom of MDAS storage containers were found to have elevated radiation exposure rates. Radiologically impacted MDAS and residual soil were moved to two locked storage containers and are pending disposal (SES-Tech Atlantic, 2019).
Site 24 Non-Time-Critical Removal Action at Site 24 TM (SES-Tech Atlantic, 2021) – AR # 003499	27 drums of soil currently stored at Site 24 were sampled to determine if the contents contained low-level radioactive waste and to demonstrate that the transport of the drums did not constitute a Department of Transportation Class 7 hazardous material shipment. The results of the sampling indicate that the soil in the 27 drums is not considered LLRW and that the soil is suitable for off-site transportation and disposal as non-hazardous waste.

^a Report will not be finalized, no AR number

3.2.10.2 Current Activities

A soil and waste removal action was initiated in 2016 but is currently on hold due to discovery of radiological material in 2018. Bi-weekly inspections of the low-level radioactive commodities are ongoing and arrangements are being made for disposal.

3.2.10.3 Nature and Extent of Contamination

Several areas of buried debris at Site 24 are the source of potential contamination to soil. Based on the results of a geophysical survey and test pitting activities, buried debris is located within six discontinuous areas at the site. Historical investigations have included analyses of surface and subsurface soil and groundwater samples for TCL VOCs, TCL SVOCs, explosives constituents, pesticides, PCBs, and TAL metals. Additional field activities, completed in 2010 as part of the 2014 RI, included analyses of surface and subsurface soil, drainage soil, and groundwater samples for VOCs, SVOCs, explosives constituents, pesticides, PCBs, and metals. The results of historical soil sampling (conducted during the 1996 SSP and the 2008 Round One RI), 2010 soil sampling (surface, subsurface, drainage), and 2013 groundwater sampling were included in the RI report. Potential unacceptable risks identified for each medium at Site 24, as documented in the previously presented reports, are summarized in **Table 3-23**.

Table 3-23. Site 24 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Soil	Human Health	Aroclor-1254, aluminum, arsenic, cadmium, chromium, and copper	A Removal Action is being conducted to address the potential unacceptable risks from exposure to waste materials and soil within the waste disposal areas.
	Ecological	Mercury, and Arsenic	
Groundwater	None Identified	None Identified	No potential unacceptable risks to human health or ecological receptors were identified associated with groundwater. The RI recommended NFA for groundwater (CH2M, 2014d); however, additional investigation is planned following completion of the removal action.
Surface Water	N/A	N/A	Surface water is not associated with Site 24.
Sediment	N/A	N/A	Sediment is not associated with Site 24.

3.2.10.4 CERCLA Path Forward

- In situ waste characterization workplan, field work, and reporting (soil)
- Removal action completion (soil and waste)
- CCR (soil and waste)
- Groundwater confirmation sampling workplan, field work, and reporting
- PP (soil and groundwater)
- ROD (soil and groundwater)
- LUC RD (soil)
- RACR

Schedule 3-10 presents the FY 2022–2023 schedule for Site 24.

3.2.11 Site 25—Building 373 Rocket Plant

Site 25 Summary	
Status:	RI/FS Phase: RI for Soil, Groundwater, Surface Water, and Sediment Ongoing
Media Investigated:	Soil: EPA OU 20 – RI Groundwater: EPA OU 20 – RI Surface Water: EPA OU 20 – RI Sediment: EPA OU 20 – RI
VI Concerns:	VI concerns are being investigated as part of the RI, but since Buildings 373, 386, and 374 are unoccupied there are no potential issues at this time
Removals and RAs:	Underground Storage Tank (UST) Removal (OHM, 1997b)
Media Closed with NFA:	No
Waste and/or Debris Present Onsite:	No

3.2.11.1 Site Description

Site 25, the Rocket Plant (formerly SWMU 25 and SSA 7), is located at the end of Main Road, just east of Felgates Creek (**Figure 3-11**). The Site 25 study area includes 2 acres and is relatively flat with a surface depression west of Building 373. The majority of the site consists of paved or grassy areas; however, a wooded area lies just west of the surface depression and separates the site from Felgates Creek. Groundwater flows westward toward Felgates Creek. Surface water generally flows towards the west, enters surface depressions and discharges to Felgates Creek.

Building 373 is an explosives loading plant. Prior to the 1960s, wash/rinse water from the cleanup of formulation/pouring equipment drained into a settling basin within the building for removal of suspended solids. The solids were incinerated and dumped at Site 4 (Burning Pad Residue Landfill). The wash/rinse water was then discharged to a pipe, which terminated in an outfall to a dirt drainage swale that discharged into Felgates Creek. This discharge line was plugged in the early 1980s and a 220-gallon UST was installed to contain the wash/rinse water. The UST consisted of a pre-cast concrete pipe installed vertically into the ground with a bottom section cast in the concrete pipe. Once the tank was filled, the water was filtered through a carbon treatment unit and discharged to the sanitary sewer system. The use of the UST was curtailed in the early 1980s when it was replaced with an aboveground storage tank, installed at the north end of the building. Materials contained in fluids within the tanks included binders, stabilizers, and explosives constituents. In addition, Building 373 was decontaminated in 2013. A summary of relevant documents and action milestones is presented in **Table 3-24**.

Table 3-24. Site 25 Key Documents

Document Title/Milestone	Summary
SSP Report for SSAs 1, 6, 7 and 15 (Baker, 1996a) – AR # 000663	An SSP investigation of AOC 7, which included what is now the Site 25 Rocket Plant, the Group 18 Magazine, and the Main Road Disposal Area, was conducted in 1994. Soil, groundwater, surface water, and sediment samples were collected during the SSP investigation, and VOCs, SVOCs, pesticides, one PCB (Aroclor-1260), explosives constituents, and metals were detected in site media. The SSP concluded that the area around the former UST and associated piping was an AOC and warranted further investigation, but no additional investigation was warranted for the Group 18 Magazine or Main Road Disposal Area (Baker, 1996a).
Final Report at SSAs 3 and 7 (OHM, 1997b) – AR # 000893	A removal action was conducted in June and July of 1996, consisting of removing the 220-gallon concrete UST and associated piping. In addition, soil beneath the UST and piping was excavated and removed to an average depth of approximately 3 feet below the bottom of the tank and piping. The excavated UST, piping, and soil were disposed of offsite. Confirmation samples were collected from the sidewalls and floor of the excavation. Results indicated the presence of VOCs, nitramines, and inorganics in soil; however, clean up goals were not established in the removal action work plan. Confirmation data were reviewed and compared to current USEPA RSLs and ESVs for use in future investigations.

Table 3-24. Site 25 Key Documents

Document Title/Milestone	Summary
Phase I RI Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25 (CH2M, 2007a) – AR # 000892 and 002158	Site 25 groundwater samples were collected and analyzed for inorganic constituents and explosives constituents. Only RDX concentrations exceeded the RSL for tap water. However, the sampled well network did not represent adequate coverage of all potential source areas at the site. The Phase I Groundwater RI report recommended additional sampling in the vicinity of the discharge pipe, since soil and groundwater samples were not previously collected in this area. The report also recommended sampling for perchlorates, which could have been present in the rocket fuels used at the site.
Revised Draft Final Round One RI for Sites 23, 24, 25, and 26 ^a (Baker, 2008b) – AR # N/A	A Round One RI was conducted at Site 25 in 1997. Soil, groundwater, surface water, and sediment samples were collected. VOCs and explosives constituents were detected in subsurface soil and groundwater, SVOCs were detected in Felgates Creek surface water and sediment, pesticides and PCBs were detected in sediment, and metals were detected in all site media. Potential human health and ecological risks and hazards were within or below acceptable ranges for all exposure pathways. However, due to data quality issues, inappropriate collection procedures and sample locations, and inappropriate quality control procedures, the document associated with the RI was not finalized, and the team agreed that only slug test data could be used to support future decisions. In accordance with Partnering Team agreement, this document will not be finalized and is not discussed further.
Site 25 RI SAP and SAP Addendum (CH2M, 2015e, 2017f) – AR # 002787 and 0032595	A SAP was prepared to outline the activities needed to gather data to determine if historical site activities warrant additional action and to allow for evaluation of alternatives and plan action, if needed. The study area included other buildings in the Rocket Plant complex, including Building 386 and a small shed used to store solvents. Following initial review of the RI data, a SAP addendum was prepared to support a supplemental investigation of soil and groundwater to meet the objectives of the RI.

^a Report will not be finalized, no AR number

3.2.11.2 Current Activities

A report documenting RI field activities conducted between 2015 and 2018 is currently being finalized and a Pre-FS SAP is being developed.

3.2.11.3 Nature and Extent of Contamination

The wash/rinse water from the cleanup of formulation/pouring equipment was the source of potential contamination at Site 25. Previous investigations have included analyses of soil, groundwater, surface water, and sediment samples for TCL VOCs, TCL SVOCs, explosives constituents, pesticides, PCBs, and TAL metals. A Round One RI was completed in 2008; however, in accordance with Partnering Team agreement, this document will not be finalized and is not discussed further. The initial SSP report identified concentrations of VOCs, SVOCs, one PCB (Aroclor-1260), explosives constituents, and metals in site media at concentrations exceeding screening levels. A SAP and follow-on SAP Addendum were finalized in 2015 (CH2M, 2015e) and 2017 (CH2M, 2017f), respectively, to further characterize soil and groundwater in the vicinity of Building 373, the former UST and associated piping, and the abandoned discharge line, and to evaluate potential transport and contaminant discharge from the site to Felgates Creek. Potential unacceptable risks identified for each medium at Site 25, as documented in the previously presented reports, are summarized in **Table 3-25**.

Table 3-25. Site 25 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Soil	Ecological	HMX and mercury	Potential unacceptable risks were identified based on the results of the RI for terrestrial ecological receptors in surface and/or shallow subsurface soil.
Groundwater	None	None	No potential unacceptable risks were identified for groundwater. No further action was recommended for groundwater (CH2M, 2021d).

Table 3-25. Site 25 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Surface Water	None	None	No potential unacceptable risks were identified for surface water. No further action was recommended for surface water (CH2M, 2021d).
Sediment	None	None	No potential unacceptable risks were identified for sediment. No further action was recommended for sediment (CH2M, 2021d).

3.2.11.4 CERCLA Path Forward

- Pre-FS Investigation work plan and field work (soil)
- FS (soil) (Pre-FS Investigation Report included as an attachment.)
- PP (soil, groundwater, surface water, and sediment)
- ROD (soil, groundwater, surface water, and sediment)
- RD (soil)
- RA (soil)
- RACR (soil)

Schedule 3-11 presents the FY 2022–2023 schedule for Site 25.

3.2.12 Site 26—Building 1816 Mark 48 Waste Otto Fuel Tank

Site 26 Summary	
Status:	RI/FS Phase: RI for Soil and Groundwater Ongoing
Media Investigated:	Soil: EPA OU 21 – RI Groundwater: EPA OU 21 – RI Surface Water: Not Present Sediment: Not Present
VI Concerns:	Groundwater data suggests there are no VI concerns. VI sampling being evaluated in the ongoing RI report
Removals and RAs:	UST and Surrounding Contaminated Soil Removal — (Environmental and Safety Designs, Inc., 1994)
Media Closed with NFA:	No
Waste and/or Debris Present Onsite:	No

3.2.12.1 Site Description

Site 26, the Building 1816 Mark 48 Waste Otto Fuel Tank (formerly SSA 18 and previously referred to as Site NW20 – The Otto Fuel Spill Site), is located at Building 1816 (**Figure 3-12**). Site 26 consists of the area surrounding Buildings 1816, 1818, 1897, and 2054, including a waste Otto fuel management process area that was active in the northern portion of Building 1816 from the mid-1970s to the mid-1990s, before the southern portion of the building was constructed and operations in the northern portion ceased. Based on the extent of the study area boundary, Site 26 is approximately 30 acres in size. The area is currently used for work on Mark 48 torpedoes as part of the Naval Submarine Torpedo Facility Command. A majority of the site is restricted; a physical barrier (chain-link fence) is present to prevent unauthorized access to the facility.

Site 26 includes a 2,500-gallon concrete UST and network of ancillary drain pipes that were formerly used to store waste Otto fuel. The tank was installed in 1974 and in late 1987, waste Otto fuel was discovered leaking from the tank. The tank was not equipped with a secondary containment system. The waste fuel stored in the tank consisted of a liquid mixture of Otto fuel and water; it may also have contained oils, denatured ethyl alcohol, detergent, and trace amounts of cyanide, halogenated hydrocarbons, and heavy metals such as arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. The fuel was removed, the tank was cleaned, and a RCRA closure permit was filed. In March 1995, the waste Otto fuel UST was removed from the site. During the removal action, some contaminated soil was noted and removed. However, before the tank removal was completed, the excavation sides collapsed and the base of the tank was left in place. There were also two fuel oil USTs at the site that are not considered to have been potential sources of CERCLA contamination. An 8,000-gallon fuel oil UST was removed from the site in 1995 and a 12,000-gallon #2 heating oil UST located in the southern portion of the site was removed in 1998. Site 26 has been retained as an ERP site because of chlorinated VOCs detected in shallow groundwater.

Depth to groundwater in this area is generally 30 feet to the shallow Cornwallis Cave aquifer. The Yorktown confining unit is approximately 25 feet thick at Site 26 and separates the Cornwallis Cave aquifer from the underlying Yorktown Eastover aquifer. The topography at the site is generally flat at approximately 70 feet amsl. A summary of relevant documents and action milestones is presented in **Table 3-26**.

Table 3-26. Site 26 Key Documents

Document Title/Milestone	Summary
AM for SSA 18 (Environmental and Safety Designs, Inc., 1994) – AR # 000612	The AM documented the decision to remove the leaking UST and surrounding soil contaminated with waste Otto fuel, and to notify current onsite workers of the potential for exposure.

Table 3-26. Site 26 Key Documents

Document Title/Milestone	Summary
Soil Assessment Report for SSA 18 (Baker, 1994e) – AR # 000619	In April 1994, a soil assessment investigation was conducted related to an expansion of Building 1816. Surface and subsurface soil samples were analyzed, TCE was detected in one sample and elevated concentrations of several metals were detected in one or more samples; however, no detected concentrations exceeded regulatory limits.
SSP Report for SSAs 2, 17, 18 and 19 (Baker, 1996b) – AR # 000666 and 000667	An SSP investigation was conducted at Site 26 in February 1995 and included collection of surface soil and groundwater samples. The investigation identified potential unacceptable human health risks associated with concentrations of SVOCs and inorganics in soil and VOCs in groundwater. 1,1,1-TCA and 1,1-DCE were detected in groundwater in the vicinity of the tank location and downgradient of the tank. The SSP recommended additional RI/FS efforts.
Draft Final Round One RI Report for Sites 23, 24, 25, and 26 ^a (Baker, 2008b) – AR # N/A	In September and October of 1997, a Round One RI investigation was conducted at Site 26. Surface and subsurface soil and groundwater samples were collected. The associated HHRA identified cumulative non-cancer hazards to future adult and child residents due to combined exposure to all media. However, because hazard indices for each target organ for chemicals in specific media were below 1, the RI recommended NFA related to human health risk. The ERA identified no potential unacceptable risks to receptors associated with the site. While the conclusions of the Draft Final RI Report were that the levels of chemicals in site media posed no unacceptable potential risk to human or ecological receptor populations, the NWS Yorktown Partnering Team did not accept the conclusions or recommendations of the report. Due to data quality issues, inappropriate collection procedures and sample locations, and inappropriate quality control procedures, the document associated with the RI was not finalized, and the team agreed that only slug test data could be used to support future decisions. In accordance with Partnering Team agreement, this document will not be finalized and is not discussed further.
Site 26 RI SAP, Building 1816 Construction Worker Authorization, and Site 26 RI SAP Addendum (CH2M, 2013b; Navy, 2014; and CH2M, 2018i) – AR # 002636, pending, pending	A SAP was prepared to outline the activities needed to gather data to determine if historical site activities warrant additional action and to allow for evaluation of alternatives and plan action, if needed. The field activities were coordinated with Naval Ordnance Safety and Security Activity as documented in an explosives site approval. Following initial review of the RI data, a SAP addendum was prepared to support a supplemental investigation of soil, groundwater, and soil vapor to meet the objectives of the RI.

^a Report will not be finalized, no AR number

3.2.12.2 Current Activities

The RI report documenting RI field activities conducted between 2014 and 2019 is currently being developed and is anticipated to be finalized in FY 2022.

3.2.12.3 Nature and Extent of Contamination

The source of contamination to site media was the contents of the UST that was removed in 1995. Previous investigations have included analyses of soil and groundwater samples for TCL VOCs, TCL SVOCs, explosives constituents, pesticides, PCBs, and TAL metals. No surface water or sediment analyses were completed at Site 26 because there are no surface water bodies associated with the site. An RI was completed in 2008; however, in accordance with Partnering Team agreement, this document will not be finalized. SAPs were finalized in 2013 (CH2M, 2013b) and 2018 (CH2M, 2018i) as part of the ongoing RI to further understand the hydraulic characteristics of Site 26 and to characterize the nature and extent of soil contamination associated with the release from the former UST source area, soil that may have been impacted by industrial operations at the site, groundwater contamination, and vapor intrusion. Potential unacceptable risks identified for each medium at Site 26, as documented in the previously presented reports, are summarized in **Table 3-27**.

Table 3-27. Site 26 Contamination and Risks Summary

Media	Potential Risk	COC	Status
Soil	Pending Evaluation	Pending Evaluation	Soil has been investigated and the results of the investigation are being documented in the ongoing RI report.
Groundwater	Pending Evaluation	Pending Evaluation	Groundwater has been investigated and the results of the investigation are being documented in the ongoing RI report.
Indoor Air and Sub-slab Soil Gas	Human Health	Pending Evaluation	Sub-slab soil gas samples has been investigated and the results of the investigation are being documented in the ongoing RI report.
Surface Water	N/A	N/A	Surface water is not associated with Site 26.
Sediment	N/A	N/A	Sediment is not associated with Site 26.

3.2.12.4 CERCLA Path Forward

- FS (soil and groundwater)
- PP (soil and groundwater)
- ROD (soil and groundwater)
- LUC RD
- RD
- RAWP
- RA field work
- CCR
- iRACR
- LTM Work Plan, field work, and reporting
- RACR

Schedule 3-12 presents the FY 2022–2023 schedule for Site 26.

3.2.13 Site 31—Barracks Road Landfill Industrial Area

Site 31 Summary	
Status:	RI/FS Phase: FS for Soil, Groundwater, Surface Water, Sediment Ongoing
Media Investigated:	Soil: EPA OU 22 – RI Groundwater: EPA OU 22 – RI Surface Water: EPA OU 22 – RI Sediment: EPA OU 22 – RI
VI Concerns:	Shed 3 and Shed 6: Buildings evacuated based on previous VI investigation and not currently occupied or monitored. Shed 4 and Shed 5: TCE concentrations in indoor air are within the USEPA target risk range. Changes in building condition which may affect potential vapor intrusion exposures will be monitored by the base. Buildings 371, 687, 1803, and 1804: NFA
Removals and RAs:	Sealing Interior Cracks in Shed 6 and Building 371 and Relocation of Employees from Sheds 3 and 6 (2012)
Media Closed with NFA:	No
Waste and/or Debris Present Onsite:	No

3.2.13.1 Site Description

Site 31 (formerly AOC 23) consists of an industrial area west of Site 12 and SSA 15 (**Figure 3-13**). The extent of the study area boundary is approximately 101 acres in size, and extends to encompass the Site 12 and SSA 15 areas. The topography of Site 31 slopes to the northwest toward an unnamed creek. The area is predominantly paved with asphalt or covered in gravel. Wooded areas are present on both the northwest and southeast sides of the study area. The industrial area consists of four large buildings (Sheds 3 through 6) and several smaller buildings. Shed 3 formerly housed a paint booth, blast booth, satellite accumulation area for aerosol paint cans, and parts washer and was used for wing and fin repair until it was evacuated in February 2012 due to vapor intrusion concerns. The building was also historically used as a missile component rework facility and a boiler plant. Shed 4 is currently used as a storage warehouse. The building was historically used for container repair and testing. Shed 5 was historically used for mine and depth charge rework, and later for administrative and driver training purposes. Shed 6 was most recently used to support public works and utilities maintenance, and was historically used for missile component rework and equipment maintenance; but like Shed 3, was evacuated in February 2012 due to vapor intrusion concerns, and is currently unoccupied. Public works operations formerly conducted in Shed 6 are now conducted in Shed 5. Railroad tracks lie to the northwest of the buildings. A UST that used to contain waste oil was previously located by the northern corner of Shed 5, but was removed in December 1993 (Baker, 1997g). Two other USTs and one aboveground storage tank were also located onsite and were used for storage of heating oil.

Site 31 was formerly known as either AOC 23 or the Area Upgradient of Site 12, and was associated with Site 12 until September 2006. At that time a consensus statement was signed by the Partnering Team indicating the VOC concentrations detected in groundwater were unrelated to Site 12 based on historical site use and the spatial distribution of contamination. The presence of VOCs was attributed to the industrial area operations upgradient of Site 12 and this area has subsequently been investigated independently of Site 12 as Site 31. The site is bounded on the east and west sides by surface drainage features and the site topography slopes downward toward these surface water features. The site is located on a groundwater divide, with groundwater flowing in both westerly and easterly directions. A summary of relevant documents and action milestones is presented in **Table 3-28**.

Table 3-28. Site 31 Key Documents

Document Title/Milestone	Summary
Site Assessment Report for AOC 23 (CH2M, 2008f) – AR # 002425	The Site Assessment was completed between April 2007 and March 2008, and consisted of an MIP study to determine the groundwater source areas, DPT soil and groundwater sampling, well installation, and groundwater, seep, surface water, and sediment sampling. The report concluded that a VOC plume was present at the site as a result of two potential sources, one in the vicinity of Shed 3 and the other in the vicinity of Shed 5. In some places, groundwater contamination was found to be migrating and discharging via seeps, but this did not appear to have a significant impact to surface water. Potential unacceptable risk was identified from exposure to metals, explosives constituents, and VOCs in groundwater, and from exposure to VOCs in indoor air. An RI was recommended for Site 31.
Site 31 AM (Navy, 2012) – AR # 002839	The Site 31 AM for a time-critical removal action (TCRA) documented the decision to evacuate personnel from Shed 3, Shed 6, and Building 371, based on the results of the indoor air and sub-slab soil gas sampling conducted in January 2012. The maximum concentrations of TCE in indoor air in Shed 3, Shed 6, and Building 371 exceeded the screening criteria. In addition, an RA contractor was tasked with sealing foundation cracks that were identified as potential pathways for vapor intrusion.
Site 31 RI Report (CH2M, 2019b) – AR # Pending	Fieldwork for the RI was performed over three phases from January 2012 to August 2015 to determine the nature and extent of contamination and to determine potential unacceptable risks to human health and ecological receptors. Soil, groundwater, surface water, and sediment samples were collected and a MIP investigation was performed within the vadose zone. VOCs posed unacceptable risks to human receptors in groundwater, surface and subsurface soil, surface water, and through vapor intrusion. SVOCs posed unacceptable risk to human receptors in groundwater, and inorganics posed unacceptable risk to human receptors in groundwater, and surface and subsurface soil. VOCs posed unacceptable risk to ecological receptors in groundwater and surface water and inorganics posed unacceptable risk to ecological receptors in surface water and sediment. Groundwater sampling for 1,4-dioxane was recommended based on the presence of indicator chemicals. An FS was recommended to address potentially unacceptable risks.
RI Data Gap 1,4-Dioxane Groundwater Investigation Site 31 SAP (CH2M, 2019f) – AR# 003415	A SAP was prepared outlining the groundwater sampling activities required to address 1,4-dioxane data gaps identified during the RI. Sampling activities were conducted in December 2019 and the results will be reported in the forthcoming FS.
Site 31 Post-RI Periodic VI Monitoring Technical Memorandum (CH2M, 2021c) – AR # pending	<p>Sampling was performed to confirm that conditions in Building 371, Building 687, Shed 4, and Shed 5 remain protective of current workers and to assess potential for future significant VI pathways.</p> <p>The report concluded that the VI pathway at Buildings 371, Building 687, and Shed 5 is not likely to become significant in the future under current building use and conditions. Shed 4 subslab soil vapor data continued to exceed vapor intrusion screening levels based on USEPA and Navy attenuation factors, indicating the potential for future vapor intrusion cannot be ruled out.</p> <p>The report recommended that no additional VI sampling is necessary at Buildings 371 and 687 and Sheds 4 and 5. The ERP manager will coordinate with the Base environmental manager and occupational safety and health professionals and assess changes in building conditions and occupancy at Shed 4 that may affect future VI potential. Potential future risk scenarios and RAs will be evaluated during the FS.</p>

3.2.13.2 Current Activities

The draft FS is being developed. The results of the 1,4-dioxane data gap investigation conducted in 2019 are being reported in the FS.

3.2.13.3 Nature and Extent of Contamination

Previous investigations included analyses of surface water, sediment, and groundwater samples for TCL VOCs, TCL SVOCs, explosives constituents, pesticides, PCBs, and TAL metals. An investigation to evaluate the results of indoor/outdoor air, sub-slab soil gas, subsurface soil, groundwater, surface water, and sediment samples was completed as part of the RI (CH2M, 2019b). Potential unacceptable risks identified for each medium at Site 31, as

documented in the previously presented reports, including the 2019 RI (CH2M, 2019b), are summarized in **Table 3-29**.

Table 3-29. Site 31 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Soil	Human Health	TCE, aluminum arsenic, hexavalent chromium, and iron in surface and subsurface soil	Potential unacceptable risks were identified during the RI associated with TCE-contaminated soil potentially acting as continued sources of contamination in the vicinity of Sheds 3 and 6 (CH2M, 2019b).
	Ecological	None Identified	
Groundwater	Human Health	1,1,2-TCA, 1,2-DCA, cis-1,2-DCE, chloroform and TCE, arsenic and cobalt, in the northern plume area; 1, 2-DCA, cis-1,2-DCE, chloroform, TCE, VC, aluminum, arsenic, cobalt, iron, and manganese in the southern plume area	Concentrations of TCE and cis-1-2-DCE are confined to the Cornwallis Cave aquifer, but are widespread and were found to be stable to increasing in concentrations downgradient of the source areas, indicating that there may be a continuing source, the plume is migrating, and/or degradation is not a significant pathway for TCE (CH2M, 2019b). TCE is the primary ecological risk driver in the Ballard Creek drainage (groundwater, seeps, and surface water). 1,4-dioxane data gap investigation results will be evaluated in the FS to determine whether it is a COC.
	Ecological	TCE in groundwater and seeps in the Ballard Creek drainage area	
Surface Water	Human Health	TCE	TCE is a COC for human health exposures only if a visitor/trespasser is also exposed to contamination in soil. Cadmium was identified as a COPC upgradient of the outfall, but elevated detection limits did not allow for a determination of whether groundwater is a significant contributor to impacts to surface water and sediment in this area (CH2M, 2019b).
	Ecological	TCE, and cadmium in the Ballard Creek drainage area	
Sediment	Human Health	None Identified	Although the RI report recommended continuing the ERA to include possible toxicity testing and biological sampling, it was determined following finalization of the RI report that the FS could proceed without continuing the ERA.
	Ecological	Lead in the Roosevelt Pond drainage, cadmium in the Ballard Creek drainage	
Indoor Air and Sub-slab Soil Gas	Human Health	Chloroform, methylene chloride, and TCE in indoor air in Sheds 3, 4, 5, and 6	Indoor air and sub-slab soil gas samples were collected as part of the initial RI investigation in January 2012. Shed 3, Shed 6, and Building 371 were immediately evacuated of personnel based on a USEPA Region 3 recommendation, as documented in the AM for the TCRA (Navy, 2012). Additional investigation of Building 687 was completed in 2017. The RI concluded that there were no unacceptable risks from current use after removal of operations from Sheds 3 and 6 and that additional sampling of indoor air and or subslab soil vapor may be warranted for occupied buildings 371, 687, Shed 4, and Shed 5 to evaluate concentration trends and to confirm that COC concentrations remain below action levels (CH2M, 2019b). Post-RI periodic VI sampling has been conducted at Building 371, Building 687, Shed 4, and Shed 5, and based on the results, no additional VI sampling is necessary at Buildings 371 and 687 and Sheds 4 and 5 (CH2M, 2021c). Potential future risk scenarios and RAs will be evaluated during the FS.

3.2.13.4 CERCLA Path Forward

- FS (soil, groundwater, surface water, and sediment)
- PP (soil, groundwater, surface water, and sediment)
- ROD (soil, groundwater, surface water, and sediment)
- LUC RD
- RD
- RAWP
- RA field work
- CCR
- iRACR
- LTM Work Plan, field work, and reporting
- RACR

Schedule 3-13 presents the FY 2022–2023 schedule for Site 31.

3.2.14 Site 33—Sand Blasting Grit Area

Site 33 Summary	
Status:	RI/FS Phase: RI for Soil, Groundwater, Surface Water, and Sediment Ongoing
Media Investigated:	Soil: EPA OU 28 – RI Groundwater: EPA OU 28 – RI Surface Water: EPA OU 28 – RI Sediment: EPA OU 28 – RI
Removals and RAs:	Excavation of Soil and Sandblasting Grit – (OHM, 2001)
Media Closed with NFA:	No
Waste and/or Debris Present Onsite:	Yes (metal, drum fragments, construction debris, railroad ties)

3.2.14.1 Site Description

Site 33 (formerly SSA 22 and AOC 4) consists of approximately 6 acres (based on the extent of the study area boundary) located in the eastern portion of NWS Yorktown. Site 33 is bounded to the east and north by Bollman Road and an intermittent drainage ditch and to the south by a surface water drainage ditch (**Figure 3-14**). The eastern portion of the site is a vacant lot, and the western portion of the site is wooded. Site 33 is the former Building 530 Paint Shop and Sand Blasting Operations, which operated between 1945 and the early to mid-1980s. Bomb fins and wings, inert bomb casings, and various other inert ordnance items were grit-blasted in a blasting booth and painted within Building 530. Grit blasting material may have been composed of coal slag or steel grit. The blasting booth within the building used a dust collector; accumulated dust was deposited on the ground surface north of Building 530. Waste dumping areas have also been observed within the wooded portions of the site to the northeast and southwest of former Building 530. The northern waste dumping area consists of metal slag, drum fragments, and construction debris, while the southern waste dumping area consists primarily of railroad ties and other related materials. Site 33 is a mostly cleared grassy area that is generally flat in topography. A summary of relevant documents and action milestones is presented in **Table 3-30**.

Table 3-30. Site 33 Key Documents

Document Title/Milestone	Summary
Navy Final Recommendation for AOCs (SSA 22 is identified as AOC 4) (P. A. Rakowski, P.E., 1995) – AR # 000355	In 1995, Site 33 was identified as AOC 4, and soil samples were collected from the grit disposal pile located to the northeast of Former Building 530. These samples were analyzed for metals. Elevated lead concentrations were detected in the samples collected from the grit pile, with a maximum concentration of 3,100 mg/kg. Based on this sampling, it was recommended that the site be retained as an AOC and that the grit pile be removed.
SSP Report for SSAs 3, 4, 5, 9, 10, 20, 21, 22, 23, and 24 (Volume I, II, and III) (Baker, 2001c) – AR # 001350, 001351, 001352	The SSP was initiated at Site 33 in 1997. SI activities included the collection of soil and groundwater samples analyzed for organic compounds and metals. VOCs, SVOCs, PCBs, and metals were detected in surface soil, primarily in the areas of grit disposal. A groundwater sample was collected from the one monitoring well located at the site. TCE was the primary constituent detected in groundwater at a concentration of 220 micrograms per liter. It was concluded that elevated VOC levels may be due to the use of solvents at Former Building 530. VOCs and metals were identified as COPCs at Site 33.
RA Report for Sites 1 and 3 and SSA 22 (OHM, 2001) – AR # 001091	Excavation of the lead-impacted soil and sandblasting grit began in 1999 and was completed in April 2000. The soil excavation area covered approximately 600 square feet, with excavation depths ranging from 6 inches to 2 feet. The groundwater monitoring well was abandoned during the soil excavation efforts. Following the soil removal effort and post-removal confirmatory sampling the USEPA indicated that NFA was required for site soil.
Site 33 SI SAP and SAP Addendum (CH2M, 2015b, 2018d) – AR # 002789 and # 003361	A SAP was prepared to outline the activities needed to determine if potential impacts from historical Site 33 activities warranted additional investigation. Following initial review of the data, a SAP addendum was prepared to support a supplemental investigation of soil and groundwater to meet the objectives of the SI.

3.2.14.2 Current Activities

Fieldwork for the SI was initiated in 2015 and completed in 2019. The results of the SI indicate additional data are needed. An RI SAP, which includes risk screening and reporting of the SI data, is being developed and will be finalized in FY 2021.

3.2.14.3 Nature and Extent of Contamination

Potential contamination at Site 33 is related to grit blasting activities within and near former Building 530 and the grit pile that was located in the north corner of Building 530. Previous investigations have included analyses of soil and groundwater samples for VOCs, SVOCs, explosives constituents, pesticides, PCBs, and metals. Potential unacceptable risks identified for each medium at Site 33, as documented in the previously presented reports, are summarized in **Table 3-31**.

Table 3-31. Site 33 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Soil	Human Health	Lead (Blast Area); pending evaluation (expanded area of investigation)	A removal action was conducted beginning in July 1999 to remove and dispose of lead-contaminated soil and blasting grit from within the Blast Area (OHM, 2001). An NFA Decision Summary for soil within the blasting area was signed in May 2004. Soil was further investigated during the SI; the results are being documented in the ongoing RI SAP. A more extensive investigation of soil will be conducted as part of the RI.
Groundwater	Pending Evaluation	Pending Evaluation	Groundwater was investigated during the SI; the results are being documented in the RI SAP. Groundwater will be further investigated as part of the RI.
Surface Water	Pending Evaluation	Pending Evaluation	Surface water was investigated during the SI; the results are being documented in the RI SAP. Surface water will be further investigated as part of the RI.
Sediment	Pending Evaluation	Pending Evaluation	Sediment was investigated during the SI; the results are being documented in the RI SAP. Sediment will be further investigated as part of the RI.

3.2.14.4 CERCLA Path Forward

- RI field work and reporting (soil, groundwater, surface water, and sediment)
- FS (soil, groundwater, surface water, and sediment)
- PP (soil, groundwater, surface water, and sediment)
- ROD (soil, groundwater, surface water, and sediment)
- LUC RD
- RD
- RAWP
- RA field work
- CCR
- iRACR
- LTM Work Plan, field work, and reporting
- RACR

Schedule 3-14 presents the FY 2022–2023 schedule for Site 33.

3.2.15 Site 34—Building 537 Discharge to Felgates Creek

Site 34 Summary	
Status:	RI/FS Phase: RI for Soil, Groundwater, Surface Water, and Sediment Ongoing
Media Investigated:	Soil: EPA OU 27 – RI Groundwater: EPA OU 27 – RI Surface Water: EPA OU 27 – RI Sediment: EPA OU 27 – RI
VI Concerns:	VI concerns are being investigated as part of the RI, but since Buildings 457, 537, 1479, and 1782 are unoccupied there are no potential issues at this time.
Removals and RAs:	Soil and Sediment Excavation and Disposal – (Shaw, 2009; CH2M, 2009a)
Media Closed with NFA:	No
Waste and/or Debris Present Onsite:	No

3.2.15.1 Site Description

Site 34 (formerly SSA 14), the Building 537 Discharge to Felgates Creek, is approximately 6 acres in size (based on the extent of the study area) and is located in the north-central portion of NWS Yorktown (**Figure 3-15**). During its operation, the site was used for industrial activities related to ordnance. The site is no longer in use and buildings at the site, including Building 537, were decontaminated (contents removed and interiors cleaned) in 2013 and 2014. A one-lane asphalt road circles around Buildings 458, 459, 460, 537, and 651, which are concrete bunkers set into a hillside. South of the road, the sparsely-wooded terrain slopes steeply to a flat marsh wetland area north of the main channel of the Eastern Branch of Felgates Creek. Site 34 consists of potential discharges from Building 537 as well as a distinct discharge pipe which originates at Building 537 and extends south to Felgates Creek. Nitramine-contaminated wastewater was reportedly discharged through the pipe.

The surface geology at Site 34 consists of approximately ten feet of silt and clay consistent with the Yorktown confining unit. This clay unit overlies the Yorktown-Eastover aquifer, which consists predominantly of sand, but includes an approximately ten feet thick clay lens between 30 and 40 feet bgs at Site 34. Depth to groundwater at the site is between 10 and 12 feet bgs. Groundwater and surface water flow south toward the Eastern Branch of Felgates Creek. A summary of relevant documents and action milestones is presented in **Table 3-32**.

Table 3-32. Site 34 Key Documents

Document Title/Milestone	Summary
Round Two RI Report for Sites 2, 8, 18, and SSA 14 (Volume I and II) (Baker, 2004) – AR # 001548 and 001549	A Round Two RI was conducted, which consisted of the collection of surface and subsurface soil, groundwater, surface water, and sediment samples at SSA 14 (now Site 34). Potentially unacceptable human health risks were identified related to CVOCs in groundwater, explosives constituents in surface soil, and metals in surface and subsurface soil. Potentially unacceptable ecological risks were identified related to VOCs, explosives constituents, and metals in soil and sediment, and explosives constituents in surface water.
EE/CA and AM for Contaminated Soil and Sediment at Site 8 and SSA 14 (Baker, 2005b; Baker, 2005c) – AR #002076 and #001871	In 2005, soil and sediment sampling was conducted within the drainage area downstream of the discharge pipe as part of the pre-removal characterization of soil to support a removal action. Sampling results were used to complete an EE/CA and AM for an NTCRA. The EE/CA recommended excavation with offsite disposal of contaminated soil and sediment within the drainage channel to mitigate potentially unacceptable human health and ecological risks. The AM documented the approved RA of excavation of contaminated soil and sediment from SSA 14, which was acting as a source of potential contamination. RGs were established for COCs at SSA 14 as follows: BEHP, HMX, chromium, iron, mercury, vanadium, and zinc in soil, and BEHP and selenium in sediment. Because pre-removal action confirmation surface and subsurface sediment samples in the drainage area of the wetland did not contain detectable mercury, mercury was not identified as a sediment COC. Therefore, a sediment-based PRG for mercury was not developed.

Table 3-32. Site 34 Key Documents

Document Title/Milestone	Summary
Draft Final CCR (Shaw, 2009) – AR # 002589	The NTCRA was completed in 2007 and included excavation with offsite disposal of contaminated sediment, as well as a smaller amount of soil within the drainage channel. Sediment in the area was excavated to meet established clean-up goals for constituents other than mercury.
SSA 14 Removal Action and Confirmation Sampling Summary TM (CH2M, 2009a) – AR # Draft No AR	The TM documented the confirmation sampling conducted following the removal action. With regard to the soil portion of the removal action, a soil-based PRG was established for mercury, and this soil-based PRG was not exceeded in confirmation samples collected following the soil removal.
RI Report for Groundwater at Sites 8 and 34 (CH2M, 2011c) – AR # 000246	Concurrent with the removal action, potential impacts to groundwater and groundwater discharges to surface water and sediment to the Eastern Branch of Felgates Creek were investigated in a groundwater RI. TCE, 1,1-DCE, cis-1-2-DCE, 1,1-DCA, and arsenic were identified as human health COCs for groundwater or exceeded the MCLs. No potential unacceptable human health risks were identified for surface water or sediment, and NFA was recommended for these media in the groundwater RI. The RI recommended an FS for groundwater to address potential unacceptable human health risks in groundwater.
Draft FS Report for Groundwater at Site 34 (CH2M, 2012a) – AR # Draft No AR	The RAOs outlined in the groundwater FS were to reduce contaminant concentrations in groundwater to established RGs for all COCs and to maintain LUCs to prevent human exposure to groundwater until the risk-based RGs were met. During review of the draft FS, the Yorktown Partnering Team identified uncertainties in the delineation of the source of VOC contamination in groundwater and agreed to put the completion of the FS on hold until a data gap investigation was completed. In addition, the Yorktown Partnering Team agreed to further assess mercury in sediment in the vicinity of two locations that were not included in the 2011 groundwater RI risk assessment.
Site 34 Data Gap RI Tier II SAP, Phase II SAP, and SAP Addendum (CH2M, 2014c, 2018b, 2018f) – AR # 003286, and # 003385	A SAP was prepared to outline the activities needed to address soil, sediment, and groundwater data gaps in support of the FS. Initial review of the data indicated the presence of CVOC plumes in newly identified areas of Site 34, adjacent to Buildings 1782 and 626. The NWS Partnering Team agreed via email on March 29, 2019 to include these new areas in the Site 34 study area. A consensus statement formerly documenting this agreement is pending. The Phase II SAP was prepared to collect additional data and information to resolve the new site uncertainties, refine the conceptual site model, assess the presence or absence of contamination, complete the FS, and supplement the current monitoring well network for future monitoring. A SAP Addendum was later completed to document a change in the analytical laboratory supporting the investigation.

3.2.15.2 Current Activities

Fieldwork supporting a data gap RI was initiated in 2014 and completed in 2021. The Data Gap RI report is being developed.

3.2.15.3 Nature and Extent of Contamination

The primary source of contamination was wastewater discharged from the Building 537 pipeline. Previous investigations have included analyses of soil, groundwater, sediment, and surface water samples for TCL VOCs, TCL SVOCs, explosives constituents, pesticides, PCBs, and TAL metals. Surface water and sediment samples were collected near Site 34 as part of an overall evaluation of surface water related to Sites 8 and 34, as the two sites are adjacent to each other and both contribute runoff and groundwater discharge to the Eastern Branch of Felgates Creek. Potential unacceptable risks identified for each medium at Site 34, as documented in the previously presented reports, are summarized in **Table 3-33**.

Table 3-33. Site 34 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Soil	Human Health	HMX	A removal action was conducted to remove and dispose of contaminated soil within the wastewater discharge area (Shaw, 2009). A more extensive investigation of site soil has been conducted and the results of the investigation are being documented in the ongoing Data Gap RI report.
	Ecological	BEHP, HMX, Chromium, Iron, Mercury, Vanadium, and Zinc	
Groundwater	Human Health	TCE, 1,1-DCE, cis-1-2-DCE, 1,1-DCA, and arsenic	Potential unacceptable risks were identified primarily associated with TCE and arsenic (CH2M, 2011c). A more extensive investigation of groundwater has been conducted and the results of the investigation are being documented in the ongoing Data Gap RI report.
Surface Water	None Identified	None Identified	No unacceptable risks were identified for any receptor based on the limited investigation area. A more extensive investigation of surface water has been conducted and the results of the investigation are being documented in the ongoing Data Gap RI report.
Sediment	Ecological	BEHP, selenium	A removal action was conducted to remove and dispose of contaminated soil and sediment (Shaw, 2009). A more extensive investigation of sediment has been conducted and the results of the investigation are being documented in the ongoing Data Gap RI report.

3.2.15.4 CERCLA Path Forward

- RI Data Gap Report (soil, groundwater, surface water, and sediment)
- FS (soil, groundwater, surface water, and sediment)
- PP (soil, groundwater, surface water, and sediment)
- ROD (soil, groundwater, surface water, and sediment)
- LUC RD
- RD
- RAWP
- RA field work
- CCR
- iRACR
- LTM Work Plan, field work, and reporting
- RACR

Schedule 3-15 presents the FY 2022–2023 schedule for Site 34.

3.3 Munitions Response Program Sites

An overview for the MRP site that is currently active and undergoing investigation at NWS Yorktown is provided in the following subsection, and includes the site description, a summary of previous investigations, associated media and identified potential unacceptable risks, activities to be completed in FY 2022–2023, and the CERCLA path forward. The only active MRP site that is currently undergoing investigation and has not been closed is UXO 2 (formerly IRP Site 2).

The following areas have been identified as areas to investigate under the MRP once they are no longer in operational use:

- Explosive Ordnance Disposal Range
- Demolition Range
- UXO 3 (active pier area)

Summaries of the MRP sites, including those with no action or NFA decisions, are included in **Table 2-1**.

3.3.1 UXO 2—Turkey Road Landfill

UXO 2 Summary	
Status:	RI/FS Phase: RI for Soil, Groundwater, Surface Water, and Sediment Ongoing
Media Investigated:	Soil: EPA OU 31 – RI Groundwater: EPA OU 31 – RI Surface Water: EPA OU 31 – RI Sediment: EPA OU 31 – RI
Radiological Concerns:	Radiological item (non-transferable radiation; potential mine electronics component) identified in December 2018 as part of ongoing RI activities. The item was transferred to the radiological storage area at Site 24 in March 2019.
Removals and RAs:	Surface and Near Surface Debris Removal IT Corporation, 1995
Media Closed with NFA:	No
Waste and/or Debris Present Onsite:	Yes (batteries, construction rubble, missile hardware, drums)

3.3.1.1 Site Description

UXO 2 (former Site 2) is a landfill located east of Turkey Road adjacent to a wetland area on the Southern Branch of Felgates Creek and two unnamed tributaries that border Site 2 (**Figure 3-16**). Based on the extent of the study area boundary, UXO 2 is approximately 7 acres in size. Operations at the landfill reportedly began in the 1940s and ceased in 1981. Wastes disposed in this landfill reportedly included mercury and carbon-zinc batteries, tree stumps and limbs, construction rubble, missile hardware (e.g., wings, fins and power packs), electrical devices, and unidentified drums and/or tanks. An estimated 240 tons of waste were disposed during the period of use. Waste material (e.g., mine casings) was primarily located along the tributaries to the Southern Branch of Felgates Creek. In June 2005, during investigation activities, an ordnance item was discovered. Although the item was eventually determined to be inert, the discovery, paired with the history of inert munitions waste disposal at the site, prompted the transference of Site 2 from the IRP to the MRP. Once identified as an MRP site, Site 2 was designated as UXO 2 and a Munitions Response Site Prioritization Protocol (MRSP) scoring was completed. The Turkey Road Landfill was transferred to the MRP on June 19, 2007. A summary of relevant documents and action milestones is presented in **Table 3-34**.

Table 3-34. UXO 2 Key Documents

Document Title/Milestone	Summary
Round One RI Report for Sites 1–9, 11, 12, 16–19, and 21 (Baker and Weston, 1993b) – AR # 000313	The field investigation for the Round One RI was conducted from June to October 1992, and soil, groundwater, surface water, and sediment samples were collected and analyzed. The results of a geophysical investigation indicated the presence of waste along the perimeter of the site adjacent to the drainage ways. Due to the peripheral distribution of waste, the report concluded that the waste was likely graded into the adjacent marshland during disposal. Analytical results indicated minimal site-related impacts to groundwater. Although exceedances of screening values were detected in surface water and sediment samples, the report concluded that detected concentrations were not site-related because elevated concentrations of these constituents were not detected in groundwater samples. The report recommended a removal action to address surficial waste and debris, followed by surface soil sampling to aid in the completion of a risk assessment.
AM and EE/CA for Site 2 (Baker, 1994b) – AR # 000615	The AM documented the removal action to dispose of surface and near surface debris. Heavy metals, nitramine compounds, and base/neutral acid extractable compounds (BNAs) were detected in media at Site 2, and waste present at Site 2 was determined to present a potential source of contamination to groundwater, surface water, sediment, and soil.
Closeout Report for Sites 2 and 9 and SSA 4, Mine Casing and Debris Removal Action (IT Corporation, 1995) – AR # 000646	A removal action was conducted from September to December 1994 in order to remove all surface and near surface debris and collect surface soil samples from within the removal areas. Subsurface waste was not addressed as part of this action. The main objective of the removal action was to eliminate risk from direct exposure to waste and to remove potential sources of contamination. In total, approximately 2 tons of tar emulsion, 6 tons of non-fibrous filter material, 365 tons of batteries, and three drums were removed from Site 2. An additional 4,323 pieces of inert munitions were removed from the sites included in the removal action excavation activities; however, the exact amount of inert munitions items from each site was not recorded. It is estimated that approximately ninety percent of the inert munitions items that were removed came from Site 2.
Round Two RI Report for Sites 2, 8, 18, and SSA 14 (Baker, 2004) – AR # 001548	Soil, groundwater, surface water, and sediment samples were collected to characterize the nature and extent of contamination. The HHRA indicated potentially unacceptable non-carcinogenic risk to hypothetical future adult and child residents from combined exposure to cadmium, thallium, Aroclor-1254, and copper under reasonable maximum exposure concentrations. The ERA identified potentially unacceptable risk to aquatic lower-trophic-level receptors from exposure to silver in sediment. However, due to the presence of elevated silver concentrations detected upgradient of Site 2, the report concluded that Site 28 was the source of silver in unnamed tributary sediments. The report recommended further characterization of PAHs, Aroclor-1254, cadmium, and mercury in site soil to evaluate the potential for migration and accumulation in downgradient media. Although current levels of exposure did not indicate the potential for unacceptable risk to aquatic receptors from these chemicals, the potential for continued source release and future exposures elevated above those measured in the current dataset warranted additional investigation.
Pre-Removal Characterization Field Investigation at Site 2 Work Plan (Baker, 2005a) – AR # 001687	A Work Plan was developed outlining the sampling approach for exploratory trenching and additional soil sampling at Site 2 to define the extent of waste and concentrations of PAHs, Aroclor-1254, cadmium, and mercury. In June 2005, during investigation activities, an ordnance item was discovered. Although the item was eventually determined to be inert, because of the identification of this potential ordnance item along with the 1994 identification of inert munitions, the site was designated as a MRP site and the Pre-Removal Characterization of Soil Investigation was halted. Once identified as an MRP site, Site 2 was designated as UXO 2, a MRSP scoring was completed, and a public announcement regarding its availability was published in local newspapers in May 2008.
TM Summary Report for Non-Intrusive Geophysical Investigation of Turkey Road Landfill (Formerly Site 2), NWS Yorktown, Yorktown, Virginia (CH2M, 2010a) – AR # 000129	A non-intrusive geophysical survey was conducted in April 2010 to delineate the southern boundary of the landfill. Results generally agreed with the findings of the 1992 geophysical survey; no distinguishable southern boundary of the site could be identified. The data also supported the conclusion that debris and waste were likely pushed out toward the wetlands surrounding the site and filled into the surrounding low-lying areas. Isolated subsurface anomalies were detected in the northern and southern portions of the eastern boundary of the investigation area. The greatest concentration of anomalies was detected along the eastern boundary of the site. Further investigation would be required on the southeastern side of the investigation area to delineate the extent of debris in this area.

Table 3-34. UXO 2 Key Documents

Document Title/Milestone	Summary
SI Report for MRP Site UXO 2 (CH2M, 2011a) – AR # 000166	The SI Report examined all of the previous investigations and actions at the site from a munitions response perspective. No documentation of munitions disposal activities or munitions certification processes was identified for the site; however, of the over 4,000 munitions items recovered and inspected, all were wholly inert training or display munitions items. This leads to a reasonable belief that an efficient inspection process was in place to ensure that no live munitions (i.e., MEC) items were placed in the landfill. Due to the low probability of encountering MEC or material potentially presenting an explosive hazard it was recommended that investigation activities to delineate the landfill boundary and the nature and extent of contamination recommence under an Explosives Safety Submission Determination Request.
RI SAP for UXO 2 (CH2M, 2019c) – AR # pending	The SAP was prepared to outline the activities required to determine the nature and extent of the contamination remaining onsite resulting from historical site activities and to gather the data needed to complete a FS, if needed.

3.3.1.2 Current Activities

An RI Data Gap SAP addendum to investigate emerging contaminants is being developed.

3.3.1.3 Nature and Extent of Contamination

The source of potential contamination is the waste disposal of tar emulsion, non-fibrous filter material, batteries, drums and inert munitions in the landfill. Previous investigations have included analyses of soil, groundwater, sediment, and surface water for TCL VOCs, TCL SVOCs, explosives constituents, pesticides, PCBs, and TAL inorganic constituents. Potential risks identified for each medium at UXO 2, as documented in the previously presented reports, are summarized in **Table 3-35**.

Table 3-35. UXO 2 Contamination and Risks Summary

Medium	Potential Risk	COC	Status
Soil	Human Health	cadmium	Potential unacceptable risks were identified associated with cadmium. A more extensive investigation of site soil is currently being conducted as part of the ongoing RI.
Groundwater	None Identified	None Identified	No unacceptable risk identified. A more extensive investigation of site groundwater is currently being conducted as part of the ongoing RI.
Surface Water	None Identified	None Identified	No unacceptable risk identified. A more extensive investigation of site surface water is currently being conducted as part of the ongoing RI.
Sediment	None Identified	None Identified	No unacceptable risk identified. Though the then-current levels of exposure did not indicate the potential for unacceptable risk to aquatic receptors from PAHs, Aroclor-1254, cadmium, and mercury, the potential for continued source release and future exposures elevated above those measured in the current dataset warranted additional investigation. A more extensive investigation of site sediment is currently being conducted as part of the ongoing RI.

3.3.1.4 CERCLA Path Forward

- RI Data Gap workplan, fieldwork, and reporting (groundwater, surface water, and sediment)
- FS (soil, groundwater, surface water, and sediment)
- PP (soil, groundwater, surface water, and sediment)
- ROD (soil, groundwater, surface water, and sediment)

- LUC RD
- RD
- RAWP
- RA field work
- CCR
- iRACR
- LTM workplan, field work, and reporting
- RACR

Schedule 3-16 presents the FY 2022–2023 schedule for UXO 2.

3.4 Federal Facility Agreement Document Review Summary

Table 3-36 summarizes the idealized document review timeframes for primary and secondary documents, as presented in the 1994 FFA. However, the FFA defers the final review schedule for each year to the SMP. Whether due to funding or resource limitations among the stakeholders, the included schedules (**Schedule 3-1 to 3-16**) act as the agreed upon review schedule for documents for FY 2022 and FY 2023.

3.5 Records of Decision

As part of the FFA, 15 source areas were identified at NWS Yorktown as requiring closeout documentation prior to delisting of the base from the National Priorities List:

- Site 1—Dudley Road Landfill
- Site 2—Turkey Road Landfill (now identified as UXO 2)
- Site 3—Group 16 Magazine Landfill
- Site 4*—Burning Pad Residue Landfill
- Site 6—Explosives-Contaminated Wastewater Impoundment
- Site 7—Plant 3 Explosives-Contaminated Wastewater Discharge Area
- Site 8—NEDED Explosives-Contaminated Wastewater Discharge Area
- Site 9—Plant 1 Explosives-Contaminated Wastewater Discharge Area
- Site 11*—Abandoned Explosives Burning Pits
- Site 12—Barracks Road Landfill
- Site 16*—West Road Landfill and SSA 16 – Building 402 Metal Disposal Area and Environs
- Site 17*—Holm Road Landfill
- Site 19—Conveyor Belt Soils at Building 10
- Site 21*—Battery and Drum Disposal Area
- Site 22—Burn Pad

Sites listed with an asterisk (*) are sites where all media have been addressed as closed.

Five-Year Reviews are required to evaluate and document the effectiveness of remedies and RAs at sites that have RODs or Decision Documents as long as waste remains in place or hazardous substances, pollutants, or contaminants remain above levels allowing for unrestricted land use. The next Five-Year Review will be completed in 2023 and, based on the current schedules, will include the following sites:

- Site 1 – Dudley Road Landfill
- Site 6 – Explosives-Contaminated Wastewater Impoundment
- Site 7 – Plant 3 Explosives-Contaminated Wastewater Discharge Area
- Site 12 – Barracks Road Landfill
- Site 19 – Conveyor Belt Soils at Building 10
- Site 22 – Burn Pad

Table 3-36. Federal Facilities Agreement Document Review Summary

FY 2022-2023 SMP

Naval Weapons Station Yorktown, Yorktown, Virginia

Primary Documents	Draft					Draft Final		Final
	EPA/State Review	EPA/State may request extension of regulatory review period	Navy response to regulator review period extension request	Navy addresses regulatory comments	Navy may request extension of period to issue responses or Draft Final	EPA/State Review	Navy addresses regulatory comments	Navy Preparation
	up to 60 days to review	up to 20 days upon written request	up to 7 days to accept extension request or invoke dispute; no response implies acceptance	up to 60 days to issue responses and issue Draft Final	up to 20 days upon written request	up to 30 days to review changes or invoke dispute	up to 30 days to produce Final or issue dispute; Draft Final become Final if no party invokes dispute; if dispute is invoked, a Revised Draft Final will be issued within 35 days from issuing dispute	A primary final document may be modified only if there is significant new information AND need to evaluate potential impacts to public health or the environment; party may seek to modify by submitting a concise written request that details the reason for the modification; if parties do not agree to the modification, any party may invoke dispute
Site Screening Process Work Plans								
Site Screening Price Reports								
Remedial Investigation/Feasibility Study Reports (including Baseline Risk Assessment) and Focused Feasibility Study Work Plans								
Remedial Investigation Reports (including baseline Risk Assessments)								
Feasibility Study and Focused Feasibility Study Reports								
Proposed Plans	Draft PP will be submitted within 30 days of the final FS or FFS Report							within 7 days of EPA acceptance and receiving State comments, Navy shall notice the PRAP for 45 days, and during which time shall hold a public meeting; after the public comment period, EPA, State, and Navy will decide if the plan needs to be modified and/or noticed again
Record of Decisions	submit draft w/in 30 days of close of public comment period including any extension on finalization of the PRAP, ROD will include responsiveness summary; up to 30 days to attempt to select a remedy		RODs are not subject to dispute; if a remedy agreement can't be reached, EPA will select the remedy and issue the final ROD			RODs are not subject to dispute; if a remedy agreement can't be reached, EPA will select the remedy and issue the final ROD	RODs are not subject to dispute; if a remedy agreement can't be reached, EPA will select the remedy and issue the final ROD	
Final Remedial Designs						up to 14 days; but can request additional 14 days if significant changes exist from the Preliminary Remedial Design		
Remedial Action Work Plans								
Remedial Action Completion Reports								
Operations and Maintenance Plans								
Site Management Plans	up to 30 days			30 days		up to 30 days		
Community Involvement Plans	Considered primary for submittal purposes, but							
Long-Term Remedial Action Monitoring Plans	secondary for review purposes							

Table 3-36. Federal Facilities Agreement Document Review Summary

FY 2022-2023 SMP

Naval Weapons Station Yorktown, Yorktown, Virginia

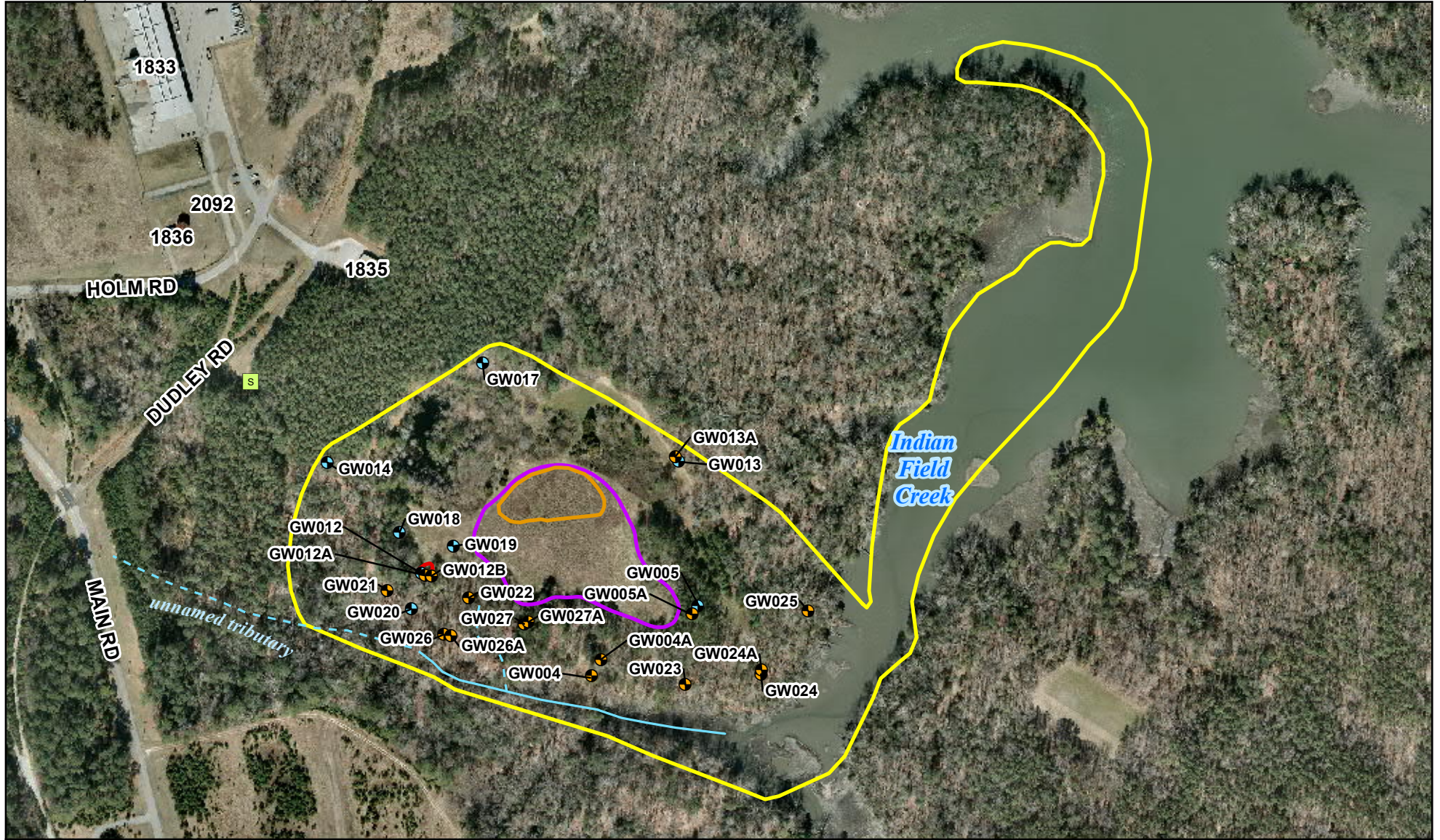
Secondary Documents	Draft					Draft Final		Final
	EPA/State Review	EPA/State may request extension of regulatory review period	Navy response to regulator review period extension request	Navy addresses regulatory comments	Navy may request extension of period to issue responses or Draft Final	EPA/State Review	Navy addresses regulatory comments	Navy Preparation
	up to 60 days to review	up to 20 days upon written request	up to 7 days to accept extension request or invoke dispute; no response implies acceptance	up to 60 days to issue responses and issue Draft Final	up to 20 days upon written request	up to 30 days to review changes or invoke dispute	up to 30 days to produce Final or issue dispute; Draft Final become Final if no party invokes dispute; if dispute is invoked, a Revised Draft Final will be issued within 35 days from issuing dispute	The draft secondary documents may be finalized in the context of the corresponding draft final primary documents.
Health and Safety Plans								
Non-Time Critical Removal Action Plans								
Pilot/Treatability Study Work Plans								
Pilot/Treatability Study Reports								
Engineering Evaluation/Cost Analysis Reports								
Well Closure Methods and Procedures								
Preliminary/Conceptual Remedial Designs or Equivalent	up to 45 days							
Prefinal Remedial Designs								
Periodic Review Assessment Reports								
Removal Action Memorandums								
Other ²	up to 30 days			up to 30 days		up to 30 days	up to 30 days	

ESDs
LUC RDs
Five-Year Reviews

Review times are listed at the top of each section unless otherwise noted.

1: Reference: USEPA, 1994. Federal Facility Agreement under CERCLA 120, Naval Weapons Station Yorktown, Yorktown, Virginia. September.

2: Not referenced in the 1994 FFA



- Legend**
- Columbia Aquifer Monitoring Well
 - Yorktown-Eastover Aquifer Monitoring Well
 - Site Sign
 - Tributary
 - Intermittent Tributary
 - Approximate Area of 1999 Excavation of Arsenic Contaminated Soil
 - Extent of 1999 Landfill Cover Restoration
 - Extent of Landfilled Waste/Landfill Cover/LUC Boundary
 - Study Area Boundary (29 Acres)

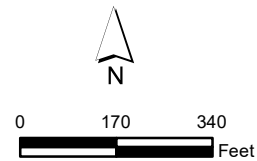
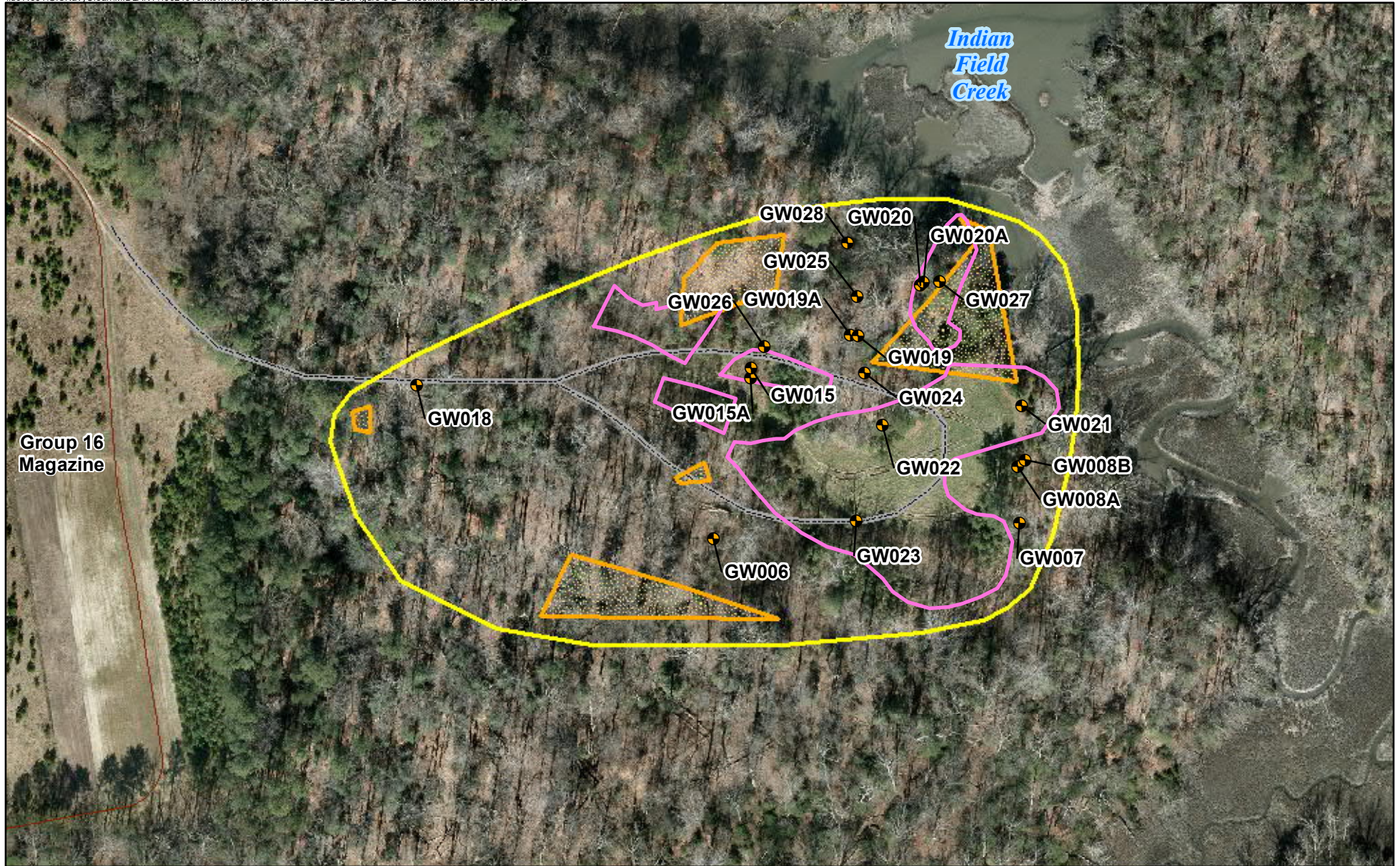







Figure 3-1
 Site 1 - Dudley Road Landfill
 Site Management Plan for FY 2022 to 2023
 NWS Yorktown
 Yorktown, Virginia



Legend

-  Yorktown-Eastover Aquifer Monitoring Well
-  Landfill Access Road
-  2000 Contaminated Soil/ Buried Debris Removal Areas
-  2000 Surface Debris Removal Area
-  Study Area Boundary (6 Acres)

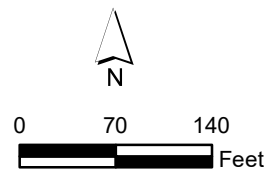
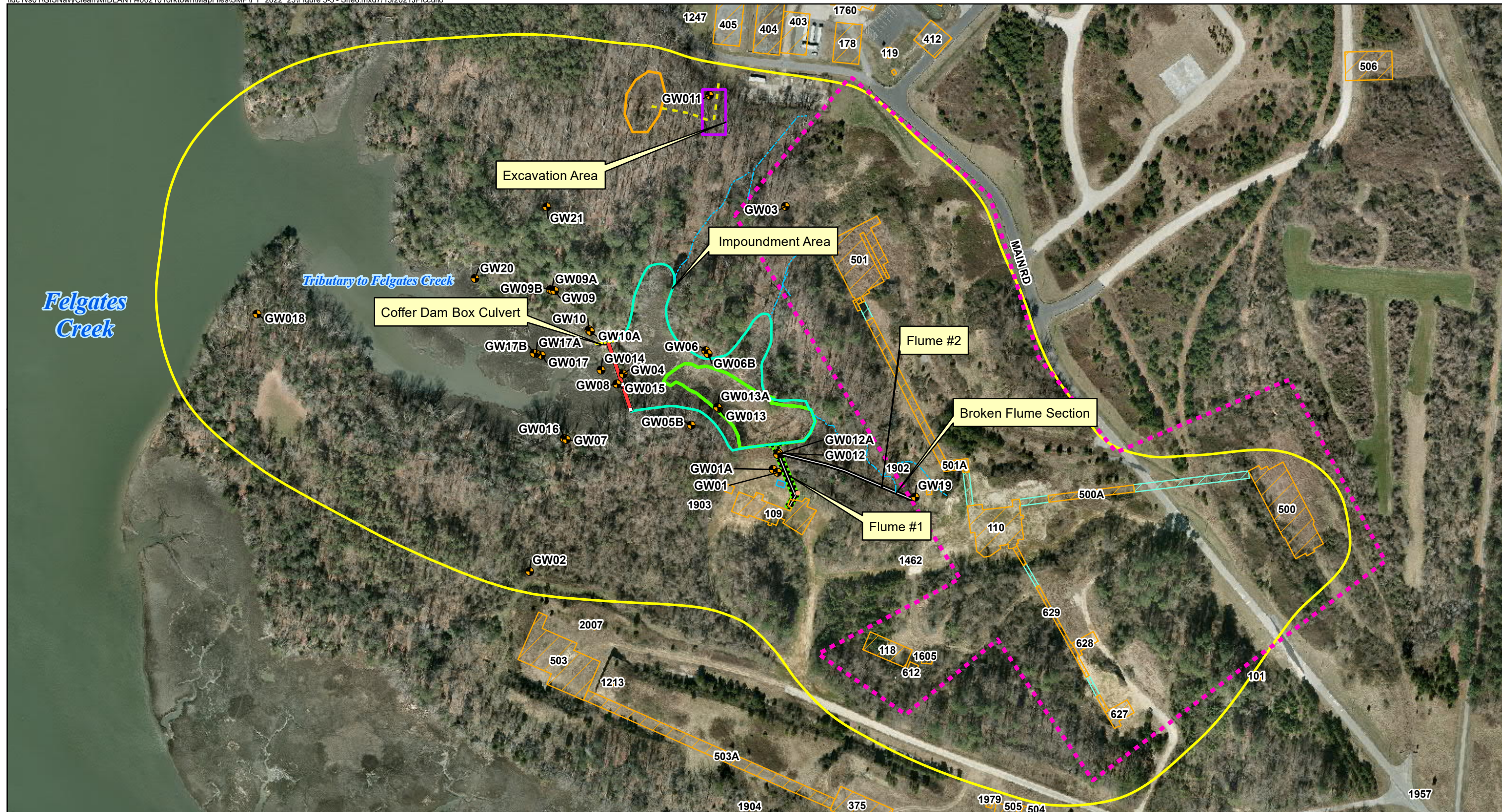


Figure 3-2
Site 3 - Former Group 16 Magazine Landfill
Site Management Plan for FY 2022 to 2023
NWS Yorktown
Yorktown, Virginia



- Legend**
- Yorktown-Eastover Aquifer Monitoring Well
 - Approximate Drainage
 - Approximate Location of Access Road
 - Impoundment Area/Inferred LUC Boundary
 - Coffer Dam
 - Oil/Water Treatment Unit (OWTU)
 - Carbon Adsorption Tower
 - 1998 & 2007 Removal Area
 - Cleared Area
 - Excavation Area/Inferred LUC Boundary
 - Flume Area
 - Site 6 Study Area Boundary (85 Acres)
 - Demolished Area
 - Demolished Building (Underground)
 - Plant 2 Inspection Area

- Building 109 - Ordnance Demilitarization and Decontamination Plant
- Building 110 - Cast Hi Explosive Fill Plant #2
- Building 118 - Boiler House
- Building 1605 - Coal Storage for Building 118 Boiler Plant
- Building 1902 - Sewage Pump Station
- Building 500 - Inert Case Prep Building
- Building 500A - Conveyor (between former Buildings 110 and 500)
- Building 501 - Cooling/Shipping Building
- Building 501A - Conveyor (between former Buildings 110 and 501)
- Building 612 - Heating Plant
- Building 627 - TNT screening Building
- Building 628 - Aluminum Screening Building
- Building 629 - Conveyor (between former Buildings 110 and 627/628)

Figure 3-3
Site 6 - Explosives Contaminated Wastewater Impoundment
Site Management Plan for FY 2022 to 2023
NWS Yorktown
Yorktown, Virginia



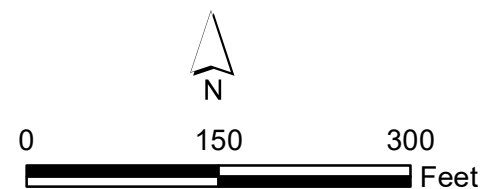
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Feet

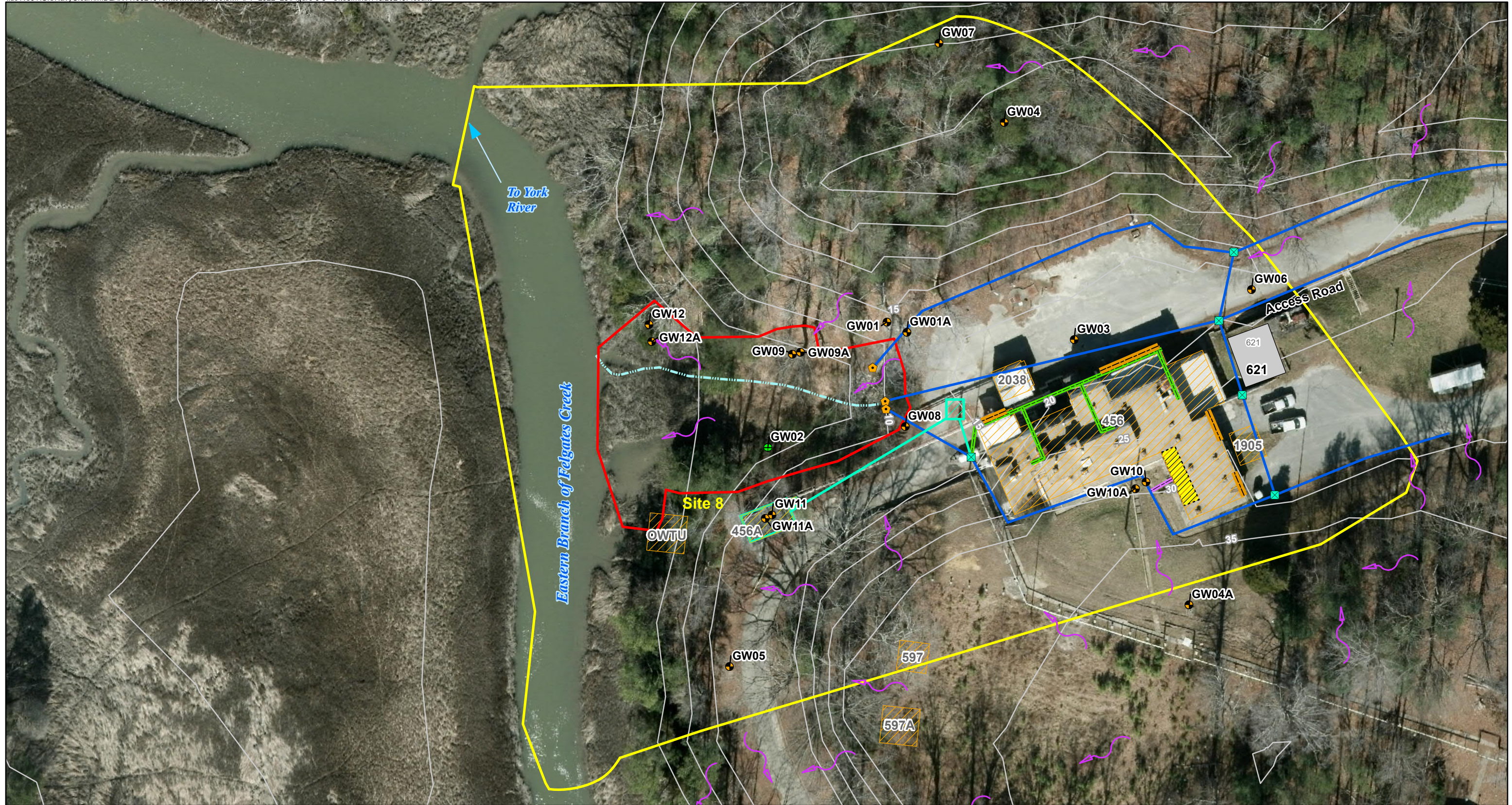
ch2m



- Legend**
- Deep Yorktown-Eastover Aquifer Monitoring Well
 - Shallow Yorktown-Eastover Aquifer Monitoring Well
 - S Site Sign
 - Building Drain
 - ▲ Culvert
 - ⊠ Drop Inlet
 - ⬠ Outfall
 - Storm Sewer
 - Former Buildings
 - Rip Rap Area
 - Former Conveyor Belt
 - Site 7 Removal Area (1996)
 - Inferred LUC Boundary
 - Study Area (33 Acres)

Figure 3-4
 Site 7 - Plant 3 Explosives Contaminated Wastewater Discharge Area
 Site Management Plan for FY 2022 to 2023
 NWS Yorktown
 Yorktown, Virginia

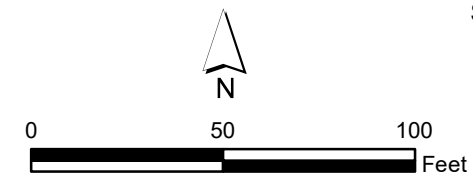


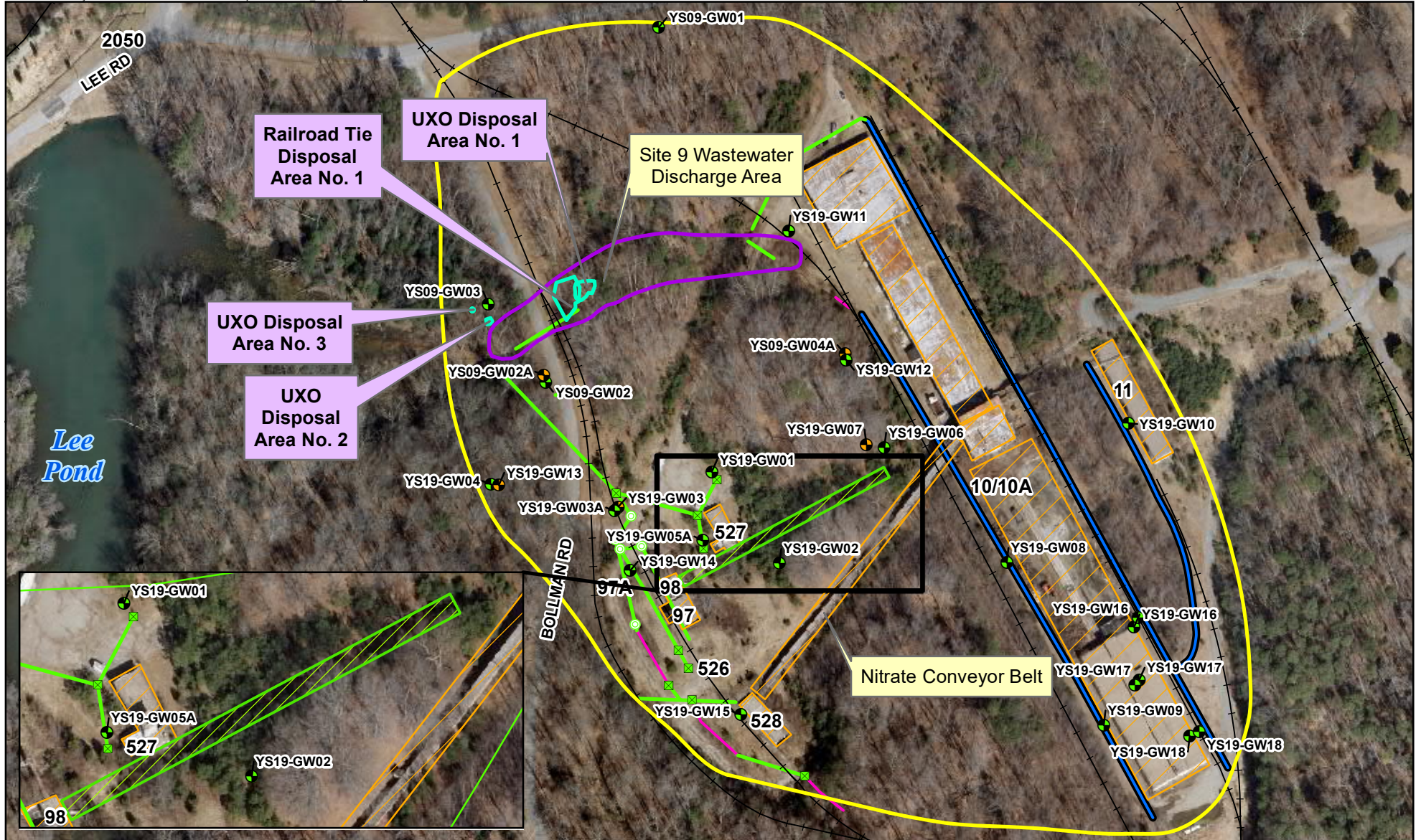


Legend

- | | | |
|---|--------------------------------|-----------------------------------|
| Unable to locate Well | Building Drain | Loading Dock |
| Yorktown-Eastover Aquifer Monitoring Well | Drainage Trench | Elevation Contour (5 ft interval) |
| Outfall | Drainage Channel | Excavated Area |
| Drop Inlet | Buildings | Study Area Boundary (3 Acres) |
| Wastewater Treatment Line | Wastewater Treatment Structure | |
| Overland Flow | Wash Basin | |
| Storm Water Drainage | Demolished Buildings | |

Figure 3-5
 Site 8 - NEDED Explosives-Contaminated Wastewater Discharge Area
 Site Management Plan for FY 2022 to 2023
 NWS Yorktown
 Yorktown, Virginia





- Legend**
- Cornwallis Cave Aquifer Monitoring Well
 - Yorktown-Eastover Aquifer Monitoring Well
 - Drop Inlet
 - Manhole
 - Belowground Drainage Ways
 - Concrete Lined Drainage Channels
 - Unlined Surface Drainage
 - Railroad
 - Site 9
 - Site 9 Removal Areas
 - Study Area Boundary (28 Acres)
 - Site 19 Removal Area/LUC Boundary
 - Former Site Structures (demolished 2010-2012)

- BLDG 10/10A - Loaded Mine Storage, Mine Cooling Building, Mine Filling Building, Empty Mine Storage (North to South)
- BLDG 11 - TNT Building
- BLDG 98 - Bulk TNT Storage
- BLDG 527 - Powder Metal Storage
- BLDG 528 - Nitrate Prep and Storage

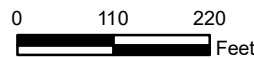
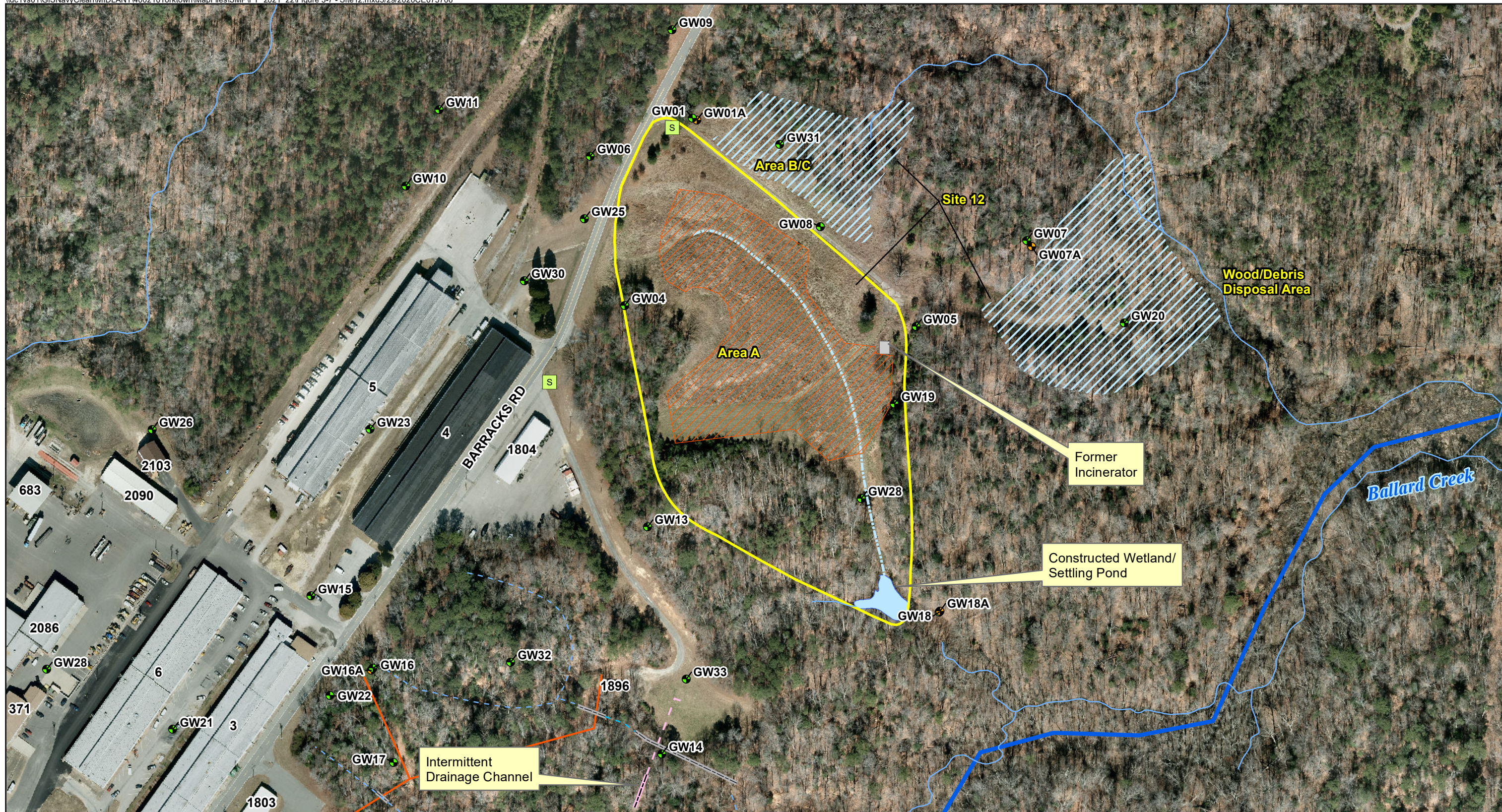


Figure 3-6
 Sites 9 and 19: Plant 1 Explosives Contaminated Wastewater Discharge Area and Conveyor Belt Soils at Building 10 Site Management Plan for FY 2022 to 2023
 NWS Yorktown
 Yorktown, Virginia





- Legend**
- Cornwallis Cave Aquifer Monitoring Well
 - Yorktown-Eastover Aquifer Monitoring Well
 - S Site Sign
 - - - Intermittent Drainage
 - - - Drainage
 - Surface Water Body
 - - - Underground Former Treatment Plant Discharge Pipe
 - - - Exposed Former Treatment Plant Discharge Pipe
 - - - Sanitary Sewer Easement
 - - - Storm Water Conveyance
 - NWS Yorktown Boundary
 - NFA Areas
 - Area A Groundwater LUC (10 Acres)
 - Extent of Landfill Cap (installed in 1997) and Area A Soil LUC (4 Acres)

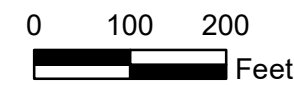
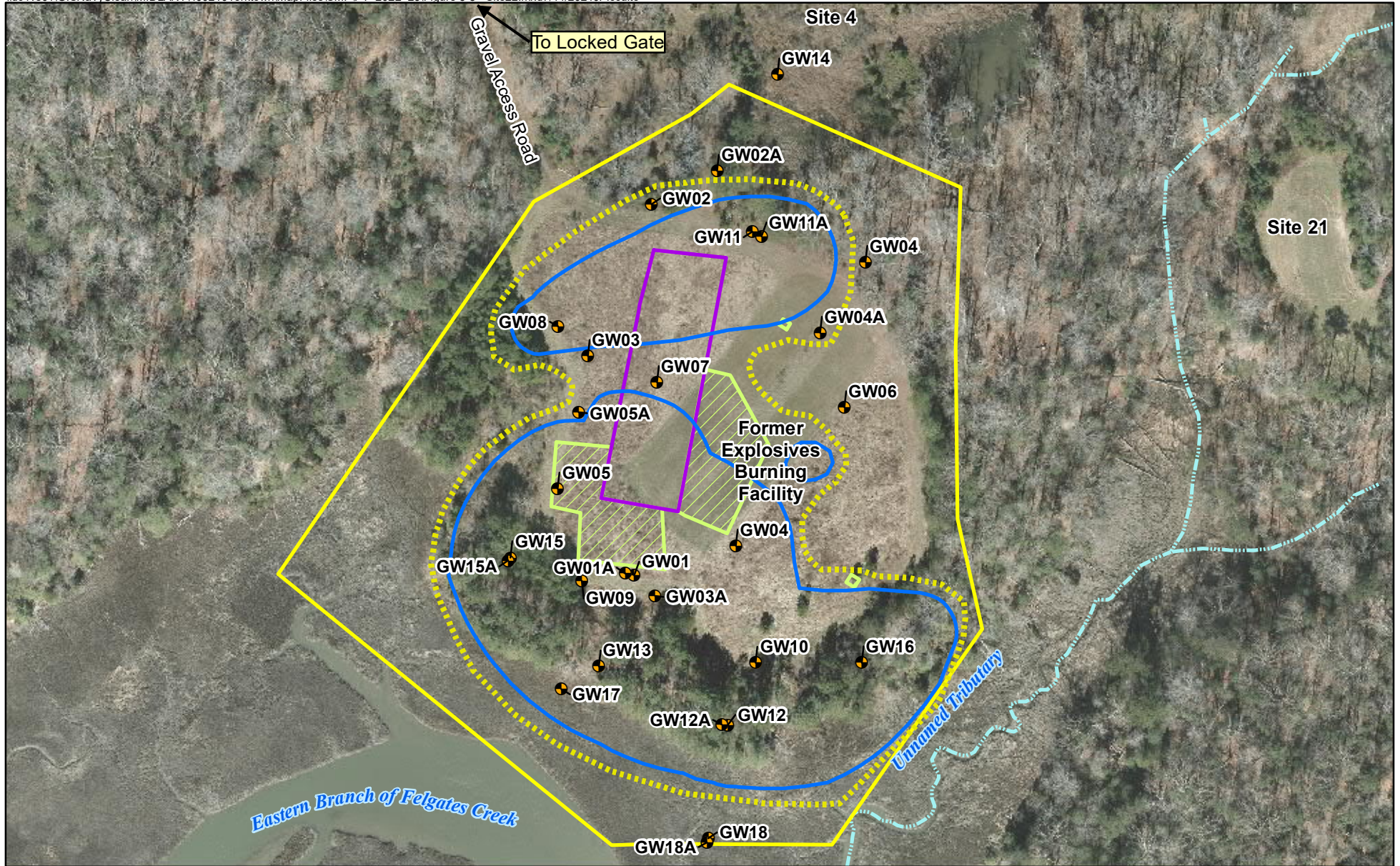









Figure 3-7
 Site 12 - Barracks Road Landfill
 Site Management Plan for FY 2022 to 2023
 NWS Yorktown
 Yorktown, Virginia





Legend

-  Yorktown-Eastover Aquifer Monitoring Well
-  Groundwater LUC Boundary
-  Study Area Boundary (10 Acres)
-  Drainage
-  Former Biocell Location
-  Removal Action Area (2003)
-  Approximate Extent of Contamination in Groundwater

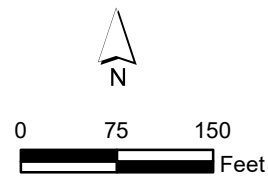


Figure 3-8
 Site 22 - Burn Pad
 Site Management Plan for FY 2022 to 2023
 NWS Yorktown
 Yorktown, Virginia





- Legend**
- Cornwallis Cave Aquifer Monitoring Well
 - Yorktown-Eastover Aquifer Monitoring Well
 - 2003 (J.A. Jones) Soil Removal Area
 - 1994 (OHM) Surface Debris Removal and Soil/Debris Removal Area
 - 2004 (UNITEC) Soil Removal Area
 - 2009 (Shaw) Soil/Debris Removal Area
 - Former Surface Debris Removal Area Previously Sampled
 - Former Surface Debris Removal Area Not Previously Sampled
 - Fence
 - Former Railroad
 - Unpaved Road
 - 18" Corrugated Metal Pipe
 - Approximate Location of Culvert
 - Surface Water Centerline
 - Elevation Contour (4 ft interval)
 - Study Area (26 Acres)
 - Marsh
 - NWS Yorktown Boundary

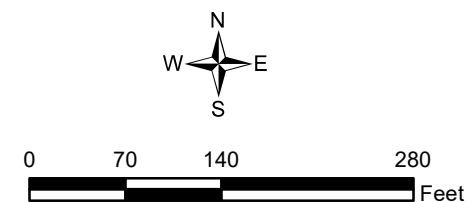


Figure 3-9
 Site 23 - Building 428 Teague Road Disposal Area
 Site Management Plan for FY 2022 to 2023
 NWS Yorktown
 Yorktown, Virginia



Legend

- Columbia Aquifer Monitoring Well
- Yorktown-Eastover Aquifer Monitoring Well
- Former Railroad Tracks
- JIEDDO Battle Course
- Helicopter Pad
- Site 24 Study Area Boundary (34 Acres)
- Drainage Swales
- Fences
- Former Building
- NWS Yorktown Boundary
- Waste Disposal Area where Excavation has not been Completed or Post-Excavation Confirmation Samples did not Achieve Remediation Goals
- Waste Disposal Area where Excavation has been Completed

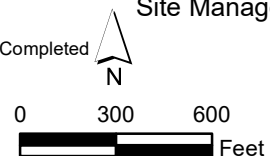


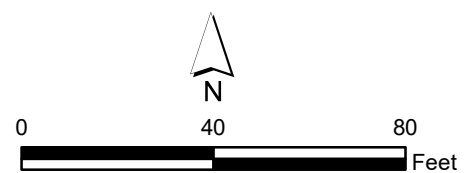
Figure 3-10
 Site 24 - Aviation Field
 Site Management Plan for FY 2022 to 2023
 NWS Yorktown
 Yorktown, Virginia

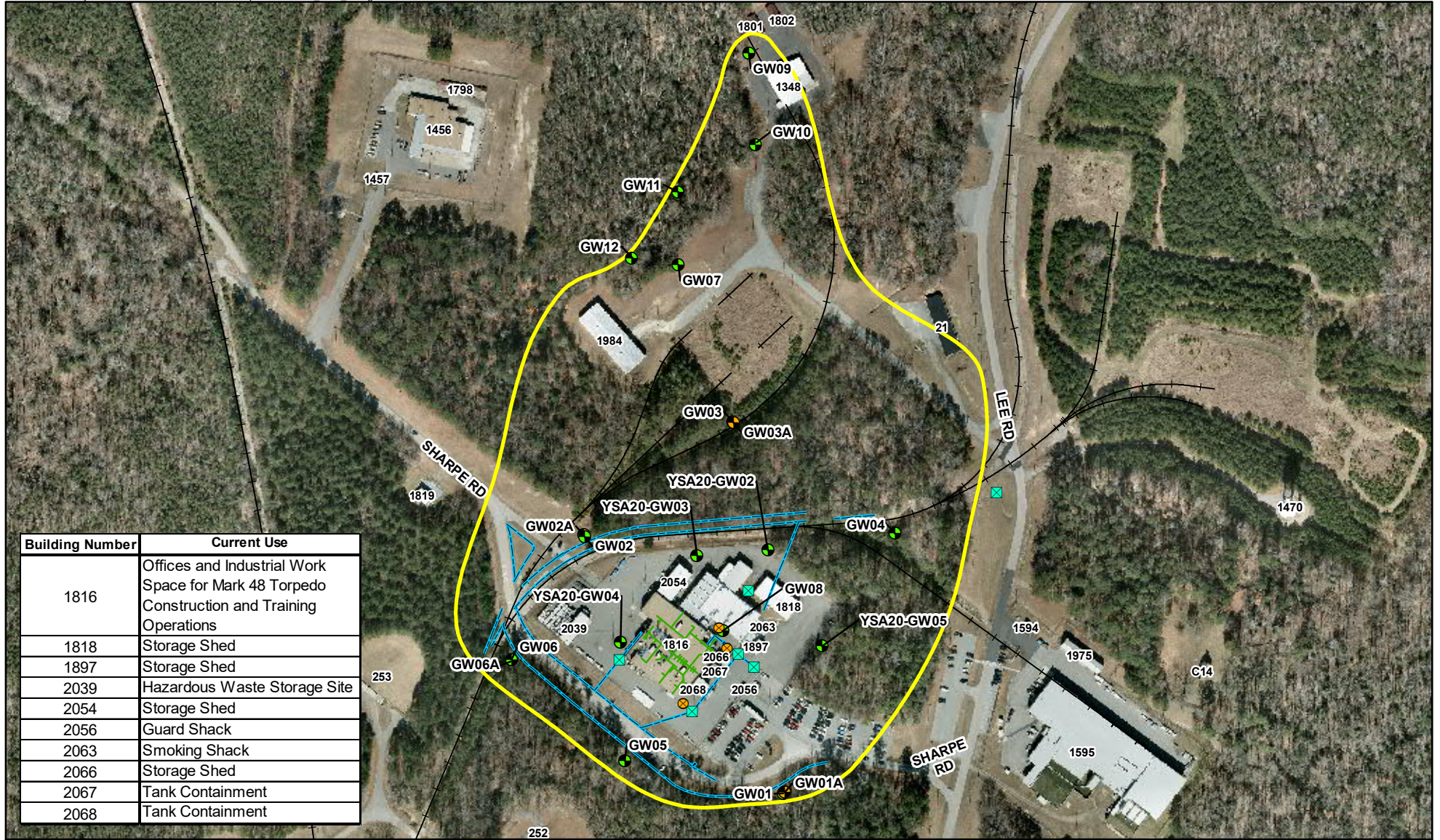


Legend

- Yorktown-Eastover Aquifer Monitoring Well
- Drop Inlet
- Concrete Tank
- ▬ Raised Berm
- ▬ Door
- ▬ Wall
- - Former Discharge Line
- ▬ Building 373 Drainage Trench
- ▬ Elevation Contour (4 ft interval)
- ▬ 12" Buried Corrugated Pipe
- ▬ Concrete-lined Drainage Swale
- ▬ Dirt-lined Drainage Swale
- ▬ Limits of 1996 Excavation (excavation included UST, UST piping, and associated soils)
- ▭ Study Area Boundary (2 Acres)
- ▭ Loading Dock
- ▭ Buildings
- ▭ Building Exterior Wall

Figure 3-11
Site 25 - Building 373 Rocket Plant
Site Management Plan for FY 2022 to 2023
NWS Yorktown
Yorktown, Virginia





Building Number	Current Use
1816	Offices and Industrial Work Space for Mark 48 Torpedo Construction and Training Operations
1818	Storage Shed
1897	Storage Shed
2039	Hazardous Waste Storage Site
2054	Storage Shed
2056	Guard Shack
2063	Smoking Shack
2066	Storage Shed
2067	Tank Containment
2068	Tank Containment

- Legend**
- Cornwallis Cave Aquifer Monitoring Well
 - Yorktown-Eastover Aquifer Monitoring Well
 - ⊗ Former UST Location
 - ⊗ Approximate location of Drop Inlet
 - Approximate location of Storm Sewer
 - Former Railroad
 - Study Area Boundary (30 Acres)

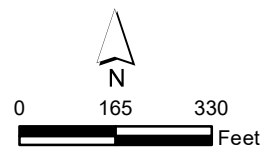
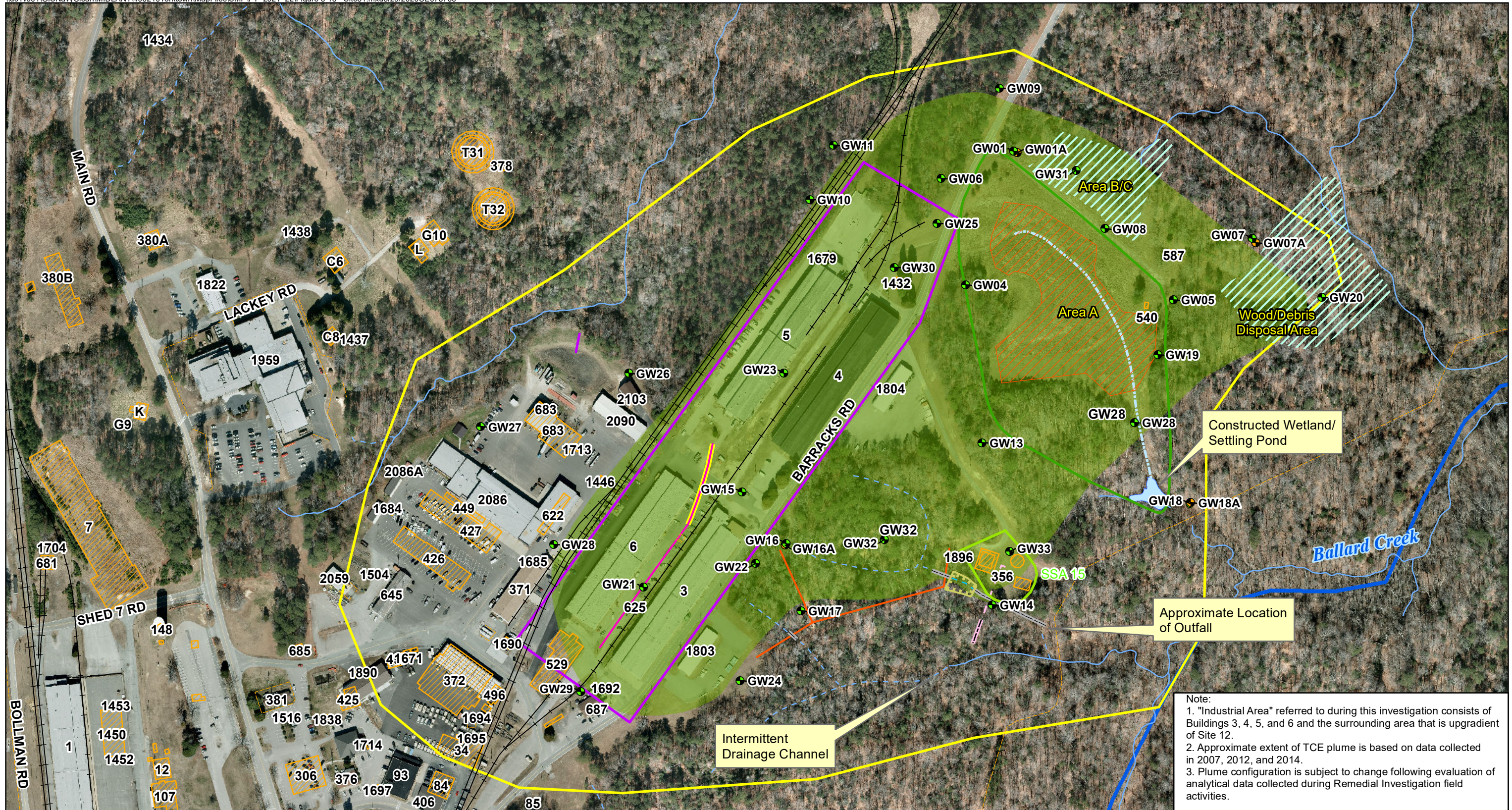


Figure 3-12
 Site 26 - Building 1816 Mark 47 Waste Otto Fuel Tank
 Site Management Plan for FY 2022 to 2023
 NWS Yorktown
 Yorktown, Virginia



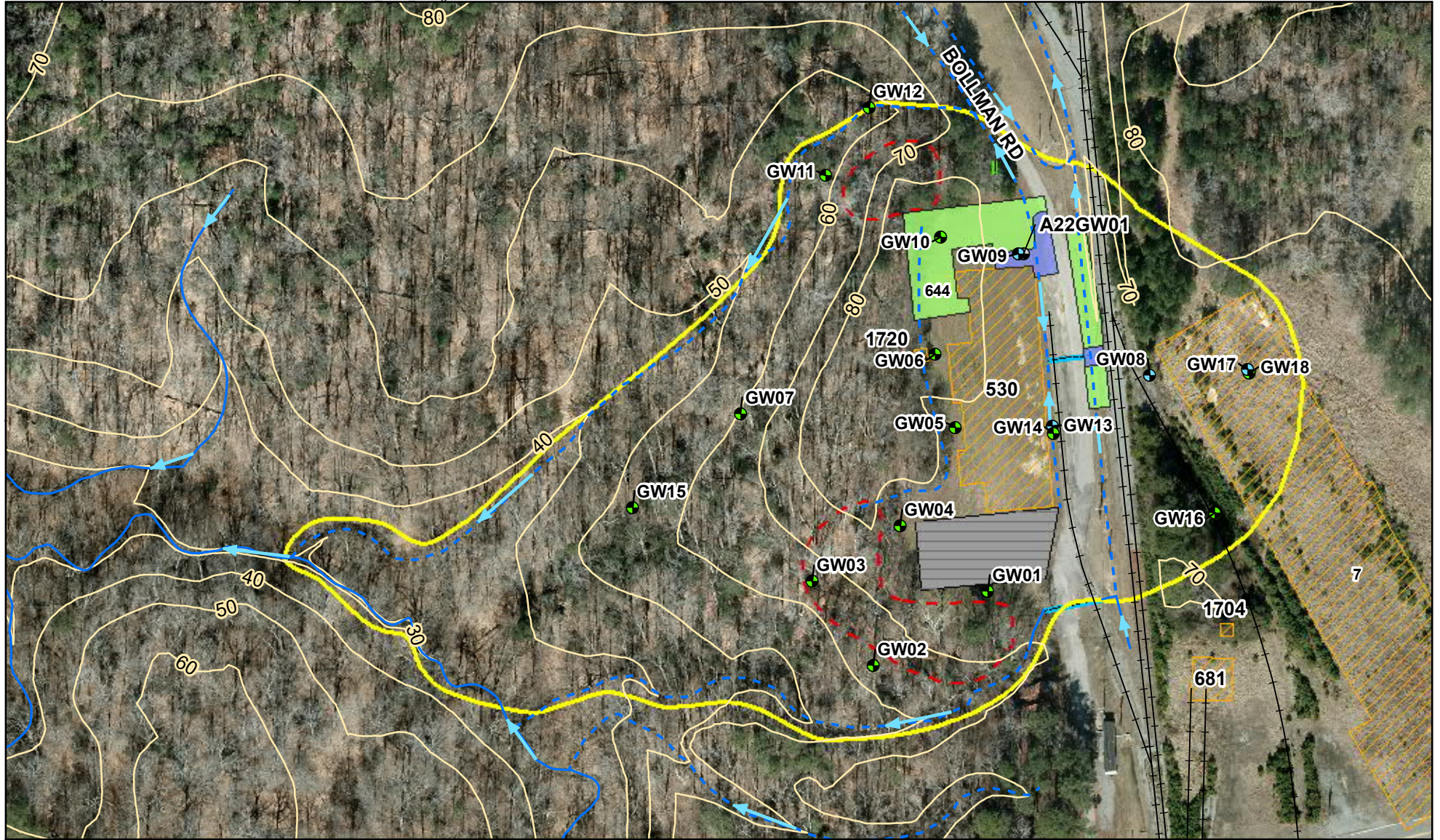


<p>Legend</p> <ul style="list-style-type: none"> ● Cornwallis Cave Aquifer Monitoring Well ● Yorktown-Eastover Aquifer Monitoring Well ● UST Well --- Trilock Block Drainage Ditch — Railroad --- Fence --- Former Drainage Ditch Location - not graded over --- Drainage Ditch Location --- Underground Former Treatment Plant Discharge Pipe --- Exposed Former Treatment Plant Discharge Pipe --- Sanitary Sewer Easement --- Storm Water Conveyance --- Intermittent Drainage --- Drainage --- Surface Water Body 		<ul style="list-style-type: none"> ■ Demolished Building ■ Deep Depression ■ SSA 15 Boundary ■ Study Area Boundary (101 Acres) ■ Site 31 Bararcks Road Industrial Area ■ WPNSTA Boundary ■ Approximate Extent of TCE Plume 		<p>Site 12</p> <ul style="list-style-type: none"> ■ Area A Groundwater LUC ■ Extent of Landfill Cap (installed in 1997) and Area A Soil LUC ■ NFA Areas 	
---	--	---	--	---	--

Note:
 1. "Industrial Area" referred to during this investigation consists of Buildings 3, 4, 5, and 6 and the surrounding area that is upgradient of Site 12.
 2. Approximate extent of TCE plume is based on data collected in 2007, 2012, and 2014.
 3. Plume configuration is subject to change following evaluation of analytical data collected during Remedial Investigation field activities.

Figure 3-13
Site 31 - Barracks Road Landfill Industrial Area
Site Management Plan for FY 2022 to 2023
 NWS Yorktown
 Yorktown, Virginia

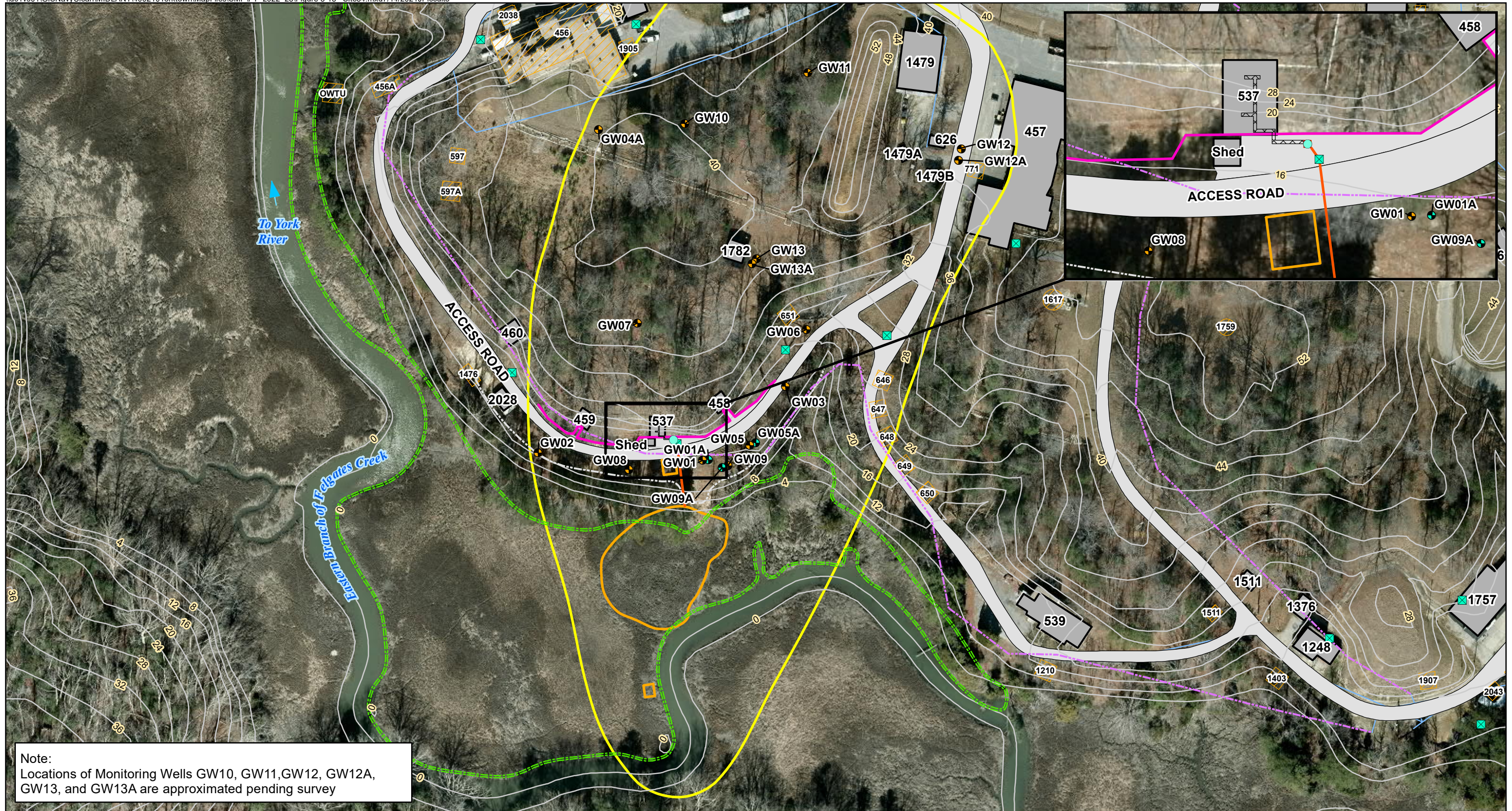
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- Legend**
- Columbia Aquifer Monitoring Well
 - Cornwallis Cave Aquifer Monitoring Well
 - Abandoned Monitoring Well
 - Culvert
 - Discharge Pipe of Unknown Origin
 - Drainage Flow Direction
 - Drainage Ditch
 - Intermittent Drainage Ditch
 - Former Railroad
 - Elevation Contour (10 ft interval)
 - Historical Parking Lot
 - Approximate Area of Debris
 - Demolished Building
 - 1999/2000 Soil Removal Area (0-24")
 - 1999/2000 Soil Removal Area (0-6")
 - Study Area Boundary (6 Acres)



Figure 3-14
Site 33 - Sand Blasting Grit Pile
Site Management Plan for FY 2022 to 2023
NWS Yorktown
Yorktown, Virginia



Note:
Locations of Monitoring Wells GW10, GW11, GW12, GW12A, GW13, and GW13A are approximated pending survey

- Legend**
- Eastover Calvert Aquifer Monitoring Well
 - 2007 Removal Action
 - Study Area Boundary (6 Acres)
 - Yorktown-Eastover Aquifer Monitoring Well
 - Top of Slope
 - Demolished Buildings
 - Drop Inlet
 - Terrain Elevation Contour (4 ft interval)
 - Approximate Wetlands Boundary
 - Discharge Pipe
 - Building 537 Building Concrete Ditch
 - Approximate Retaining Wall Location
 - Buildings
 - Wastewater Force Main
 - Paved Area

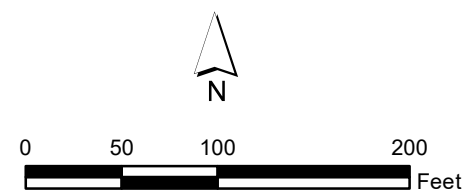
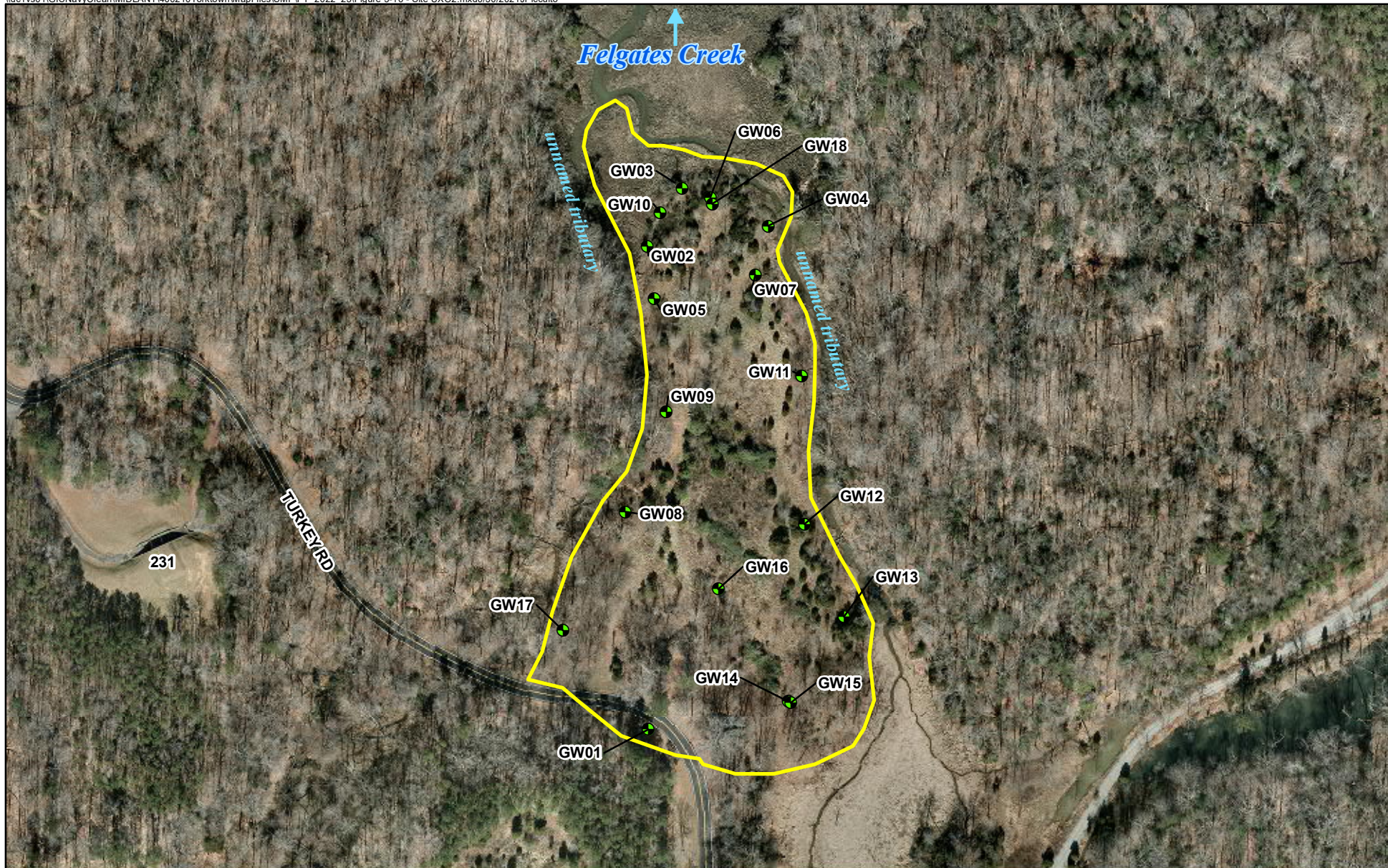


Figure 3-15
Site 34 - Building 537 Discharge to Felgates Creek
Site Management Plan for FY 2022 to 2023
NWS Yorktown
Yorktown, Virginia



Legend

- Cornwallis Cave Aquifer Monitoring Well
- ▭ Study Area Boundary (7 Acres)

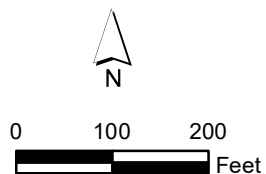
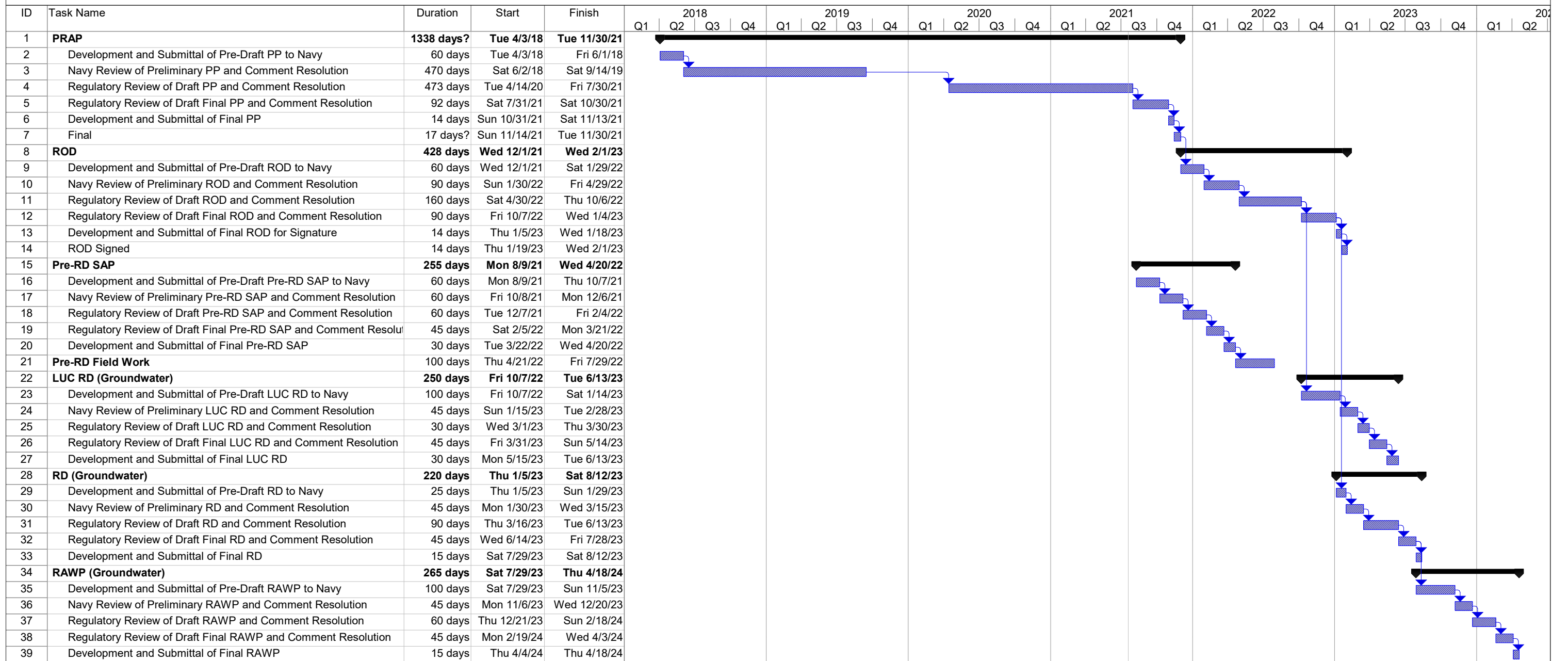


Figure 3-16
UXO 2 - Turkey Road Landfill
Site Management Plan for FY 2022 to 2023
NWS Yorktown
Yorktown, Virginia

**Schedule 3-1
Site 1 SMP FY2022-2023**



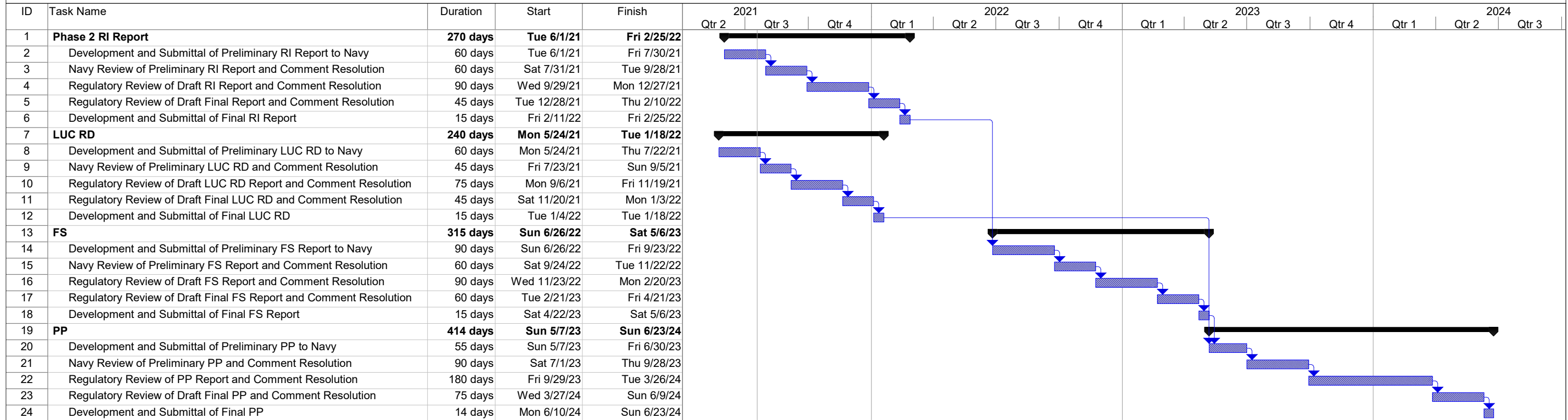
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Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-2
Site 3 SMP FY2022-2023**

ID	Task Name	Duration	Start	Finish	Predecessors	2020		2021				2022				2023				2024					
						Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	
1	ROD	650 days	Mon 6/1/20	Sat 3/12/22																					
2	Development and Submittal of Pre-Draft ROD to Navy	90 days	Mon 6/1/20	Sat 8/29/20																					
3	Navy Review of Preliminary ROD and Comment Resolution	100 days	Sun 8/30/20	Mon 12/7/20	2																				
4	Regulatory Review of Draft ROD and Comment Resolution	180 days	Tue 12/8/20	Sat 6/5/21	3																				
5	Regulatory Review of Draft Final ROD and Comment Resolution	150 days	Sun 6/6/21	Tue 11/2/21	4																				
6	Regulatory Review of Revised Draft Final ROD and Comment Resolution	90 days	Wed 11/3/21	Mon 1/31/22	5																				
7	Development and Submittal of Final ROD for Signature	20 days	Tue 2/1/22	Sun 2/20/22	6																				
8	ROD Signed	20 days	Mon 2/21/22	Sat 3/12/22	7																				
9	RD (Groundwater)	285 days	Mon 2/21/22	Fri 12/2/22																					
10	Development and Submittal of Pre-Draft RD to Navy	60 days	Mon 2/21/22	Thu 4/21/22	7																				
11	Navy Review of Preliminary RD and Comment Resolution	60 days	Fri 4/22/22	Mon 6/20/22	10																				
12	Regulatory Review of Draft RD and Comment Resolution	90 days	Tue 6/21/22	Sun 9/18/22	11																				
13	Regulatory Review of Draft Final RD and Comment Resolution	60 days	Mon 9/19/22	Thu 11/17/22	12																				
14	Development and Submittal of Final RD	15 days	Fri 11/18/22	Fri 12/2/22	13																				
15	LUC RD (Groundwater)	235 days	Tue 2/1/22	Fri 9/23/22																					
16	Development and Submittal of Pre-Draft LUC RD to Navy	60 days	Tue 2/1/22	Fri 4/1/22	6																				
17	Navy Review of Preliminary LUC RD and Comment Resolution	60 days	Sat 4/2/22	Tue 5/31/22	16																				
18	Regulatory Review of Draft LUC RD and Comment Resolution	60 days	Wed 6/1/22	Sat 7/30/22	17																				
19	Regulatory Review of Draft Final LUC RD and Comment Resolution	40 days	Sun 7/31/22	Thu 9/8/22	18																				
20	Development and Submittal of Final LUC RD	15 days	Fri 9/9/22	Fri 9/23/22	19																				
21	Remedial Action Work Plan	254 days	Fri 11/18/22	Sat 7/29/23																					
22	Development and Submittal of Pre-Draft RAWP to Navy	90 days	Fri 11/18/22	Wed 2/15/23	13																				
23	Navy Review of Preliminary RAWP and Comment Resolution	60 days	Thu 2/16/23	Sun 4/16/23	22																				
24	Regulatory Review of Draft RAWP and Comment Resolution	60 days	Mon 4/17/23	Thu 6/15/23	23																				
25	Regulatory Review of Draft Final RAWP and Comment Resolution	30 days	Fri 6/16/23	Sat 7/15/23	24																				
26	Development and Submittal of Final RAWP	14 days	Sun 7/16/23	Sat 7/29/23	25																				
27	RA Fieldwork	736 days	Fri 6/16/23	Fri 6/20/25	24																				

Task		Project Summary		Inactive Summary		Manual Summary		External Milestone	
Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-3
Site 6 SMP FY2022-2023**



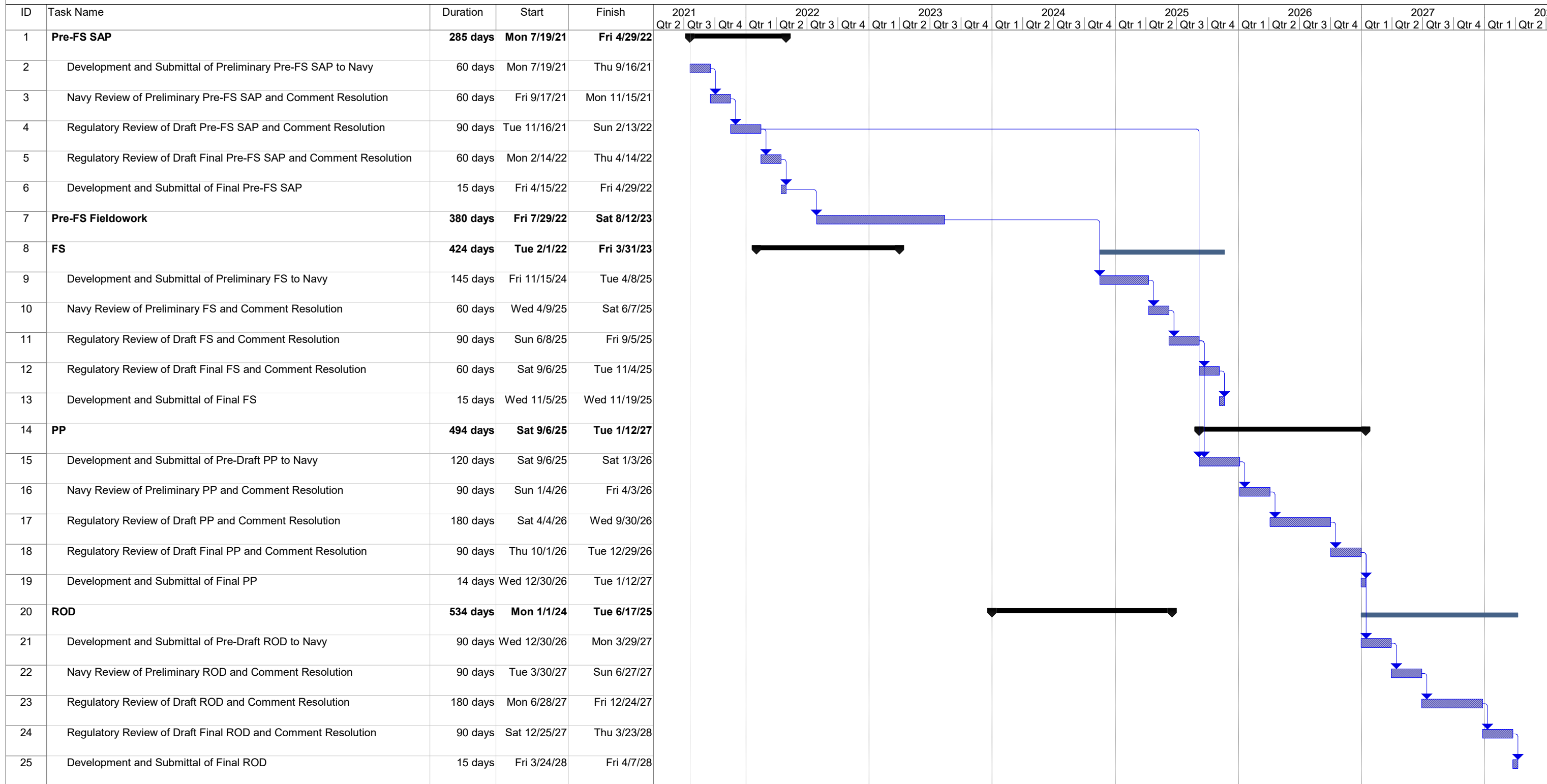
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Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-4
Site 7 SMP FY2022-2023**

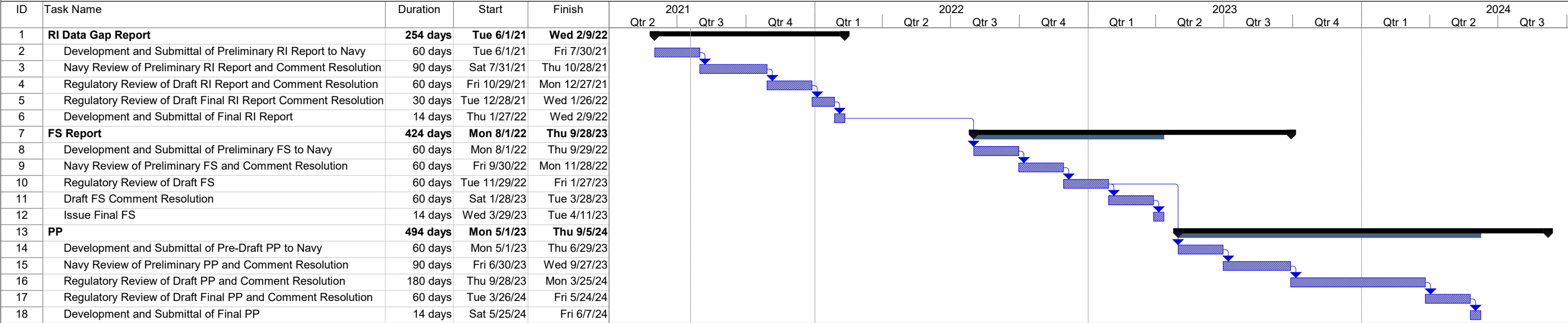
ID	Task Name	Duration	Start	Finish	2021				2022				2023				2024				2025			
					Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3
1	Pre-FS Investigation SAP	394 days	Mon 1/11/21	Tue 2/8/22																				
2	Development and Submittal of Preliminary Pre-FS Investigation SAP to Navy	170 days	Mon 1/11/21	Tue 6/29/21																				
3	Navy Review of Preliminary Pre-FS Investigation SAP and Comment Resolution	60 days	Wed 6/30/21	Sat 8/28/21																				
4	Regulatory Review of Draft Pre-FS Investigation SAP and Comment Resolution	90 days	Sun 8/29/21	Fri 11/26/21																				
5	Regulatory Review of Draft Final Pre-FS Investigation SAP and Comment Resolution	60 days	Sat 11/27/21	Tue 1/25/22																				
6	Development and Submittal of Final Pre-FS Investigation SAP	14 days	Wed 1/26/22	Tue 2/8/22																				
7	Pre-FS Investigation Fieldwork Completion	50 days	Wed 2/9/22	Wed 3/30/22																				
8	FS	484 days	Fri 2/24/23	Fri 6/21/24																				
9	Development and Submittal of Preliminary FS to Navy	260 days	Fri 2/24/23	Fri 11/10/23																				
10	Navy Review of Preliminary FS and Comment Resolution	60 days	Sat 11/11/23	Tue 1/9/24																				
11	Regulatory Review of Draft FS and Comment Resolution	90 days	Wed 1/10/24	Mon 4/8/24																				
12	Regulatory Review of Draft Final FS and Comment Resolution	60 days	Tue 4/9/24	Fri 6/7/24																				
13	Development and Submittal of Final FS Report	14 days	Sat 6/8/24	Fri 6/21/24																				
14	2021 LTM Fieldwork Completion	28 days	Tue 11/2/21	Mon 11/29/21																				
15	2021 LTM Report	344 days	Tue 11/30/21	Tue 11/8/22																				
16	Development and Submittal of Preliminary LTM Report to Navy	150 days	Tue 11/30/21	Thu 4/28/22																				
17	Navy Review of Preliminary LTM Report and Comment Resolution	60 days	Fri 4/29/22	Mon 6/27/22																				
18	Regulatory Review of Draft LTM Report and Comment Resolution	60 days	Tue 6/28/22	Fri 8/26/22																				
19	Regulatory Review of Draft Final LTM Report and Comment Resolution	60 days	Sat 8/27/22	Tue 10/25/22																				
20	Development and Submittal of Final LTM Report Report	14 days	Wed 10/26/22	Tue 11/8/22																				
21	PP	474 days	Tue 4/9/24	Sat 7/26/25																				
22	Development and Submittal of Pre-Draft PP to Navy	100 days	Tue 4/9/24	Wed 7/17/24																				
23	Navy Review of Preliminary PP and Comment Resolution	90 days	Thu 7/18/24	Tue 10/15/24																				
24	Regulatory Review of Draft PP and Comment Resolution	180 days	Wed 10/16/24	Sun 4/13/25																				
25	Regulatory Review of Draft Final PP and Comment Resolution	90 days	Mon 4/14/25	Sat 7/12/25																				
26	Development and Submittal of Final PP	14 days	Sun 7/13/25	Sat 7/26/25																				

Task		Project Summary		Inactive Summary		Manual Summary		External Milestone	
Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-5
Site 8 SMP FY2022-2023**



**Schedule 3-6
Sites 9 & 19 SMP FY2022-2023**



Task		Project Summary		Inactive Summary		Manual Summary		External Milestone	
Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-7
Site 12 SMP FY2022-2023**

ID	Task Name	Duration	Start	Finish	2021				2022				2023			
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	
1	Wood Debris Disposal Area Investigation Work Plan/ SAP	360 days	Thu 4/1/21	Sat 3/26/22												
2	Development and Submittal of Preliminary Draft SAP to Navy	135 days	Thu 4/1/21	Fri 8/13/21												
3	Navy Review of Preliminary Draft SAP and Comment Resolution	60 days	Sat 8/14/21	Tue 10/12/21												
4	Regulatory Review of Draft SAP and Comment Resolution	90 days	Wed 10/13/21	Mon 1/10/22												
5	Regulatory Review of Draft Final SAP and Comment Resolution	60 days	Tue 1/11/22	Fri 3/11/22												
6	Development and Submittal of Final SAP	15 days	Sat 3/12/22	Sat 3/26/22												
7	Wood Debris Disposal Area Investigation Fieldwork	60 days	Sun 3/27/22	Wed 5/25/22												
8	Wood Debris Disposal Area Investigation Report	464 days	Thu 5/26/22	Fri 9/1/23												
9	Development and Submittal of Preliminary Draft TM to Navy	240 days	Thu 5/26/22	Fri 1/20/23												
10	Navy Review of Preliminary Draft TM and Comment Resolution	60 days	Sat 1/21/23	Tue 3/21/23												
11	Regulatory Review of Draft TM and Comment Resolution	90 days	Wed 3/22/23	Mon 6/19/23												
12	Regulatory Review of Draft Final TM and Comment Resolution	60 days	Tue 6/20/23	Fri 8/18/23												
13	Development and Submittal of Final TM	14 days	Sat 8/19/23	Fri 9/1/23												
14	2021 LTM Report	314 days	Mon 11/15/21	Sat 9/24/22												
15	Development and Submittal of Preliminary Draft LTM Report to Navy	90 days	Mon 11/15/21	Sat 2/12/22												
16	Navy Review of Preliminary Draft LTM Report and Comment Resolution	60 days	Sun 2/13/22	Wed 4/13/22												
17	Regulatory Review of Draft LTM Report and Comment Resolution	90 days	Thu 4/14/22	Tue 7/12/22												
18	Regulatory Review of Draft Final LTM Report and Comment Resolution	60 days	Wed 7/13/22	Sat 9/10/22												
19	Development and Submittal of Final LTM Report	14 days	Sun 9/11/22	Sat 9/24/22												

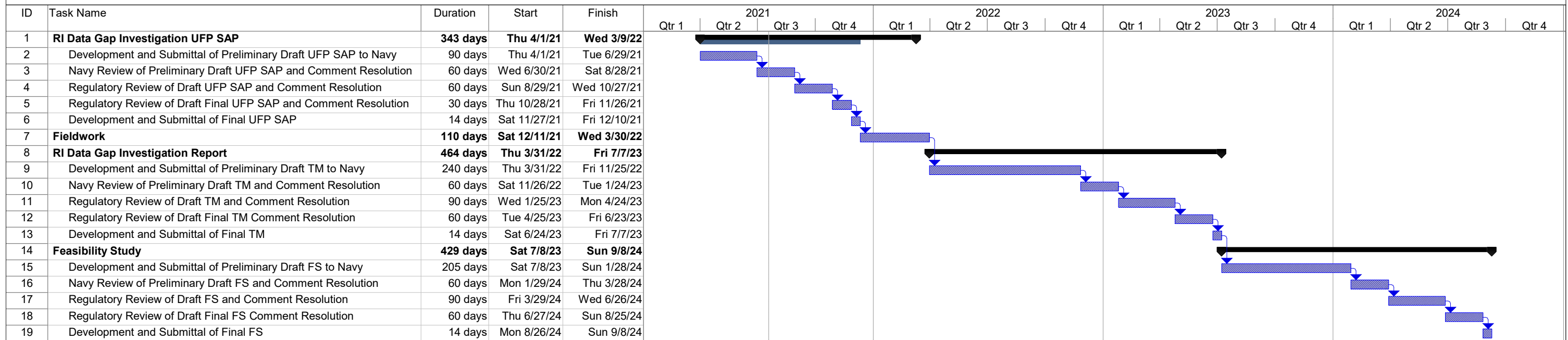
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Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-8
Site 22 SMP FY2022-2023**

ID	Task Name	Duration	Start	Finish	20	Qtr 3	Qtr 4	Qtr 1	Qtr 2	2021	Qtr 3	Qtr 4	Qtr 1	Qtr 2	2022	Qtr 3	Qtr 4	Qtr 1	Qtr 2	20
1	Remedy Optimization Pilot Study SAP	469 days	Mon 8/10/20	Sun 11/21/21																
2	Development and Submittal of Preliminary Draft SAP to Navy	120 days	Mon 8/10/20	Mon 12/7/20																
3	Navy Review of Preliminary Draft SAP and Comment Resolution	214 days	Tue 12/8/20	Fri 7/9/21																
4	Regulatory Review of Draft SAP and Comment Resolution	75 days	Sat 7/10/21	Wed 9/22/21																
5	Regulatory Review of Draft Final SAP and Comment Resolution	45 days	Thu 9/23/21	Sat 11/6/21																
6	Development and Submittal of Final SAP	15 days	Sun 11/7/21	Sun 11/21/21																
7	Remedy Optimization Fieldwork	500 days	Mon 11/22/21	Wed 4/5/23																

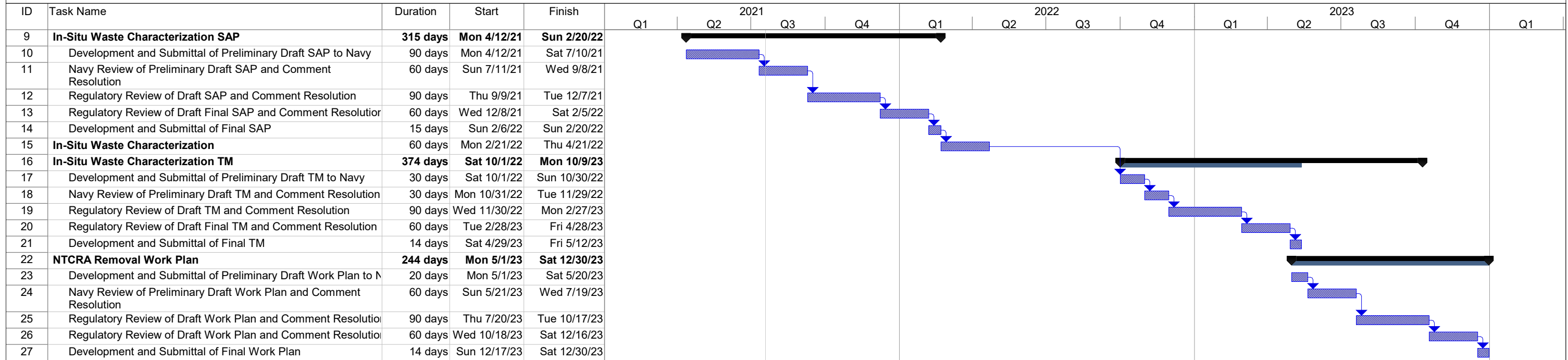
Task		Project Summary		Inactive Summary		Manual Summary		External Milestone	
Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-9
Site 23 SMP FY2022-2023**



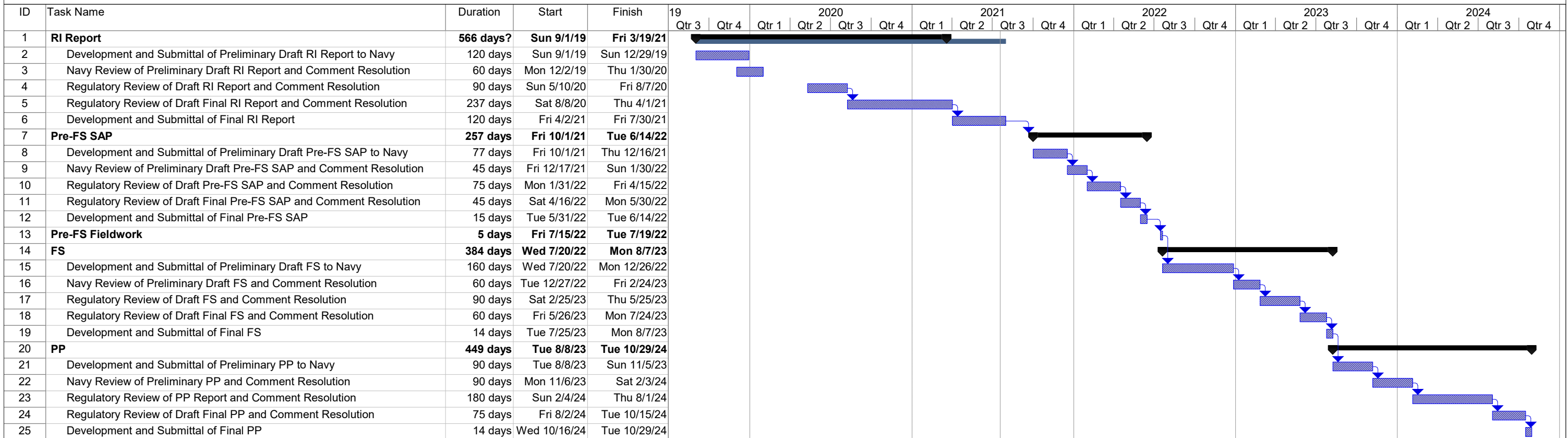
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Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-10
Site 24 SMP FY2022-2023**



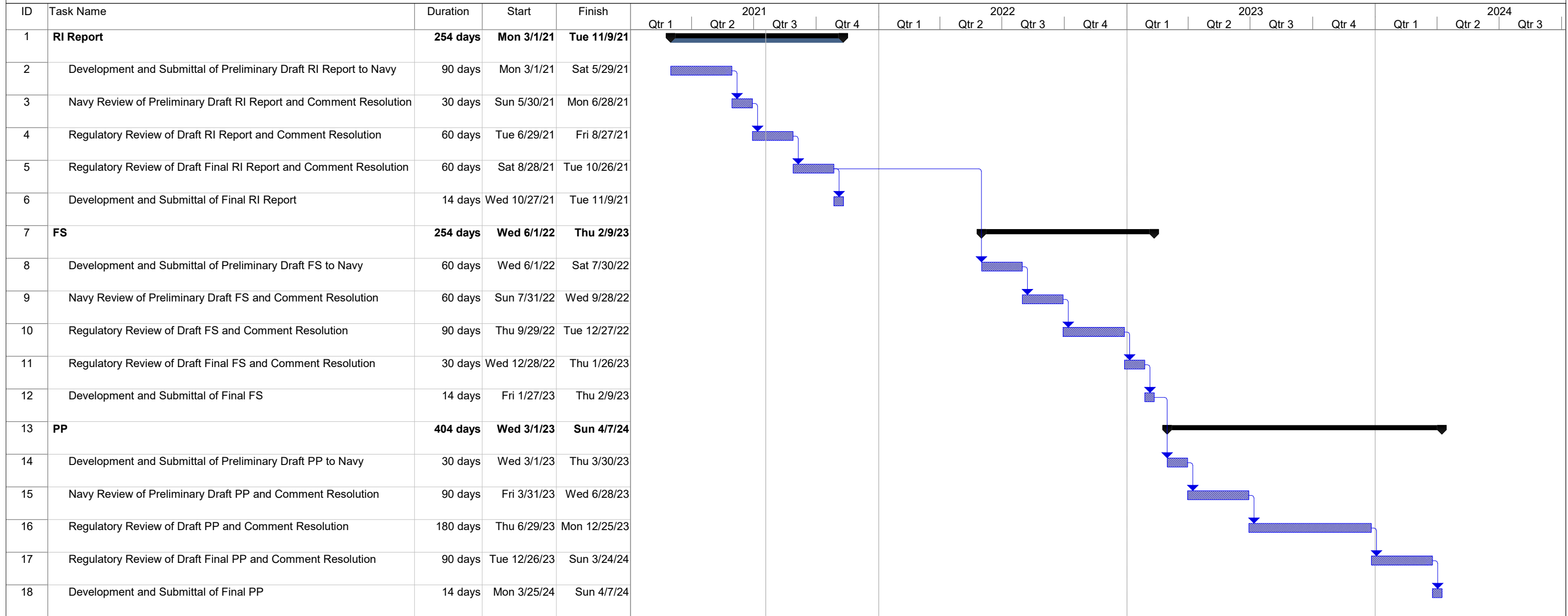
Task		Project Summary		Inactive Summary		Manual Summary		External Milestone	
Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-11
Site 25 SMP FY2022-2023**



Task		Project Summary		Inactive Summary		Manual Summary		External Milestone	
Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-12
Site 26 SMP FY2022-2023**



Task		Project Summary		Inactive Summary		Manual Summary		External Milestone	
Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-13
Site 31 SMP FY2022-2023**

ID	Task Name	Duration	Start	Finish	21	Q3	Q4	Q1	Q2	2022	Q3	Q4	Q1	Q2	2023	Q3	Q4	Q1	Q2	2024	Q3	Q4
1	FS (with 1,4-Dioxane sampling results summary)	270 days	Wed 9/1/21	Sat 5/28/22																		
2	Development and Submittal of Preliminary Draft FS to Navy	60 days	Wed 9/1/21	Sat 10/30/21																		
3	Navy Review of Preliminary FS and Comment Resolution	60 days	Sun 10/31/21	Wed 12/29/21																		
4	Regulatory Review of Draft FS and Comment Resolution	75 days	Thu 12/30/21	Mon 3/14/22																		
5	Regulatory Review of Draft Final FS and Comment Resolution	60 days	Tue 3/15/22	Fri 5/13/22																		
6	Development and Submittal of Final FS	15 days	Sat 5/14/22	Sat 5/28/22																		
7	PP	419 days	Sat 5/14/22	Thu 7/6/23																		
8	Development and Submittal of Preliminary Draft PP to Navy	75 days	Sat 5/14/22	Wed 7/27/22																		
9	Navy Review of Preliminary Draft PP and Comment Resolution	90 days	Thu 7/28/22	Tue 10/25/22																		
10	Regulatory Review of Draft PP and Comment Resolution	180 days	Wed 10/26/22	Sun 4/23/23																		
11	Regulatory Review of Draft Final PP and Comment Resolution	60 days	Mon 4/24/23	Thu 6/22/23																		
12	Development and Submittal of Final PP	14 days	Fri 6/23/23	Thu 7/6/23																		
13	ROD	449 days	Fri 7/7/23	Fri 9/27/24																		
14	Development and Submittal of Preliminary Draft ROD to Navy	75 days	Fri 7/7/23	Tue 9/19/23																		
15	Navy Review of Preliminary Draft ROD and Comment Resolution	90 days	Wed 9/20/23	Mon 12/18/23																		
16	Regulatory Review of Draft ROD and Comment Resolution	180 days	Tue 12/19/23	Sat 6/15/24																		
17	Regulatory Review of Draft Final ROD and Comment Resolution	90 days	Sun 6/16/24	Fri 9/13/24																		
18	Development and Submittal of Final ROD	14 days	Sat 9/14/24	Fri 9/27/24																		

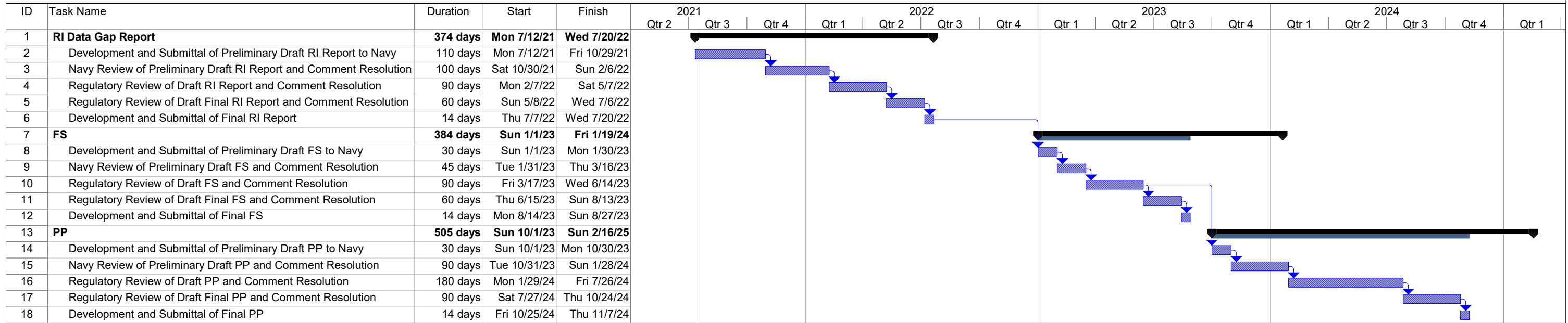
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Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-14
Site 33 SMP FY2022-2023**

ID	Task Name	Duration	Start	Finish	21	2022								2023				2024		
						Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3		
1	RI Fieldwork	110 days	Mon 8/16/21	Fri 12/3/21																
2	RI Report	224 days	Fri 7/1/22	Thu 2/9/23																
3	Development and Submittal of Preliminary Draft RI Report to Navy	30 days	Fri 7/1/22	Sat 7/30/22																
4	Navy Review of Preliminary Draft RI Report and Comment Resolution	30 days	Sun 7/31/22	Mon 8/29/22																
5	Regulatory Review of Draft RI Report and Comment Resolution	90 days	Tue 8/30/22	Sun 11/27/22																
6	Regulatory Review of Draft Final RI Report and Comment Resolution	60 days	Mon 11/28/22	Thu 1/26/23																
7	Development and Submittal of Final RI Report	14 days	Fri 1/27/23	Thu 2/9/23																
8	FS	284 days	Fri 9/1/23	Mon 6/10/24																
9	Development and Submittal of Preliminary Draft FS to Navy	60 days	Fri 2/10/23	Mon 4/10/23																
10	Navy Review of Preliminary Draft FS and Comment Resolution	60 days	Fri 9/1/23	Mon 10/30/23																
11	Regulatory Review of Draft FS and Comment Resolution	90 days	Tue 10/31/23	Sun 1/28/24																
12	Regulatory Review of Draft Final FS and Comment Resolution	60 days	Mon 1/29/24	Thu 3/28/24																
13	Development and Submittal of Final FS	14 days	Fri 3/29/24	Thu 4/11/24																

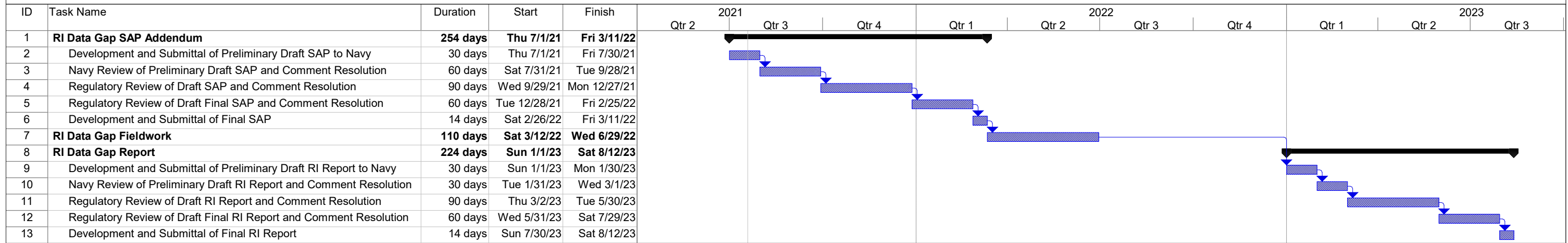
Task		Project Summary		Inactive Summary		Manual Summary		External Milestone	
Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-15
Site 34 SMP FY2022-2023**



Task		Project Summary		Inactive Summary		Manual Summary		External Milestone	
Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

**Schedule 3-16
UXO-2 SMP FY2022-2023**



Task		Project Summary		Inactive Summary		Manual Summary		External Milestone	
Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			




Land Use Planning

Sites with LUCs and the boundaries of those LUCs are shown on **Figure 4-1**. Annual LUC inspections are conducted at each of the sites with LUCs to ensure they are being maintained. The following LUCs are in place:

- Site 1 – Dudley Road Landfill: Prohibit disturbance of soil cover and residential land use
- Site 6 – Explosives-Contaminated Wastewater Impoundment: Prohibit residential and industrial land use in the Impoundment Area and disturbance of the soil cover in the Excavation Area
- Site 7 – Plant 3 Explosives-Contaminated Wastewater Discharge Area: Prohibit residential land use within the drainage area
- Site 12 – Barracks Road Landfill (Area A): Prohibit disturbance of the soil cover and residential land use, and restrict potable groundwater use
- Site 19 – Conveyor Belt Soils at Building 10: Prohibit disturbance of the soil cover and residential use within the former conveyor belt removal area
- Site 22 – Burn Pad: Restrict groundwater use and construction of future buildings within the LUC boundary



Legend

-  Soil LUC Boundary
-  Groundwater LUC Boundary
-  NWS Yorktown Boundary

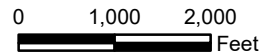


Figure 4-1
LUC Boundaries
Site Management Plan for FY 2022 to 2023
NWS Yorktown
Yorktown, Virginia

References

- A. T. Kearney, Inc. 1992. *RCRA Solid Waste Management Unit Investigation, Naval Weapons Station Yorktown, Yorktown, Virginia*. December.
- Baker Environmental, Inc. (Baker). 1993. *Waste Characterization Sampling, SSAs 1, 2, and 5, Naval Weapons Station Yorktown, Yorktown, Virginia*. November.
- Baker. 1994a. *Action Memorandum, Sites 2 and 9 and Site Screening Area 4, Naval Weapons Station Yorktown, Yorktown, Virginia*. May.
- Baker. 1994b. *Action Memorandum and Engineering Evaluation/Cost Analysis, Site 2 – Turkey Road Landfill, Naval Weapons Station Yorktown, Yorktown, Virginia*. May.
- Baker. 1994c. *Work Plan for Sites 6, 7, 12, 16, Site Screening Area 16, and Background, Naval Weapons Station Yorktown, Yorktown, Virginia*. June.
- Baker. 1994d. *Engineering Evaluation/Cost Analysis and Action Memorandum SSA 1, 2, and 5, Naval Weapons Station Yorktown, Yorktown, Virginia*. July.
- Baker. 1994e. *Soil Assessment Report for Site Screening Area 18, Naval Weapons Station Yorktown, Yorktown, Virginia*. July.
- Baker. 1995. *Habitat Evaluation Report, Sites 1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 16, 17, 18, 19, and 21, Naval Weapons Station Yorktown, Yorktown, Virginia*. July.
- Baker. 1996a. *Site Screening Process Report for Site Screening Areas 1, 6, 7, and 15, Naval Weapons Station Yorktown, Yorktown, Virginia*. March.
- Baker. 1996b. *Site Screening Progress Report for Site Screening Areas 2, 17, 18 and 19, Naval Weapons Station Yorktown, Yorktown, Virginia*. March.
- Baker. 1996c. *Feasibility Study Report Site 12, Naval Weapons Station Yorktown, Yorktown, Virginia*. June.
- Baker. 1996d. *Proposed Remedial Action Plan Site 12, Naval Weapons Station Yorktown, Yorktown, Virginia*. June.
- Baker. 1996e. *Round Two RI Report Site 12, Naval Weapons Station Yorktown, Yorktown, Virginia*. June.
- Baker. 1997a. *Feasibility Study Sites 1 and 3, Naval Weapons Station Yorktown, Yorktown, Virginia*.
- Baker. 1997b. *Hot Spot Delineation, Naval Weapons Station Yorktown, Yorktown, Virginia*.
- Baker. 1997c. *Pilot Study Report for the Explosives-Contaminated Soil at the Naval Weapons Station Yorktown, Yorktown, Virginia*. July.
- Baker. 1997d. *Round Two RI Report, Sites 9 and 19, Naval Weapons Station Yorktown, Yorktown, Virginia*. January.
- Baker. 1997e. *Record of Decision, Operable Unit Nos. III, IV, and V, Site 12, Naval Weapons Station Yorktown, Yorktown, Virginia*. May.
- Baker. 1997f. *Feasibility Study Sites 9 and 19, Naval Weapons Station Yorktown, Yorktown, Virginia*. June.
- Baker. 1997g. *Pilot Study Report for the Explosives-Contaminated Soil at the Naval Weapons Station Yorktown, Yorktown, Virginia*. July.
- Baker. 1997h. *Proposed Plan Sites 9 and 19, Naval Weapons Station Yorktown, Yorktown, Virginia*. July.
- Baker. 1998a. *Record of Decision, v3, Operable Unit Nos. VI and VII, Sites 9 and 19, Naval Weapons Station Yorktown, Yorktown, Virginia*. March.
- Baker. 1998b. *Feasibility Study, v2, Sites 6 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia*. May.

- Baker. 1998c. *Proposed Remedial Action Plan, v2, Sites 6 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia.* May.
- Baker. 1998d. *Round Two Remedial Investigation Report for Sites 6 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia.* May.
- Baker. 1998e. *Version 2 Round Two Remedial Investigation Report for Sites 1 and 3, Naval Weapons Station Yorktown, Yorktown, Virginia.* May.
- Baker. 1998f. *Record of Decision, Operable Unit Nos. XII, XIII, XIV, and XV, Sites 6 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia.* October.
- Baker. 1998g. *Final Record of Decision, v3, Operable Unit Nos. VI and VII, Sites 9 and 19, Naval Weapons Station Yorktown, Yorktown, Virginia.* March. (AR No.: 02077)
- Baker. 1999a. *Proposed Remedial Action Plan for Sites 1 and 3, Naval Weapons Station Yorktown, Yorktown, Virginia.* May.
- Baker. 1999b. *Record of Decision, Operable Unit Nos. VIII and IX, Site 1 and Site 3, Naval Weapons Yorktown, Yorktown, Virginia.* June.
- Baker. 2000. *Long-Term Monitoring Report, Site 12, Naval Weapons Station Yorktown, Yorktown, Virginia.* March.
- Baker. 2001a. *Round Two Remedial Investigation Report, Sites 4, 21, and 22, Naval Weapons Station Yorktown, Yorktown, Virginia.* January.
- Baker. 2001b. *Feasibility Study, Sites 4, 21, and 22, Naval Weapons Station Yorktown, Yorktown, Virginia.* April.
- Baker. 2001c. *Site Screening Process Report for Site Screening Areas 3, 4, 5, 9, 10, 20, 21, 22, 23, and 24, Naval Weapons Station Yorktown, Yorktown, Virginia.* October.
- Baker. 2002a. *Five-Year Review Report for Sites 1, 6, 7, 12, 16, and 19, Naval Weapons Station Yorktown, Yorktown, Virginia.* September.
- Baker. 2002b. *Draft Final Remedial Investigation Report for Sites 23, 24, 25, and 26, Naval Weapons Station Yorktown, Yorktown, Virginia, Volume I of IV.* February.
- Baker. 2003a. *Record of Decision, Operable Unit Nos. XVII, Site 22 – Burn Pad, Naval Weapons Yorktown, Yorktown, Virginia.* September.
- Baker. 2003b. *Ecological Cleanup Goals for Soil, Site 23, Teague Road Disposal Area, Naval Weapons Station Yorktown, Yorktown, Virginia.* February.
- Baker. 2004. *Round Two Remedial Investigation Report for Sites 2, 8, 18, and Site Screening Area 14, Naval Weapons Station Yorktown, Yorktown, Virginia.* June.
- Baker. 2005a. *Work Plan for the Pre-Removal Characterization of Soil, Site 2, Site 8, and SSA 14, Naval Weapons Station Yorktown, Yorktown, Virginia.* June.
- Baker. 2005b. *Engineering Evaluation/Cost Analysis for Contaminated Soil and Sediment at Site 8 and SSA 14, Naval Weapons Station Yorktown, Yorktown, Virginia.* December.
- Baker. 2005c. *Action Memorandum for Contaminated Soil and Sediment at Site 8 and SSA 14, Naval Weapons Station Yorktown, Yorktown, Virginia.* December.
- Baker. 2005d. *Site 12 Long-Term Monitoring Report - 1998-2003, Naval Weapons Station Yorktown, Yorktown, Virginia.* December.
- Baker. 2006a. *Remedial Design for Naval Weapons Station Yorktown Sites 6 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia.* March.

- Baker. 2006b. *Long-Term Monitoring Report, Sites 1, 3 and 7. Naval Weapons Station Yorktown, Yorktown, Virginia*. October.
- Baker. 2008a. *Post-Remedial Action Site Conditions TM, Site 3, Naval Weapons Station Yorktown, Yorktown, Virginia*.
- Baker. 2008b. *Revised Draft Final Round One Remedial Investigation Report for Sites 23, 24, 25, and 26, Naval Weapons Yorktown, Yorktown, Virginia*. January.
- Baker Environmental, Inc. and Roy F. Weston, Inc. (Baker and Weston). 1993a. *Focused Biological Sampling and Preliminary Risk Evaluation Report, Naval Weapons Station Yorktown, Yorktown, Virginia*. July.
- Baker and Weston. 1993b. *Round One Remedial Investigation Report for Sites 1-9, 11, 12, 16-19, and 21, Naval Weapons Station Yorktown, Yorktown, Virginia*. July.
- Black & Veatch. 1996a. *Site 19 and Composites of Site 9, Site 19, SSA 6, and SSA7 Independent Sampling and Risk Screening Report, Naval Weapons Station Yorktown, Yorktown, Virginia*. April.
- Black & Veatch. 1996b. *AOC 22, Site 12, and SSA 2, SSA 19 and King Creek Independent Sampling and Risk Screening Report, Naval Weapons Station Yorktown, Yorktown, Virginia*. April.
- Brockman, A. R., D. L. Nelms, G. E. Harlow Jr., and J. J. Gildea. 1997. *Geohydrology of the Shallow Aquifer System. Naval Weapons Station Yorktown, Yorktown, Virginia*. Prepared in cooperation with the Naval Weapons Station Yorktown Base Civil Engineer, Environmental Directorate. USGS Water Resources Investigation Report 97-4188.
- C. C. Johnson & Associates, Inc., and CH2M HILL, Inc. (C. C. Johnson/CH2M). 1984. *Initial Assessment Study of Naval Weapons Station Yorktown, Yorktown, Virginia*. July.
- CH2M HILL, Inc. (CH2M). 2007a. *Phase I Remedial Investigation Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25, Naval Weapons Station Yorktown, Yorktown, Virginia*. September.
- CH2M. 2007b. *Five-Year Review Report for Sites 1, 3, 6, 7, 11, 12, 16/SSA16, 17, and 19, Naval Weapons Station Yorktown, Yorktown, Virginia*. September.
- CH2M. 2008a. *Site 8 Removal Action and Post-Removal Confirmation Sampling Summary, Naval Weapons Station Yorktown, Yorktown, Virginia*. February.
- CH2M. 2008b. *Site Management Plan Fiscal Years 2008—2009 Naval Weapons Station Yorktown, Yorktown, Virginia, and Cheatham Annex, Williamsburg, Virginia*. February.
- CH2M. 2008c. *Expanded Site Inspection Report for the Closed MWR Skeet Range and the Closed Marine Pistol and Rifle Range, Naval Weapons Station Yorktown, Yorktown, Virginia*. March.
- CH2M. 2008d. *Long-Term Monitoring Report, Naval Weapons Station Yorktown, Yorktown, Virginia*. April.
- CH2M. 2008e. *Explanation of Significant Differences, Site 3 – Group 16 Magazines Landfill, Naval Weapons Station Yorktown, Yorktown, Virginia*. October.
- CH2M. 2008f. *Site Assessment Report AOC 23, Weapons Station Yorktown, Yorktown, Virginia*. December.
- CH2M. 2009a. *SSA 14 Removal Action and Confirmation Sampling Summary Technical Memorandum, Naval Weapons Station Yorktown, Yorktown, Virginia*. January.
- CH2M. 2009b. *Community Involvement Plan, Naval Weapons Station Yorktown and Cheatham Annex*. August.
- CH2M. 2009c. *Five-Year Review Report, Naval Weapons Station Yorktown, Yorktown, Virginia*. November.
- CH2M. 2009d. *Remedial Investigation Report for Groundwater at Sites 4, 21, and 22, Naval Weapons Station Yorktown, Yorktown, Virginia*. November.
- CH2M. 2010a. *Technical Memorandum Summary Report for Non-Intrusive Geophysical Investigation of Turkey Road Landfill (Formerly Site 2), Naval Weapons Station Yorktown, Yorktown, Virginia*. July.

- CH2M. 2010b. *Long Term Monitoring Report at Site 7, Naval Weapons Station Yorktown, Yorktown, Virginia.* September.
- CH2M. 2011a. *Site Inspection Report, Munitions Response Program Site UXO 2, Naval Weapons Station Yorktown, Yorktown, Virginia.* January.
- CH2M. 2011b. *Phase II Remedial Investigation, Site 6. Naval Weapons Station Yorktown, Yorktown, Virginia.* March.
- CH2M. 2011c. *Remedial Investigation Report for Groundwater at Sites 8 and 34, Naval Weapons Station Yorktown, Yorktown, Virginia.* June.
- CH2M. 2011d. *Record of Decision, Site 4-Burning Pad Residue Landfill, Site 21-Battery and Drum Disposal Areas, and Site 22-Burn Pad, Naval Weapons Station, Yorktown, Virginia.* August.
- CH2M. 2011e. *Feasibility Study Report for Groundwater at Site 22. Naval Weapons Station Yorktown, Yorktown, Virginia.* September.
- CH2M. 2012a. *Draft Feasibility Study Report for Groundwater at Site 34, Naval Weapons Station Yorktown, Yorktown, Virginia.* March.
- CH2M. 2012b. *Phase II Remedial Investigation Report for Sites 1 and 3. Naval Weapons Station Yorktown, Yorktown, Virginia.* June.
- CH2M. 2012c. *Memo to File Documentation of Non-significant Difference to the Record of Decision for Site 6 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia, Clarification of Site 6 Areas.* July.
- CH2M. 2012d. *Proposed Plan, Site 22 Groundwater – Burn Pad, Naval Weapons Station Yorktown, Yorktown, Virginia.* September.
- CH2M. 2012e. *Record of Decision, Site 22 Groundwater – Burn Pad, Naval Weapons Station Yorktown, Yorktown, Virginia.* September.
- CH2M. 2012f. *Revised Final Explanation of Significant Difference, Site 12 – Barracks Road Landfill, Naval Weapons Station Yorktown, Yorktown, Virginia.* September.
- CH2M. 2012g. *Suspension of Site 6 Long-term Monitoring Requirements for Operable Unit XV Identified in the 1998 Record of Decision Technical Memorandum, Naval Weapons Station Yorktown, Yorktown, Virginia.* September.
- CH2M. 2012h. *Suspension of Site 7 Long-term Monitoring Requirements for Operable Unit XV Identified in the 1998 Record of Decision Technical Memorandum, Naval Weapons Station Yorktown, Yorktown, Virginia.* September.
- CH2M. 2013a. *Five-Year Review Report for Site 1, 6, 7, 12, 16/SSA 16, and 19, Naval Weapons Station Yorktown, Yorktown, Virginia.* February.
- CH2M. 2013b. *Sampling and Analysis Plan, Site 26 Remedial Investigation, Naval Weapons Station Yorktown, Yorktown, Virginia.* December.
- CH2M. 2014a. *Feasibility Study Report for Groundwater at Site 3, Naval Weapons Station Yorktown, Yorktown, Virginia.* January.
- CH2M. 2014b. *Technical Memorandum, Site 1 Dudley Road Landfill, Extent of Landfill Waste and Soil Cover, Naval Weapons Station Yorktown, Yorktown, Virginia.* January.
- CH2M. 2014c. *Final Tier II Sampling and Analysis Plan, Site 34 Data Gap Investigation, Naval Weapons Station Yorktown, Yorktown, Virginia.* March.
- CH2M. 2014d. *Remedial Investigation, Site 24, Naval Weapons Station Yorktown, Yorktown, Virginia.* April.

- CH2M. 2014e. *Memorandum to File Documentation of Land Use Controls for Site 6 and Site 7, Naval Weapons Station Yorktown, Yorktown, Virginia*. June.
- CH2M. 2014f. *Final Sampling and Analysis Plan, Loading Plant No. 1 (including Site 9 and Site 19) Remedial Investigation*. Naval Weapons Station Yorktown, Yorktown, Virginia. July.
- CH2M. 2014g. *Community Involvement Plan, Naval Weapons Station Yorktown and Cheatham Annex*. November.
- CH2M. 2015a. *Site 12 Long Term Management Report, 2009-2013, Naval Weapons Station Yorktown, Yorktown, Virginia*. February.
- CH2M. 2015b. *Final Sampling and Analysis Plan, Site Inspection, Site 33 Former Building 530 Paint Shop and Sand Blasting Operations, Naval Weapons Station Yorktown, Yorktown, Virginia*. March.
- CH2M. 2015c. *Engineering Evaluation/Cost Analysis Site 24 – Aviation Field, Naval Weapons Station Yorktown, Yorktown, Virginia*. June.
- CH2M. 2015d. *Well Inventory and Inspection, Naval Weapons Station Yorktown, Yorktown, Virginia*. July.
- CH2M. 2015e. *Final Sampling and Analysis Plan, Remedial Investigation, Site 25, Naval Weapons Station Yorktown, Yorktown, Virginia*. March.
- CH2M. 2016a. *Action Memorandum for Site 24 – Aviation Field, Naval Weapons Station Yorktown, Yorktown, Virginia*. March.
- CH2M. 2016b. *Final Phase III Remedial Investigation Report Site 1, Naval Weapons Station Yorktown, Yorktown, Virginia*. October.
- CH2M. 2017a. *Final Expanded Remedial Investigation Report, Site 7, Naval Weapons Station Yorktown, Yorktown, Virginia*. June.
- CH2M. 2017b. *Final Sampling and Analysis Plan, Long-Term Monitoring, Site 12 – Barracks Road Landfill, Naval Weapons Station Yorktown, Yorktown, Virginia*. June.
- CH2M. 2017c. *Final Sampling and Analysis Plan, Site 8 Pre-Feasibility Study Data Gap Investigation*. Naval Weapons Station Yorktown, Yorktown, Virginia. August.
- CH2M. 2017e. *Final Sampling and Analysis Plan, Remedial Investigation, Site 23, Naval Weapons Station Yorktown, Yorktown, Virginia*. November.
- CH2M. 2017f. *Work Plan Addendum for the Sampling and Analysis Plan Remedial Investigation Site 25 Naval Weapons Station Yorktown, Yorktown, Virginia*. December.
- CH2M. 2018a. *Fourth Five-Year Review Report, Naval Weapons Station Yorktown, Yorktown, Virginia*. March.
- CH2M. 2018b. *Final Sampling and Analysis Plan, Site 34, Phase II Data Gap Remedial Investigation, Naval Weapons Station Yorktown, Yorktown, Virginia*. March.
- CH2M. 2018c. *Final Sampling and Analysis Plan for Site 7, Pre-Feasibility Study and Long-Term Monitoring Investigation, Naval Weapons Station Yorktown, Yorktown, Virginia*. May.
- CH2M. 2018d. *Final Sampling and Analysis Plan, Site Inspection Site 33 Former Building 530 Paint Shop and Sand Blasting Operations, Naval Weapons Station Yorktown, Yorktown, Virginia*. June.
- CH2M. 2018e. *Final Sampling and Analysis Plan, Loading Plant No. 1 (including Site 9 and Site 19) Remedial Investigation, Naval Weapons Station Yorktown, Yorktown, Virginia*. August.
- CH2M. 2018f. *Final Sampling and Analysis Plan Addendum, Site 34, Phase II Data Gap Remedial Investigation, Naval Weapons Station Yorktown, Yorktown, Virginia*. September.
- CH2M. 2018h. *Final Feasibility Study Report for Groundwater at Site 1, Naval Weapons Station Yorktown, Yorktown, Virginia*. November.

- CH2M. 2018i. *Final Sampling and Analysis Plan Addendum, Site 26 Remedial Investigation, Naval Weapons Station Yorktown, Yorktown, Virginia.* November.
- CH2M. 2018j. *Final Sampling and Analysis Plan, Site 31 Post-Remedial Investigation Periodic Vapor Intrusion Monitoring, Naval Weapons Station Yorktown, Yorktown, Virginia.* December.
- CH2M. 2019a. *Final Sampling and Analysis Plan, Phase 2 Data Gap Remedial Investigation, Site 6.* Naval Weapons Station Yorktown, Yorktown, Virginia. February.
- CH2M. 2019b. *Final Remedial Investigation Report, Site 31, Naval Weapons Station Yorktown, Yorktown, Virginia.* March.
- CH2M. 2019c. *Final Sampling and Analysis Plan for Remedial Investigation, UXO 2 – Turkey Road Landfill, Naval Weapons Station Yorktown, Yorktown, Virginia.* March.
- CH2M. 2019d. *Final Phase I Data Gap Remedial Investigation Report for Site 6, Naval Weapons Station Yorktown, Yorktown, Virginia.* June.
- CH2M. 2019e. *Final Site 12 Long-Term Management Report 2014–2017, Naval Weapons Station Yorktown, Yorktown, Virginia.* March.
- CH2M. 2019f. *Final Sampling and Analysis Plan Remedial Investigation Data Gap 1,4-Dioxane Groundwater Investigation Site 31 NWS Yorktown, VA.* December.
- CH2M. 2020a. *Pre-Design Investigation Summary Report, Site 22, the Burn Pad, Naval Weapons Station Yorktown, Yorktown, Virginia.* May
- CH2M. 2020b. *Final Sampling and Analysis Plan Pre-Remedial Design Investigation Site 3, Naval Weapons Station Yorktown, Yorktown, Virginia.* July.
- CH2M. 2020c. *Final Remedial Investigation Report Site 23 – Building 428 Teague Road Disposal Area, Naval Weapons Station Yorktown, Yorktown, Virginia.* July.
- CH2M. 2020d. *Revised Proposed Plan Site 3 – Group 16 Magazine Landfill, Naval Weapons Station Yorktown, Yorktown, Virginia.* August.
- CH2M. 2020e. *Final Site Management Plan Fiscal Years 2021 – 2022, Naval Weapons Station Yorktown, Yorktown, Virginia.* September.
- CH2M. 2020f. *Final Site 8 Supplemental Remedial Investigation Report, Naval Weapons Station Yorktown, Yorktown, Virginia.* November.
- CH2M. 2021a. *Final Pre-Feasibility Study Investigation and 2018 Long-Term Monitoring Report Site 7, the Plant 3 Explosives-Contaminated Wastewater Discharge Area, Naval Weapons Station Yorktown, Yorktown, Virginia.* February.
- CH2M. 2021b. *Final Site 12 – Barracks Road Landfill Long-Term Monitoring Sampling and Analysis Plan, Naval Weapons Station Yorktown, Yorktown, Virginia.* May.
- CH2M. 2021c. *Final Site 31 Post-Remedial Investigation Vapor Intrusion Monitoring Technical Memorandum, Naval Weapons Station Yorktown, Yorktown, Virginia.* May.
- CH2M. 2021d. *Final Remedial Investigation Report, Site 25, Naval Weapons Station Yorktown, Yorktown, Virginia.* July.
- Dames & Moore. 1986. *Confirmation Study Step 1A (Verification), Round One, Naval Weapons Station Yorktown, Yorktown, Virginia.* June.
- Dames & Moore. 1988. *Confirmation Study Step 1A (Verification), Round Two, Naval Weapons Station Yorktown, Yorktown, Virginia.* June.

- Environmental and Safety Designs, Inc. 1994. *Action Memorandum, Site Screening Area 18, Naval Weapons Station Yorktown, Yorktown, Virginia*. March.
- International Technology Corporation (IT Corporation). 1995. *Closeout Report, Sites 2 and 9, Site Screening Area 4, Mine Casing and Debris Removal Action, Naval Weapons Station, Yorktown, Virginia*. October.
- J.A. Jones Environmental Services. 2003. *Construction Closeout Report for Site 23, Naval Weapons Station, Yorktown, Virginia*. October.
- Malcolm Pirnie. 2005. *Revised Draft Final Preliminary Assessment, Naval Weapons Station Yorktown, Yorktown, Virginia*. December.
- Meng, A. A. III, and J. F. Harsh. 1988. *Hydrogeologic Framework of the Virginia Coastal Plain*. U.S. Geological Survey Professional Paper. 1404-C. 82 p.
- Naval Energy and Environmental Support Activity (NEESA). 1984. *Initial Assessment Study of Naval Weapons Station Yorktown, Virginia*. July.
- Department of the Navy (Navy). 2012. *Action Memorandum Site 31 Barracks Road Industrial Area, Naval Weapons Station Yorktown, Yorktown, Virginia*. September.
- Navy. 2014. *Construction Worker Authorization – Installation and Periodic Monitoring of Environmental Observation Wells – Building Number 1816, Naval Weapons Station, Yorktown [N69212/WEBSAR 3187/WF-090]*. May 28.
- Navy. 1997. *Record of Decision, Site 12 Barracks Road Landfill (Operable Unit Nos. III, IV, and V)*. May.
- Navy. 2016. *Perfluorinated Compounds/Perfluoroalkyl Substances PFC/PFAS) – Identification of Potential Areas of Concern (AOCs)*. June.
- Naval Facilities Engineering Command (NAVFAC). 2013a. *Land Use Control Remedial Design, Site 12: Barracks Road Landfill. Naval Weapons Station Yorktown, Yorktown, Virginia*. April.
- NAVFAC. 2013b. *Land Use Control Remedial Design, Site 22: Burn Pad. Naval Weapons Station Yorktown, Yorktown, Virginia*. April.
- NAVFAC. 2013c. *Technical Memorandum, Site 7 – Plant 3 Explosives-Contaminated Wastewater Discharge Area, Naval Weapons Station Yorktown, Yorktown, Virginia, Clarification of Operable Units and Approach for Implementing Comprehensive Environmental Compensation and Liability Act (CERCLA)*. October.
- NAVFAC. 2013d. *Site 6 – Explosive Contaminated Wastewater Impoundment Clarification of Operable Units and Approach for Implementing Comprehensive Environmental Compensation and Liability Act (CERCLA), Naval Weapons Station Yorktown, Yorktown, Virginia*. October.
- NAVFAC. 2014a. *Remedial Design for Land Use Controls, Site 1 – Dudley Road Landfill Soil and Waste (Operable Unit VIII), Naval Weapons Station Yorktown, Yorktown, Virginia*. May.
- NAVFAC. 2014b. *Proposed Plan – Site 3, Naval Weapons Station Yorktown, Yorktown, Virginia*. May.
- NAVFAC. 2015a. *Land Use Control Remedial Design, Site 7: Plant 3 Explosives-Contaminated Wastewater Discharge Area, Operable Unit XII, Naval Weapons Station Yorktown, Yorktown, Virginia*. March.
- NAVFAC. 2015b. *Remedial Action Completion Report, Site 12 – Barracks Road Landfill, Naval Weapons Station Yorktown, Yorktown, Virginia*. October.
- NAVFAC, 2018. *Non-Time Critical Removal Action, Explosives Safety Submission, Environmental Restoration Site 24, Naval Weapons Station Yorktown, Yorktown, Virginia*. April.
- OHM Remediation Services Corp (OHM). 1996. *Soil and Debris Removal Action Site Screening Areas 1, 2, and 5, Naval Weapons Station, Yorktown, Virginia*. January.

- OHM. 1997a. *Report for Field-Scale Treatability Study at Sites 7 and 22, Naval Weapons Station Yorktown, Yorktown, Virginia.* April.
- OHM. 1997b. *Report at Site Screening Areas 3 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia.* March.
- OHM. 1998. *Report for Site 12 – Area A, Naval Weapons Station Yorktown, Yorktown, Virginia.* January.
- OHM. 1999. *Contractor Closeout Report for Site 6 Remediation, Naval Weapons Station Yorktown, Yorktown, Virginia.* December.
- OHM. 2000. *Draft Contractor Closeout Report for Site 19 Bioremediation, Naval Weapons Station Yorktown, Yorktown, Virginia.* April.
- OHM. 2001. *Remedial Action, Sites 1 and 3 and SSA 22, Naval Weapons Station Yorktown, Yorktown, Virginia.* June.
- P.A. Rakowski, P.E. 1995. *Navy Final Recommendation for Areas of Concern, Naval Weapons Station Yorktown, Yorktown, Virginia.*
- Sealaska Environmental Services-Tetra Tech EC, Inc (SES-TECH Atlantic). 2016. *Removal Action Work Plan, Non-Time-Critical Removal Action at Site 24, Naval Weapons Station, Yorktown, Virginia.* May.
- SES-TECH Atlantic. 2018. *Explosives Safety Submission Amendment 1, Non-Time-Critical Removal Action at Site 24, Naval Weapons Station, Yorktown, Virginia.* March.
- SES-TECH Atlantic. 2019. *Final Addendum to the Removal Action Work Plan Non-Time-Critical Removal Action at Site 24, Naval Weapons Station Yorktown, Yorktown, Virginia.* December.
- SES-TECH Atlantic. 2020. *Final Technical Memorandum Results of the February 2020 Radiological Sampling Event, Site 24 – Aviation Field, Naval Weapons Station Yorktown, Yorktown, Virginia.* September.
- SES-TECH Atlantic. 2021. *Final Technical Memorandum Transportation and Disposal of Drummed Soil Stored at Site 24, Site 24 – Aviation Field, Naval Weapons Station Yorktown, Yorktown, Virginia.* April.
- Shaw Infrastructure and Environmental, Inc. (Shaw). 2003. *Project Closeout Report for Sites 21 and 22 Naval Weapons Station Yorktown, Yorktown, Virginia.* June.
- Shaw. 2008. *Construction Close-Out Report for Site 6, Naval Weapons Station Yorktown, Yorktown, Virginia.* October.
- Shaw. 2009. *Construction Close-Out Report For Site 8 and SSA 14, Naval Weapons Station Yorktown, Yorktown, Virginia.* October.
- Shaw. 2011. *Construction Completion Report at Site 23 Naval Weapons Station Yorktown, Yorktown, Virginia.* March.
- Universe Technologies, Inc. (UNITEC). 2006. *Excavation and Offsite Landfill Disposal Site 23, Naval Weapons Station Yorktown, Yorktown, Virginia.* April.
- United States Environmental Protection Agency (USEPA). 1994. *Federal Facility Agreement for Naval Weapons Station Yorktown, Yorktown, Virginia.* September.
- Versar. 1991. *Remedial Investigation Interim Report, Naval Weapons Station Yorktown, Yorktown, Virginia.* July 1991. [Revision of Dames & Moore’s 1989 *Draft Remedial Investigation Interim Report, Naval Weapons Station, Yorktown, Virginia.*]