Final Environmental Assessment

Addison-Evans Water Production and Laboratory Facility Floodwall and Stream Enhancement

Chesterfield County, Virginia

July 2021

Prepared by

Arcadis U.S., Inc
9954 Mayland Drive, Suite 2400
Richmond, VA 23233

Chesterfield County Utilities
9840 Government Center Parkway
Chesterfield, VA 23832

Prepared for

FEMA Region III, Project ID: PDMC-PJ-03-VA-2018-008
615 Chestnut St, 6th Floor
Philadelphia, PA 19106

FEMA

List of Acronyms, Chemical Formulas, and Abbreviations

%	percent
ac	acre
AEWPLF	Addison Evans Water Production and Laboratory Facility
APE	Area of Potential Effect
Arcadis	Arcadis U.S., Inc.
AST	Above Ground Storage Tank
BMP	Best Management Practice
CBRS	Coastal Barrier Resources System
CFR	Code of Federal Regulations
CWA	Clean Water Act
CZM	Coastal Zone Management
DEQ	Department of Environmental Quality
E&S	erosion and sedimentation
EA	Environmental Assessment
EO	Executive Order
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FPPA	Farmland Protection Policy Act
ft	feet
FW	floodwall
GP WP1	General Permit Number WP1
GIS	geographic information system
IPaC	Information for Planning and Consultation
Lf	linear feet
mgd	million gallons per day
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NGVD29	National Geodetic Vertical Datum of 1929
NHPA	National Historic Preservation Act
NLEB	Northern long-eared bat
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWP	Nationwide Permit
OSHA	Occupational Safety and Health Administration
PAC	Powdered Activated Carbon

PFO	Palustrine Forest
PM	particulate matter
PSSK	Palustrine Scrub Shrub Artificially Flooded
PUB	Palustrine Unconsolidated Bottom
PUBK	Palustrine Unconsolidated Bottoms Artificially Flooded
QAL	Quaternary alluvium
R2	Riverine Lower Perennial
R2UB1	Riverine Lower Perennial Unconsolidated Bottoms Cobble-Gravel
R4	Riverine Intermittent
SE	stream enhancement
SFHA	Special Flood Hazard Area
SHPO	State Historic Preservation Officer
sq	square
TCA	temporary construction access
U.S.	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VDEQ	Virginia Department of Environmental Quality
Wb	Webster-Glencoe Silty Clay Loams
Wc	Webster-Le Sueur Silty Clay Loams
WOTUS	Waters of the United States

Table of Contents

Tables

List of Appendices

SECTION ONE: BACKGROUND

1.1 Project Authority

Chesterfield County has applied through the Virginia Department of Emergency Management to the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation grant program for funding assistance to design and construct a floodwall at the Addison Evans Water Production and Laboratory Facility (AEWPLF). In accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality regulations implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500 through 1508. Updated September 14, 2020.), and FEMA regulations for NEPA compliance (44 CFR Part 10), FEMA must fully understand and consider the environmental consequences of actions proposed for federal funding. Recent changes to the President's Council on Environmental Quality (CEQ) regulations implementing the NEPA (40 Code of Federal Regulations [C.F.R.] §§ 1500–1508) became effective on September 14, 2020. 85 Fed. R. 43304-76 (July 16, 2020). As stated in 40 C.F.R. § 1506.13, the new regulations apply to any NEPA process begun after September 14, 2020. This Environmental Assessment (EA) substantively commenced prior to that date; therefore, this EA conforms to the CEQ NEPA implementing regulations that were in place prior to September 14, 2020, and procedures adopted pursuant to Department of Homeland Security Directive 023-01, Rev. 01, and FEMA Directive 108-1. The purpose of this EA is to meet FEMA's responsibilities under NEPA and to determine whether to prepare a Finding of No Significant Impact or a Notice of Intent to prepare an Environmental Impact Statement for the proposed project.

1.2 Project Location

The proposed project is located at the Addison Evans Water Production and Laboratory Facility (AEWPLF), 13400 Hull Street Road in Midlothian, Chesterfield County, Virginia (subject property)(Appendix A Figures 1 and 2). The AEWPLF is located in the western portion of the county approximately 15 miles southwest of Richmond, at latitude N 37.415855 and longitude W -77.645406. The subject property is adjacent to the southern end of Swift Creek Reservoir and the associated dam. The Swift Creek Reservoir provides water supply storage and withdrawal for the facility and allows passage of water through its dam spillway and outlet channel into the headwaters of Swift Creek which transects the western portion of the proposed project area.

1.3 Purpose and Need

The purpose of the proposed project is to protect the AEWPLF from floodwaters and mitigate potential damages, financial burden, shutdowns, and risks to on-site employees, as experienced in past flood events.

As the AEWPLF is located immediately below the spillway of the Swift Creek Reservoir and is within the Special Flood Hazard Area (SFHA), the facility suffers from frequent minor flooding and less frequent, but significant, major flooding events. Even during typical periods of heavy rainfall, the topography of the subject property causes water to pool in areas south and west of

the subject property, which further inundates the SFHA and limits the water flow capacity. Furthermore, the topography inhibits the flow of water downstream and away from the subject property. During high-flow discharges from Swift Creek Reservoir, water overwhelms the banks of the creek and impacts the facility.

In October 2018, Hurricane Michael caused what was at that time the largest flooding event in the history of the facility. Water flooded across the subject property and took approximately 30 hours to recede causing extensive damage. The sludge lagoons were fully submerged, the sandbags protecting the ammonia feed pumps were overtopped and compromised, and water overtopped the loading dock on the filter building and entered through the elevator shaft. Flood waters filled the basement up to about 3 feet below the ceiling. This flooding event caused the facility to be offline for approximately two months and resulted in more than $600,000 in damage to pumps and electrical equipment at the facility.

On August 15, 2020, a low-pressure weather system stalled over Chesterfield County, and approximately 8 to 12 inches of rain fell on the county causing what the National Weather Service classified as “700-year flooding” (Chesterfield Observer 2020). The basement of the AEWPLF filter building was completely inundated again. Staff were required to evacuate by boat, as floodwaters also reached the windows of the main operating floor offices 11 feet above the ground. This flood event exceeded the levels of Hurricane Michael by over 6 feet, damaging nearly every treatment system and major equipment in the facility causing the facility to shut down. Repairs are estimated to require 8 to 9 months to complete, and the facility is currently not providing treated water at the time of this report. Total damages from the flood event were estimated to be more than $3,000,000.

Minor and catastrophic flooding disrupts operations at the AEWPLF and reduces or eliminates the County’s ability to supply drinking water to its customers from this facility, requiring water to be purchased under existing wholesale agreements from alternative sources at a higher cost. Minor flooding events can shut down the AEWPLF for 1-3 days, while major flooding events can put the facility offline for a week and a half or longer, depending on the severity of the damage. The most recent flooding event noted above has resulted in the facility being offline for 8 months and went back online on April 16, 2021.

The flood events and associated interruptions in operation create risks to human health and safety. Anytime a water system loses pressure there is risk for contaminants to enter the system. To date, Chesterfield County has not experienced an impact to the water quality of distributed water due to a past flood event, but the risk is present for future flood events. Staff have safely evacuated the facility during past flood events, and no known injuries have been recorded in association with floods. However, human health and safety are at risk in the event of a flood. Large-scale flooding carries the obvious risk of drowning, but smaller floods can result in dangerous electrical hazards, contamination risks, and serious injury. Flood waters also pose a risk to damage the integrity of chemical storage and secondary containments at the facility, which create a risk for a spill event.

County is fulfilling the Regional Hazard Mitigation Plan's first mitigation goal (Page 219 of 232): "Reduce risk exposure and vulnerabilities to hazards ranked "medium" and "high" by focusing on regional and local mitigation action on priority hazards." In addition, according to the Richmond-Crater Multi-Regional Hazard Mitigation Plan (Page 182 of 232), Chesterfield County's Hazard Identification and Risk Assessment Ranking (1 Highest to 12 Lowest) for flooding alone is 5. However, the ranking for thunderstorms is 2 and hurricanes is ranked with the highest value of 1. Both events can bring high levels of precipitation causing potentially catastrophic flooding. By implementing the proposed floodwall project, Chesterfield

1.4 Existing Facility

Constructed in 1967, the Swift Creek Water Supply Reservoir and AEWPLF provides 12 million gallons of drinking water per day and produces approximately 19% of Chesterfield County's total supply. The treatment facility withdraws raw water from the Swift Creek Reservoir through an intake structure and 30-inch raw water line. Water treatment is provided by coagulation and flocculation, sedimentation, filtration, and disinfection. The facility discharges treated water to the County's distribution system through a 30-inch finished water line. A Site Layout is provided in Figure 3.

The operational area is located in the central eastern portion of the subject property. The facility includes a laboratory building, main operational building and offices, sedimentation basins, filters, sludge lagoons, backup generator for emergency power, and associated ancillary buildings for chemical feed systems, maintenance, and groundskeeping. Bulk storage and chemical feed systems for the water treatment process include ammonia in the Ammonia Storage Building, sodium hypochlorite in the Sodium Hypochlorite Building and powdered activated carbon (PAC) stored in a PAC silo. On the exterior grounds there are above ground storage tanks within separate containment areas for orthophosphate, ferric sulfate, fluoride, and lime.

The western portion of the subject property includes sludge lagoons. The lagoons are divided into three separate treatment cells which are separated by a concrete wall and flow splitter. The embankment of the lagoons borders the Swift Creek Reservoir outlet channel on the western side and a drainage channel on the northern side. The sludge lagoon receives water treatment residuals including filter backwash waste and settled solids. These residuals are allowed to settle in the lagoon and the decanted water discharges to the public sanitary sewer system which runs around the perimeter of the lagoons.

Asphalt paved driveway and parking areas provide access to the structures and extend along the eastern portion of the subject property northward to the dam. Gravel and undeveloped roads as well as a chain linked security fence are located around the perimeter of the operational areas.

The northern portion of the subject property consists of the asphalt road providing access to the dam, spillway, and associated stilling basin. The majority of ground cover is maintained herbaceous vegetation with scrub shrub and wooded buffer areas. Swift Creek's original stream bed location (prior to reservoir construction) is now the discharge location for the reservoir drain

valve, which according to reports by current AEWPLF operations staff has only been opened once in the past 30 years. A riprap and concrete lined drainage ditch bisects the property, flowing east to west and discharging to the Swift Creek Reservoir outlet channel on the western portion of the subject property. The PAC silo is also located on the northern portion of the subject property.

The western and southern portions of the subject property are wooded and undeveloped. The southern end of the subject property is bounded by Hull Street Road (U.S. Route 360). The Swift Creek Reservoir discharges over the concrete lined spillway and into a stilling basin, which is approximately 400 ft long and 170 ft wide, to dissipate energy. The outlet channel extends approximately 620 ft along the western portion of the subject property from the stilling basin to the natural streambed of Swift Creek. The creek flows to the southeast and off-site under the Hull Street Road bridge, eventually flowing to the Appomattox River.

SECTION TWO: ALTERNATIVES ANALYSIS

Two alternatives were evaluated to address the need for floodwater protection and mitigation at AEWPLF: the no-action alternative and the proposed action alternative to build a floodwall and stream enhancement. Consistent with the purpose and need, focus was placed on finding an alternative that would mitigate risk from future flood events.

2.1 Alternative 1 – No Action

Under the No Action Alternative, a floodwall would not be constructed, and stream enhancement would not occur. Following completion of repairs from recent flood event, the AEWPLF would continue to operate at risk of future shutdowns due to flooding. Operations and equipment storage would remain consistent with current activities. Risks to human health and safety would not be mitigated.

2.2 Action Alternative 2 – Floodwall and Stream Enhancement (Proposed Action)

Under the Proposed Action a floodwall would be constructed around the perimeter of the operational area and stream enhancement would occur in the Swift Creek SFHA to improve capacity and flow. The floodwall would provide flood protection along the perimeter of the north, south, and west sides of the facility tying into high ground on the east.

The total length of the floodwall would be about 2,000 feet with the top of the wall set at elevation 178.5 feet, providing 3.5 feet of freeboard on top of the 100-year flood elevation, which is 175 feet (NGVD29 per FEMA FIRM 51041C0117D) (Appendix A Figure 9). The floodwall will be 16 feet high on average. Steel flood gates will be installed at the main entrance to the facility and on the access road to the dam which will be normally open to allow vehicle access in and out of the subject property. Construction of the floodwall would require clearing approximately 0.8 acre of trees adjacent to the operational area.

A stormwater pumping station and an improved stormwater collection system will be constructed to discharge interior drainage flows from inside of the floodwall. A check valve will allow normal storm flows to discharge to the existing riprap and concrete drainage channel and Swift Creek during "normal" rainfall events. During heavy rainfall events when Swift Creek overflows its banks the check valve will close, and interior drainage flows will be diverted to the pump station to discharge over the floodwall.

Deployable flood protection will provide separate protection for the PAC silo facility which is outside the footprint of the operational area of the main facility.

Stream enhancement will include realigning and stabilizing a section of the Swift Creek Reservoir outlet channel adjacent to the lagoons to allow for floodwall construction as well as reducing the amounts of trees, heavy vegetation, and debris located within the Swift Creek Reservoir outlet channel, downstream stream channel, and overbank areas of Swift Creek to help improve the conveyance of waters in the floodplain. Vegetation removal would include cutting trees to ground surface, trimming branches, and removing scrub-shrub and dead or downed vegetation and debris. The root systems of removed vegetation will be left in place to prevent erosion and no grubbing of tree stumps or land disturbance is planned for the stream enhancement activities outside of the realignment section. By building the floodwall in conjunction with stream enhancement, the level of protection for the AEWPLF and the surrounding area will be increased.

The components of the proposed action are depicted on Figure 4 and shown on the engineering drawings in Appendix B.

2.3 Alternatives Considered and Eliminated from Further Consideration

Three additional alternatives were considered and eliminated from further consideration. One was to protect only the existing building and treatment units in the central location of the subject property, and not include the sludge lagoons or the silo. This would have minimized the footprint of the floodwall and thereby reduced cost. However, this alternative would not have protected the sludge lagoons. The sludge lagoons are typically the first area impacted during flood events. When the lagoons are flooded, the ability to produce finished water is interrupted. Therefore, this option did not meet the purpose and need to mitigate shutdowns.

The second alternative considered was to construct the floodwall around a greater area, including the PAC Silo. This alternative would place the drainage ditch that transects the property inside the floodwall. The drainage area of this ditch includes nearly 200 acres of the adjacent neighborhood which is located on higher ground. The storm flows from this area are nearly 10 times higher than the drainage from the facility alone. The interior drainage pump station would be an order of magnitude larger and thus significantly more expensive, while providing minimal additional benefit. Therefore, this option was eliminated from consideration as well.

The third alternative considered was to construct the floodwall as described in Section 2.2 but not to include any stream enhancement activities which would reduce the impacts to the existing stream channel and surface waters. However, the stabilization and realignment of the portion of the stream channel immediately adjacent to the lagoons is necessary to prevent scour along the foundation of the proposed floodwall. Without this stabilization potential shifting of the stream channel or undermining of the foundation carries greater risk to the long-term stability of the floodwall improvements. The remainder of the enhancement activities are intended to provide better flow characteristics and carrying capacity of the stream channel along the subject property. Over time the outlet channel below the stilling basin has become overgrown with trees and will likely continue to become more overgrown with vegetation which would impede the passage of floodwaters and cause an even greater water surface elevation during severe flood events reducing the level of protection the floodwall is intended to provide. Therefore, this option was eliminated from consideration as well.

SECTION THREE: AFFECTED ENVIRONMENT AND CONSEQUENCES

This section presents the categories of resources and potential consequences to those resources under the No Action and Proposed Action Alternatives. The consequences were evaluated based on impact intensity and/or duration. Table below provides impact determination terms and definitions.

Table 3- 1 Consequence Determination Terms

Impact Intensity Threshold	
Negligible	Changes in the resource or resource related values would be below or at the level of detection. If detected, effects would be considered slight with no perceptible consequences to health or visibility.
Minor	Changes in the resource or resource related values would be measurable; although the changes would be small, effects on the resource or the environment would be localized.
Moderate	Changes in the resource or resource related values would be readily apparent. The effects would be sufficient to cause concern, although effects would be relatively local and short-term.
Major	Changes in the resource or resource related values would be obvious, the effects would have substantial consequences to the resource and environment and be noticed regionally.
Impact Duration Definitions	
Short-term effect	Recovers in less than three years and contributes to a beneficial effect.
Long-term effect	Takes more than three years to recover and does not contribute to the long-term beneficial effect.
Long-term beneficial effect	Takes more than three years to recover and contributes to the long-term beneficial effect.

Preliminary Screening of Assessment Categories

A preliminary screening was used to narrow the list of categories for which detailed assessments need to be performed. The screening was based on available information on the general project area and the No Action and Proposed Action Alternatives. The categories that were eliminated from further assessment were Coastal Zone Management (CZM) and Coastal Barrier Resources.

The Coastal Zone Management Act (16 U.S.C. § 1451 et seq.) provides for the management of the nation's coastal resources. The Virginia CZM Program is a network of state agencies and local governments, which administers enforceable laws, regulations and policies that protect coastal resources and foster sustainable development. The Virginia Department of Environmental Quality (VDEQ) serves as the lead agency for Virginia's networked program. The subject property is located within Virginia's Coastal zone. According to the VDEQ Federal Consistency Manual, federal assistance to state and local governments does not require a federal consistency determination (VDEQ 2020b). Therefore, no further evaluation is required at this time.

The Coastal Barrier Resources Act (CBRA) of 1982 and subsequent amendments designated relatively undeveloped coastal barriers along the Atlantic, Gulf of Mexico, Great Lakes, United States (U.S.) Virgin Islands, and Puerto Rico coasts as part of the John H. Chafee Coastal Barrier Resources System (CBRS), and made these areas ineligible for most new federal expenditures and financial assistance. The proposed project is not located within or near the CBRS (U.S. Fish and Wildlife Service [USFWS] 2020a). Therefore, no further evaluation is required.

3.1 Physical Environment

3.1.1 Geology, Seismicity and Soils

Chesterfield County is located within the Piedmont and Coastal Plain geophysical provinces of Virginia. The bulk of the county and the full project area lie to the west of the Fall Line and within the Piedmont Province. Hard, crystalline igneous and metamorphic formations dominate this region with some areas of sedimentary rocks, with saprolite deposits overlying bedrock. Based on the Geologic Map of the Hallsboro Quadrangle (Prince et al. 2018) (Figure 5), the subject property consists predominately of modified land within the operational area, and Quaternary alluvium (Qal) within the floodplain of Swift Creek. The modified land is described as extensive cut and/or fill of various thickness related to grading, excavation, and mining.

The region is underlain by Paleozoic Petersburg Granite; however, to the northeast of the subject property, there is a mapped mafic xenolith feature of unknown extent. These xenoliths are found within the Petersburg Granite complex, composed of fine to coarse-grained biotite hornblende gneiss, and generally heavily weathered to saprolite.

The U.S. Department of Agriculture Natural Resources Conservation Services Web Soil Survey (Appendix C) was referenced for detailed soil information and depicted in Figure 6. While the general soil association varies throughout the county, the dominant soil types in the project area

are identified as Made Land (15) corresponding to the main project area. Alluvial deposits of Swift Creek include of the Enon-Louisberg Complex (50R; 12-40% slopes) and Roanoke Loam. Appling, Louisburg, and Grover sandy loams of various slope (6-45%) comprise the remaining land adjacent to the project area.

Based on the geotechnical investigation performed in October 2020, the project area geology conforms to the soil types identified within the Web Soil Survey and the bedrock type identified in the geologic map. Saprolite was encountered at approximately 15, 17, and 11 feet below ground surface in the northern, southern, and western portions of the project area, respectively. Bedrock was described as bluish-gray Petersburg granite and encountered at approximately 15 feet below ground surface along the north and northeast portions and approximately 24 to 32.5 feet below ground surface along the southern and western portions of the subject property.

The Farmland Protection Policy Act (FPPA – Public Law 97-98, 7 U.S.C. 4201) is intended to minimize the extent to which federal programs unnecessarily and irreversibly convert farmland to nonagricultural uses. Implementing procedures included in associated regulations found in Title 7 of the CFR, Section 658, established the farmland conversion impact rating system to evaluate impacts to Federal programs as a result of the conversion of farmland to nonagricultural uses. Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are implemented or assisted by a Federal Agency. No prime farmland was identified within the proposed project area. There will be no FPPA compliance requirements due to no prime farmland or other important farmland occurring in the development of the proposed project area.

Based on the USGS Seismic Hazards Map, seismic activity in the central region of Virginia is low (USGS 2018). In August of 2011 a magnitude 5.8 earthquake in/near Mineral, VA, approx. 45 miles from the subject property caused ground shaking at the subject property on the order of 5% of the force of gravity. No immediate structural damage was observed at the subject property. Over the years, cracks have been found in the brick veneer and it is possible that a crack in the southeast corner of the building was caused by the Mineral area earthquake. However, this crack is considered to be a cosmetic issue and not a structural concern.

Alternative 1 – No Action:

Under the No Action Alternative, there would be no impacts to geological features or soils. Normal geomorphological erosional processes would occur on a long-term basis.

Alternative 2 – Floodwall and Stream Enhancement:

Area soils would have minor short term impacts during construction and site grading activities. Soil loss may occur directly from construction activities or indirectly via high wind or rain events. To reduce soil erosion, appropriate Best Management Practices (BMPs) would be required at the construction location and would be identified through a VDEQ National Pollutant Discharge Elimination System permitting process. BMPs may include an erosion and sedimentation (E&S) control plan utilizing silt fences, re-vegetation of disturbed soils, and maintenance of soil

stockpiles during construction to prevent soils from eroding and dispersing off-site. Erosion control blankets would be utilized for disturbed and seeded steep slopes. Additional E&S control measures may be implemented as part of an E&S Control Plan. Work within the SFHA would be coordinated and permitted by the local floodplain administrator. Performance of soil, rock staging, placement, and compaction activities would be pursuant to the engineering and design plans found in Appendix B.

The proposed project will be designed in accordance with local building and seismic codes. No impacts from seismic activity are anticipated.

Construction activities associated with the floodwall and stream enhancement may potentially have negligible to minor short-term impacts. The proposed floodwall may result in a minimal to negligible decrease in natural soil infiltration due to increased impervious surface and soil compaction of the floodwall embankment.

3.1.2 Water Resources and Water Quality

Surface Waters

The Clean Water Act (CWA), as amended in 1977, established the basic framework for regulating discharges of pollutants into the Waters of the United States (WOTUS). It also established requirements associated with dredging and filling WOTUS. Section 404 of the CWA established the U.S. Army Corps of Engineers (USACE) permit requirements for discharging dredged or fill materials into WOTUS and traditional navigable waterways. In addition, Executive Order (EO) 11990 (Protection of Wetlands) requires Federal agencies to avoid, to the extent possible, adverse impacts to wetlands.

A desktop review of the subject property was conducted using Environmental Systems Research Institute's ArcMap geographic information system (GIS) software and available federal, state, and county digital datasets. This review allowed for preliminary identification of aquatic resources at the subject property. Current USFWS National Wetland Inventory (NWI) data indicate eight NWI-mapped resources within subject property boundaries. (Appendix A Figure 7: NWI Wetlands Map). (USFWS 2021).

Arcadis U.S., Inc. (Arcadis) conducted the delineation to determine the extent of WOTUS, which includes wetlands and other aquatic resources under the jurisdiction of the USACE and other aquatic resources under the jurisdiction of the VDEQ. The field work was conducted on September 16, 2020 and October 21, 2020. The delineation was conducted in accordance with the Regional Supplement to the USACE Wetland Delineation Manual: Eastern Mountains and Piedmont Version 2.0 (USACE 2012). The Supplement is intended to be utilized in association with the USACE Wetlands Delineation Manual (Environmental Laboratory 1987). Additionally, aquatic resources were delineated in accordance with the latest revision of the CWA by the U.S Environmental Protection Agency (USEPA) and the USACE entitled Clean Water Rule: Definition of "WOTUS" (Clean Water Rule: Definition of "Waters of the United States", 2015). On April 21, 2020, USEPA and USACE published the Navigable Waters Protection Rule to revise and replace

the definition of WOTUS, which became effective on June 22, 2020 (85 Federal Register 22250; USACE and USEPA 2020).

The delineated aquatic resources were classified in accordance with the methodology outlined in The Classification of Wetlands and Deepwater Habitats of the U.S. (Cowardin et al. 1979). A detailed description of the methodology is provided in the Aquatic Resources Delineation Report dated February 2021 (Arcadis 2021).

A total of seven aquatic resources were identified within the subject property as described below and depicted on Figure 8.

Resource W1 (PUBK)

Wetland W1 is the man-made sludge lagoon. Hydrology is manually controlled. The sludge lagoon receives water treatment residuals including filter backwash waste and settled solids. These residuals are allowed to settle in the lagoon and the decanted water discharges to the public sanitary sewer system. The accumulated sludge is removed as necessary and disposed of in accordance the facilities operating permit. The lagoons were last dredged approximately 20 years ago. This surface water was assigned Cowardin Classification PUBK, a palustrine system with unsolicited bottoms and with artificial water regime.

Resource W2 (PSSK)

Wetland W2 is the portion of the manmade sludge lagoon with manually controlled hydrology (as described for W1) and scrub shrub vegetation.

Resource W3 (PFO)

Wetland W3 is a PFO wetland located within the spillway outlet channel and abutting Resource S1, Swift Creek. The dominant vegetation within this wetland includes river birch (*Salix nigra*), red maple (*Acer rubrum*), American Elm (*Ulmus americana*), sweetgum (*Liquidambar styraciflua*), sour wood (*Oxydendrum arboreum*), royal fern (*Osmunda spectabilis*), netted chain fern (*Woodwardia areolata*), sensitive fern (*Onoclea sensibilis*) and common greenbrier (*Smilax rotundifolia*).

Resource W4 (Palustrine Unconsolidated Bottom)

Wetland W4 is a Palustrine Unconsolidated Bottom (PUB) wetland located within the spillway outlet channel and that discharges into Resource S1. This resource receives groundwater and holds it until it drains into S1 during times of higher water volume from storms.

Table 3-1 presents a summary of delineated wetlands at the subject property.

Table 3- 2 Delineated Wetlands

Wetland	Classification	Area (sq. ft)	Area (ac)
W1	PUBK	73,682	1.69

W2	PSSK	15,221	0.35
W3	PFO	37,169	0.85
W4	PUB	1,325	0.03

Notes:
ac - acre
sq ft – square feet

Resource S1a (R2)

Stream S1a is the natural stream bed of Swift Creek. It is a perennial stream that flows through the subject property from the north to the southeast. S1a contains a silt, sand, gravel, and cobble substrate. Stream width varies from 10 to 20 feet. Three to five inches of flow was observed in the section of stream during the delineation.

Resource S1b (R2)

Upstream of S1a is the spillway outlet channel which ties into the natural streambed channel of Swift Creek. The spillway outlet channel was a manmade feature originally constructed to be approximately 620 feet long and 100 feet wide. It has since filled in and naturalized. The stream width is now approximately 10-20 feet. Wetlands W3 and W4 are located within the wider spillway outlet channel adjacent to S1b.

Resource S1c (R2)

Stream S1c is a manmade channel that was historically armored with rip rap and concrete and has naturalized. Hydrology is received from S1d and S2.

Resource S1d (R2)

Stream S1d is the remnants of the former main channel of Swift Creek prior to construction of the reservoir. The reservoir drain valves can discharge to this area when opened, which has only occurred once in the past 30 years. Hydrology is received from stormwater runoff.

Resource S2a (R4)

Stream S2 is an intermittent ditch. The ditch was historically impacted with rip rap and concrete lined banks and bottoms. The eastern end of the ditch has naturalized, designated as S2a.

Resource S2b (R4)

Stream S2b is the western end of S2, where rip rap and concrete are visible.

Table 3-2 presents a summary of delineated streams at the subject property.

Table 3- 3 Delineated Streams

Stream	Classification	Area (sq. ft)	Area (ac)	Length (linear ft)
S1a	R2UB1	34513	0.79	806
S1b	R2UB1	21667	0.5	620
S1c	R2UB1	12956	0.3	361
S1d	R2UB1	9100	0.2	357
S2a	R4	567	0.01	140
S2b	R4	1387	0.03	240

A jurisdictional determination pre-application conference call including Chesterfield County, USACE and VDEQ was held on December 14, 2020. USACE conducted a jurisdictional determination site visit on January 7, 2021. USACE further coordinated with VDEQ to report their findings and help inform VDEQ jurisdiction determination. The results of the USACE site visit are summarized in the aquatic resource descriptions above, as well as reflected in the Jurisdictional Determination Confirmation Request submitted to the USACE on March 8, 2021 and the Preliminary Jurisdictional Determination received from the USACE dated April 23, 2021 (Appendix C). VDEQ does not typically issue formal jurisdiction determinations and has informally stated they concur with USACE determinations and would also have jurisdiction over the rip-rap lined channel S2b.

Groundwater

Although the occurrence of groundwater in the Piedmont Province is ubiquitous, the ability of fractured rock aquifers in the Piedmont to supply groundwater varies locally. The size and number of fractures and faults in the bedrock which store and transmit groundwater decrease with depth, so most significant water supplies are found within a few hundred feet of the surface. No significant groundwater use is identified within, or proximal to, the project area.

Drinking Water

Drinking water in Chesterfield County is supplied by three sources, including Swift Creek Reservoir (via the AEWPLF), Lake Chesdin (via the Appomattox River Water Authority) and the James River (via the City of Richmond). The AEWPLF on Swift Creek Reservoir has a capacity of 12 mgd and produces approximately 19% of the county's water needs. The county has a daily allocation of 66.5 mgd from the Appomattox River Water Authority, which is located on Lake Chesdin, and receives approximately 56% of a typical daily water demand from this source. The county's contract with the City of Richmond ensures an available supply of 32 mgd from the City's water treatment plant, which on average provides approximately 25% of the county's drinking water (Chesterfield County 2020a).

Alternative 1 – No Action:

Under the No Action Alternative, a floodwall would not be constructed, and stream enhancement would not occur. Operations and equipment storage would remain consistent with current activities. The AEWPLF would continue to operate at risk of future shutdowns due to flooding. Long term shutdowns at the facility would jeopardize potable water supply to County residents. During peak water use seasons, the water demand cannot be met by the two other water systems, City of Richmond and Appomattox River Water Authority. As a result of the failure to meet water demand, water restrictions would be placed on the users. Therefore, the No-Action alternative would have moderate impacts to drinking water resources.

No impacts to surface waters or groundwaters are anticipated under the No-Action Alternative.

Alternative 2 – Floodwall and Stream Enhancement:

Surface waters would be both permanently and temporarily impacted by the proposed project (Figure 8). Surface water impacts would be permitted in accordance with the CWA through the Virginia Joint Permit Application (JPA) process to apply for permits through the Norfolk District USACE, VDEQ, and the Virginia Marine Resources Commission (VMRC).

Temporary impacts to allow construction equipment to cross aquatic features may be necessary. Temporary fill material could include geo-fabric overlain with clean fill. All temporary fill materials would be removed at project completion and contours in these areas restored to pre-construction conditions. The impacts associated with construction access would be permitted by the USACE under Nation Wide Permit (NWP) 33 -Temporary Construction Access, and Dewatering. Compensatory mitigation is not required for NWP 33 activities.

Impacts associated with the stream enhancement would include cutting trees to ground surface and converting approximately 0.8 acre of forested wetlands to scrub shrub wetlands. Impacts to S1a and S1b would include selectively removing scrub-shrub vegetation and cutting trees within the channel to ground surface. The root systems of removed vegetation will be left in place to prevent erosion and no grubbing of tree stumps is planned for the stream enhancement activities. By improving flow and conveyance of flood waters, the long-term impact would minimize sedimentation in the stream channel of S1a and S1b. Impacts associated with stream enhancement activities are anticipated to be permitted under NWP 27- Aquatic Habitat Restoration, Enhancement and Establishment Activities. Compensatory mitigation is not required for NWP 27 activities.

Permanent impacts associated with the floodwall construction are proposed at W3, S1b, S1c, S2a and S2b. Permanent impacts to W3 and S1b associated with floodwall grading and stream realignment and will be approximately 0.02 acre at W3 and 120 Lf/0.06 acre at S1b. The stream channel realignment in this section will be stabilized to prevent meandering or scour along the foundation of the proposed floodwall and provide a stable channel where the alignment, cross section, and longitudinal profile are sustainable over time. S1c will be restored to rip rap and concrete lined channel as originally designed to manage flow from stormwater discharges and

from the reservoir drain and to protect the channel from erosion and scouring at the base of the floodwall. Impacts to S1c are anticipated to be approximately 360 Lf/ 0.2 acre of permanent impacts. The entire length of S2a and S2b would be permanently moved and culverted. Permanent Impacts to W3, S1b, S1c and S2a are anticipated to be permitted under NWP 43 – Stormwater Management Facilities. Approximately 240 Lf/0.03 acre of rip rap lined channel of S2b would not fall under USACE jurisdiction; therefore, it is anticipated that the VDEQ would issue a Virginia Water Protection (VWP) state general permit for proposed impacts to that portion. Compensatory mitigation credits would be purchased from an approved mitigation bank as required under the NWP 43 and VWP.

Total permanent impacts to aquatic resources are anticipated to be approximately 861 Lf/0.3 acre of stream and 0.02 acre of jurisdictional wetlands. Total conversion impacts are anticipated to be approximately 0.8 acre of forested jurisdictional wetlands to scrub shrub. Construction activities would comply with all permit conditions and BMPs would be implemented to minimize impacts to downstream resources. The project would be implemented consistent with permit conditions, BMPs would be implemented to minimize impacts to downstream and compensatory mitigation credits would be purchased from an approved mitigation bank; therefore, impacts to aquatic resources are minor. A summary of jurisdiction, proposed impacts, potential permits, and mitigation requirements is provided in Table 3-3 below.

Table 3- 4 Proposed Aquatic Resources Impacts

Aquatic Resource	Regulatory Jurisdiction	Proposed Activity	Type of Impact	Approximate Area of Impact	Potential Permit	Proposed Compensatory Mitigation
W1	NA	FW	Permanent	0.05 ac	NA	NA
			Temporary	0.08 ac		
W2	NA	FW	Permanent	0.006 ac	NA	NA
			Temporary	0.04 ac		
W3	USACE VDEQ	FW	Permanent	0.02 ac	NWP 43	Purchase Bank Credits
		FW	Conversion	0.04 ac		
		SE	Conversion	0.8 ac	NWP 27	NA
		TCA	Temporary	0.05 ac	NWP 33	NA
W4	USACE VDEQ	SE	Temporary	0.03 ac	NWP 33	NA
S1a	USACE VDEQ VMRC	NA	NA	NA	NA	NA
S1b	USACE VDEQ	FW	Permanent	120 LF	NWP 43 VMRC	Purchase Bank Credits
		SE	Temporary	450 LF	NWP 27	NA
		TCA	Temporary	50 LF	NWP 33	NA

S1C	USACE VDEQ	FW	Permanent	361 LF	NWP 43	Purchase Bank Credits
S1d	USACE VDEQ	NA	NA	NA	NA	NA
S2a	USACE VDEQ	FW	Permanent	140 LF	NWP 43	Purchase Bank Credits
S2B	VDEQ	FW	Permanent	240 LF	GP WP1	Purchase Bank Credits

Notes:
FW: Floodwall
SE: Stream Enhancement
TCA: Temporary Construction Access

Additional details of the proposed impacts to surface waters, potential permits required, and proposed mitigation measures are discussed further in Section 3.2.2.

Impacts to surface waters from stormwater discharges would be in compliance with the Virginia Pollutant Discharge Elimination System General Permit VAR-10 for discharges of stormwater from construction activities and the Virginia Stormwater Management Program regulations for post construction stormwater discharges.

No impacts to groundwater are anticipated under the Proposed Action Alternative.

The proposed project would protect the AEWPLF and avoid shutdowns due to flood events. The facility would continue to provide drinking water to the county without interruption or extensive damage from flood events. Therefore, impacts to drinking water would be beneficial.

3.1.3 Floodplain Management (Executive Order 11988)

EO 11988 requires federal agencies to take action to minimize occupancy and modification of the floodplain. Specifically, EO 11988 prohibits federal agencies from funding construction in the 100-year floodplain unless there are no practicable alternatives. FEMA's regulations for complying with EO 11988 are promulgated in 44 CFR Part 9. No practicable alternatives have been identified for this project.

The community of Chesterfield County participates in the National Flood Insurance Program and this project is within the 100-year floodplain and the associated floodway as indicated in the Flood Insurance Rate Map, panel # 0117 for Chesterfield County (Figure 9). FEMA applies the Eight-Step Decision-Making Process to ensure that it funds projects consistent with EO 11988 (Appendix D). The NEPA compliance process involves essentially the same basic decision-making process to meet its objectives as the Eight-Step Decision-Making Process. Therefore, the Eight-Step Decision-Making Process has been applied through implementation of the NEPA process.

A hydraulic model was developed to evaluate potential impacts of the project on the existing floodplain and the hydrology from the current FEMA Flood Insurance Study (FIS) was reviewed. Additionally, FEMA is currently in the process of conducting a restudy for the Lower James River basin (Restudy). This Restudy is expected to be the basis for upcoming changes to FEMA's Flood

Insurance Rate Maps; the next step in this process is release of revised mapping to the public and a review period. Arcadis was provided a copy of the Restudy hydraulic model and hydraulic analysis. FEMA approved using the Restudy hydraulic model, and associated water surface elevations, as the best available dataset to serve as the basis for modeling the potential impacts of the proposed floodwall.

In order to examine the potential impacts, Arcadis developed an Existing Conditions model for Swift Creek. The proposed floodwall at the AEWPLF was added to the Existing Conditions model to produce a Proposed Conditions model. Comparing the expected flood extents and water surface elevations in these two models shows the potential effects of the proposed floodwall and stream enhancement. The modeling efforts were based on preliminary design drawings and as such are considered an initial evaluation of the effects of the proposed floodwall and stream enhancement.

Based on uncertainty surrounding the FEMA Restudy 500-year flow value, as well as evidence from the recent August 15, 2020 storm indicating that the Restudy and Current Effective values are not likely to represent 500-year flow conditions, modeling and mapping of the 500-year event are not included at this time.

Alternative 1 – No Action:

Under the No Action Alternative, flooding would continue to occur and is anticipated to become greater magnitude and extents than current conditions. Therefore impacts to the floodplain would be considered moderate. The AEWPLF would continue to operate at risk of future shutdowns due to flooding.

Additionally FEMA's model for the existing conditions of the outlet channel below the Swift Creek Reservoir spillway assumed a wide, clear channel free of any heavy vegetation which could impede flow during flood events. The existing conditions hydraulic model was developed to closely match the assumed FEMA Restudy conditions. However in reality, the outlet channel is overgrown with trees and other ground cover and only a narrow portion of the channel allows free flow. Under the No Action Alternative, this overgrown vegetation would continue to impede the passage of floodwaters, and flooding would continue to occur at levels which are greater than shown in the either the current effective FIS or Restudy.

Alternative 2 – Floodwall and Stream Enhancement:

Construction of the floodwall would result in changes to the 100-year floodplain and floodway by removing the portion of the current AEWPLF from the floodplain and floodway. As shown on Figure 10 (Appendix A) the primary change to the floodplain consists of removal of the portion of the flood zone that would be protected by the floodwall. Minimal increases to the extent of the flood zone are expected outside of the floodwall boundaries, with the flood zone width increasing in very localized areas by about 10 feet horizontally. No additional buildings fall within the expanded floodplain area. Likewise, areas protected by the floodwall would be removed from the floodway resulting in a realignment of the floodway, as shown in Figure 11;

this realigned floodway is nearly identical to the currently adopted floodway. No buildings fall within the area of change. The upstream extent of changes to both the floodplain and floodway are limited based on the location of the Swift Creek Reservoir Dam and stilling basin. The downstream extent of changes to the floodplain and floodway are limited based on the constriction at Hull Street Road acting as the hydraulic control. Note that while the maps represent changes to the floodplain and floodway based on updating modeling and mapping; changes from the currently adopted floodplain and floodway are primarily based on updates to the topography, bridge representation, model engine, and model improvements such as added cross sections and are not associated with the proposed floodwall.

The proposed stream enhancement activities to remove heavy vegetation and debris within the Swift Creek Reservoir outlet channel (within the floodway) will restore the conditions and conveyance capacity of the channel back to what is currently assumed in the existing conditions model. A sensitivity analysis was performed to evaluate clearing of scrub-shrub vegetation and trimming of low-lying tree limbs in only the overbank areas of Swift Creek (within the floodplain) to account for reduced vegetation in the forested areas under proposed conditions. This analysis demonstrated while the overbank area stream enhancements alone would slightly improve the conveyance of waters in the floodplain, the results of these enhancements would not significantly change the impacts from the floodwall as the Hull Street Road bridges are the controlling hydraulic feature in the system.

In order to be conservative in the level of impact of the floodwall, the Swift Creek Proposed Conditions model did not include any further hydraulic capacity for the Stream Enhancement areas compared to the Existing Conditions model. However, while not reflected in the models because of the assumed existing conditions, the stream enhancement activities would provide an immediate and long-term benefit by restoring the carrying capacity of the floodplain and floodway to the levels reflected in the both the current effective FIS and Restudy.

3.1.4 Air Quality

The Clean Air Act requires that states adopt ambient air quality standards to protect the public from potentially harmful amounts of air pollutants. Primary and secondary air quality standards are established by the USEPA. Primary air quality standards protect the public health, including the health of sensitive populations, such as people with asthma, older adults, and children. Secondary air quality standards protect public welfare by implementing and promoting healthy ecosystems, preventing poor visibility, and preventing damage to crops and buildings. The USEPA has set national ambient air quality standards (NAAQS) for six of the following criteria pollutants: ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, inhalable particulate matter ($PM_{2.5}$ and PM_{10}), and lead. According to the USEPA, Chesterfield County is classified as an attainment area (USEPA 2020d), defined as a geographic region that meets or is cleaner than the NAAQS (USEPA 2020b).

The VDEQ enforces and monitors air quality air standards in Virginia. AEWPLF does not operate under a VDEQ air quality permit.

Alternative 1 – No Action:

Under the No Action Alternative, no impacts to air quality would occur.

Alternative 2 – Floodwall and Stream Enhancement:

Under the Proposed Action Alternative, negligible short-term impacts to air quality may occur during construction. Emissions from fuel-burning construction equipment may temporarily increase levels of carbon monoxide, nitrogen oxide, ozone, PM_{10} and non-criteria pollutants such as volatile organic compounds. Air emissions will be consistent with typical construction activities, temporary in nature, and mitigated with BMPs consistent with local, state, and federal requirements. Due to the size of the project and the limited duration of construction activities, no air quality permits through DEQ are anticipated to be required.

3.2 Biological Environment

3.2.1 Terrestrial and Aquatic Environment

The subject property is predominantly previously disturbed area developed with structures, roads, man-made lagoons and ditches, and maintained vegetated ground cover. Given the relatively high level of disturbance associated with water treatment operations, it is unlikely that significant wildlife occurs within the boundaries of the operational areas.

The southern and western portions of the subject property are undeveloped forested areas, with Swift Creek transecting the western portion. The dominant vegetation in the forested areas includes river birch (*Salix nigra)*, red maple (*Acer rubrum)*, American Elm (*Ulmus americana*), sweetgum (*Liquidambar styraciflua*), sour wood (*Oxydendrum arboreum*), royal fern (*Osmunda spectabilis*), netted chain fern (*Woodwardia areolata*), sensitive fern (Onoclea sensibilis), and common greenbrier (*Smilax rotundifolia)* (Arcadis 2021).

A search of the Virginia Department of Wildlife Resources (VDWR) Fish and Wildlife Information Service identified 461 species with potential to occur within a 3-mile radius of the subject property (Appendix C) (VDWR 2020). The subject proprty is surrounded by residential, and urban built-up areas to the east, south, and west with Swift Creek Reservoir bordering the subject property to the north. Potential wildlife that may occur in the project area would be typical for those land use types. Such groups of species include foraging and nesting passerines as well as foraging raptors; common reptiles (such as several species of salamander, snakes, and turtles); and non-chiropterid mammals including various rodents (rats, mice, squirrels), musteloids (raccoons and skunks), opossums, and feral cats. Swift Creek could support various aquatic species of fish, invertebrates, mollusks, crayfishes, and amphibians. Wildlife observed during site visits included heron, several species of small birds, squirrels, unidentified bi-valves, and unidentified fish species.

Alternative 1 – No Action:

Under the No Action Alternative, no impacts to terrestrial and aquatic environment would occur.

Alternative 2 – Floodwall and Stream Enhancement:

Under the Proposed Action Alternative, the terrestrial and aquatic environments would be temporarily impacted during construction activities, with minor permanent impacts due to the floodwall and stream enhancement.

Impacts associated with construction activities would be mostly short-term and negligible due to the developed nature of most of the subject property. Temporary impacts may include equipment access and placement of temporary fill materials. Temporary fills within aquatic resources would be placed on geo-fabric overlain with clean fill. All temporary fill materials would be removed at project completion and the impacted areas restored to pre-construction grade.

Most of the floodwall would be constructed in previously disturbed areas. The southern portion of the floodwall would require tree clearing; however, it would occur on the fringe of the forested area and adjacent to the operational area. Therefore, impacts due to tree clearing would be considered negligible. Upland overbank areas along Swift Creek in the stream enhancement area would be cleared of scrub-shrub vegetation and low-lying tree limbs trimmed.

Aquatic resources would be permanently and temporarily impacted as well as converted by the proposed project. Impacts would be permitted in accordance with the CWA through the Virginia JPA process. The project would be implemented consistent with permit conditions. Total permanent impacts to aquatic resources are anticipated to be approximately 861 Lf/ 0.3 acre of stream and 0.02 acre of wetlands. . The project would be implemented consistent with permit conditions and if required compensatory mitigation credits would be purchased from an approved mitigation bank; therefore, impacts to aquatic resources are minor. Proposed impacts to aquatic resources, potential permits required, and proposed mitigation measures are discussed further in Section 3.2.2.

3.2.2 Wetlands (Executive Order 11990)

EO 11990, Protection of Wetlands, requires federal agencies to take action to minimize the loss of wetlands. The NEPA compliance process also requires federal agencies to consider both direct and indirect impacts to wetlands, which may result from federally authorized, enacted, or funded actions.

As discussed in Section 3.1.2, Arcadis conducted an aquatic resources delineation to determine the extent of WOTUS and other aquatic resources under the jurisdiction of the VDEQ. The findings of the delineation are presented in Section 3.1.2. A Jurisdictional Determination Confirmation Request was submitted to the USACE on March 8, 2021 and USACE provided a

Preliminary Jurisdictional Determination dated April 23, 2021 (Appendix C).The findings of the delineation and jurisdictional determination are presented in Section 3.1.2.

Alternative 1 – No Action:

Under the No Action Alternative, no impacts to WOTUS or Waters of the State would occur.

Alternative 2 – Floodwall and Stream Enhancement:

Under the Proposed Action Alternative, permanent, temporary and conversion impacts to WOTUS and Waters of the State would occur (Appendix A Figure 8). Surface water impacts would be permitted in accordance with the CWA through the JPA process to apply for permits through the Norfolk District USACE, VDEQ, and VMRC.

Temporary Impacts to allow construction equipment to cross wetland features may be necessary. Temporary fill material could include geo-fabric overlain with clean fill. All temporary fill materials would be removed at project completion and contours in these areas restored to pre-construction conditions. The impacts associated with construction access would be permitted by the USACE under NWP 33 -Temporary Construction Access, and Dewatering. Compensatory mitigation is not required for NWP 33 activities.

Impacts to wetlands associated with the stream enhancement would include cutting trees to ground surface and converting approximately 0.8 acre of forested wetlands to scrub shrub wetlands. The root systems of removed vegetation will be left in place to prevent erosion and no grubbing of tree stumps is planned for the stream enhancement activities. . Impacts associated with Stream Enhancement activities are anticipated to be permitted under NWP 27- Aquatic Habitat Restoration, Enhancement and Establishment Activities. Compensatory mitigation is not required for NWP 27 activities.

Total permanent impacts to wetland features are anticipated to be approximatelyd 0.02 acre of jurisdictional wetlands. Total conversion impacts are anticipated to be approximately 0.8 acre of forested jurisdictional wetlands to scrub shrub. The project would be implemented consistent with permit conditions, BMPs would be implemented to minimize impacts to downstream and compensatory mitigation credits would be purchased from an approved mitigation bank; therefore, impacts to aquatic resources are minor.

3.2.3 Threatened and Endangered Species

In accordance with Section 7 of the Endangered Species Act of 1973 (ESA), the project area was evaluated for potential occurrences of federally listed threatened and endangered species. The ESA requires any federal agency that funds, authorizes, or carries out an action to ensure that the action is not likely to jeopardize the continued existence of any endangered or threatened species, or to result in the destruction or adverse modification of designated critical habitats.

Alternative 1 – No Action:

Under the No Action Alternative, no impacts to federally listed special status species would occur.

Alternative 2 – Floodwall and Stream Enhancement:

Under the Proposed Action Alternative, no impacts to federally listed special status species would occur. FEMA conducted agency consultation with the USFWS to assess potential impacts to special status species. As part of the process, the USFWS Information for Planning and Consultation (IPaC) tool was queried to identify federally-listed species that may occur in the project area. The IPaC-generated Official Species List (Appendix C), dated October 6, 2020, identified no critical habitat and only one federally-listed species, the Northern long-eared bat (NLEB) (*Myotis septentrionalis*), with potential to occur within or in the immediate vicinity of the subject property. According to the VDGIF NLEB Winter Habitat and Roost Trees application, known winter habitat and roosting trees are greater than 100 miles from the proposed project area and will not affect any known NLEB hibernacula. In a letter dated October 6, 2020, USFWS stated that based upon FEMA's IPaC submission, the Proposed Action is consistent with activities analyzed in the Programmatic Biological Opinion dated January 5, 2016. As such, the Proposed Action may affect the NLEB; however, any take that may occur as a result of the Proposed Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o).

3.2.4 Migratory Birds

All native migratory birds, including waterfowl, shorebirds, passerines, hawks, owls, vultures, and falcons are afforded protection under the Migratory Bird Treaty Act of 1918 (16 USC 703-712). The Migratory Bird Treaty Act makes it illegal to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid Federal permit (50 CFR 10.13).

The IPaC tool did not identify any migratory bird species within the project area that are on the USFWS Birds of Conservation Concern list.

Alternative 1 – No Action:

Under the No Action Alternative, no impacts to federally listed special status species would occur.

Alternative 2 – Floodwall and Stream Enhancement:

Under the Proposed Action Alternative, impacts to migratory birds are anticipated to be short-term and negligible. The floodwall will be constructed in the operational area of the subject property, which is developed and does not provide suitable habitat. The proximity to Swift Creek reservoir would provide natural areas and habitat resources for migratory birds to move to during construction and stream enhancement activities. After construction, species could return to the undeveloped areas.

3.3 Hazardous Materials

Databases maintained by the USEPA and VDEQ were reviewed to evaluate the past and present environmental condition of the Proposed Action areas. Database listings for the subject property and surrounding properties were searched within radiuses consistent with environmental due diligence conformance standards (ASTM 2013). The search identified no Superfund sites, no Resource Conservation and Recovery Act Corrective Action sites 1-mile of the subject property (USEPA 2020a, 2020c). No state-listed hazardous waste sites or petroleum releases were identified within a half-mile of the subject property (VDEQ 2020a).

One underground storage tank which historically contained fuel oil was abandoned in place in accordance with VDEQ procedures and requirements. AEWPLF has three exterior above ground storage tanks (ASTs), three silos, and two ASTs located in chemical feed buildings on the subject property which store chemicals used in the water treatment process. One silo contains PAC and the other two contain lime, these materials are not listed as hazardous by EPA and do not have a reportable quantity if spilled. The three exterior ASTs store orthophosphate, ferric sulfate, fluoride. The chemical feed buildings include ASTs for sodium hypochlorite and ammonia. All exterior ASTs and interior ASTs are contained in secondary containment areas and managed under a Spill Prevention Cleanup and Countermeasures Plan.

Alternative 1 – No Action:

Under the No Action Alternative, a floodwall would not be constructed, and stream enhancement would not occur. Operations and equipment storage would remain consistent with current activities. The AEWPLF would continue to operate at risk of future floods that could impact hazardous materials and chemical storage areas, as in the recent past. Indirect impacts to soils, surface or groundwater from release of hazardous materials due to the No Action Alternative could range from minor to major, depending on the size of flood and damage to chemical storage areas.

Alternative 2 – Floodwall and Stream Enhancement:

Under the Proposed Action Alternative, hazardous materials and chemical storage areas would be protected from future flooding events. Therefore, the Proposed Alternative would have a beneficial impact to hazardous materials.

Although subsurface hazardous materials are not anticipated to be present, excavation activities could expose or otherwise affect subsurface hazardous wastes or materials; any hazardous materials discovered, generated, or used during implementation of the proposed project would be disposed of and handled in accordance with applicable local, state, and federal regulations.

During construction activities, contractors would be required to properly handle, store, and dispose of any hazardous materials necessary to be on site for project implementation. Equipment would be required to be monitored for leaks and maintained in good operating conditions.

3.4 Socioeconomics

3.4.1 Zoning and Land Use

Based on the County's Zoning and Development Ordinances Map, the land parcel occupied by the AEWPLF is part of an agricultural district (Chesterfield County 2020b). Additional land uses in the immediate area include corporate offices (to the west-southwest of the subject property); residential properties (to the east-northeast of the subject property); and commercial properties (across Hull Street Road). Land use is depicted in Figure 12.

Alternative 1 – No Action:

Under the No Action Alternative, no impacts to zoning and land use are anticipated.

Alternative 2 – Floodwall and Stream Enhancement:

Under the Proposed Action Alternative, the AEWPLF would continue to operate consistent with current conditions. No impacts to zoning or land use are anticipated.

3.4.2 Visual Resources

Visual resources at the subject property would be the view of waters and natural areas associated with Swift Creek Reservoir. However, the subject property itself is an industrial location, and does not provide viewing opportunities, nor does it obstruct views from adjacent parcels as it is not in the line-of-sight. The subject property sits at a lower elevation than the commercial properties to the west and residential properties to the east. On either side, unobstructed views are only available to waterfront properties, as commercial or residential structures inhibit the views from locations that are farther away. Views from the south are obstructed by structures, roadways at higher elevation, or forested areas.

Alternative 1 – No Action:

Under the No Action Alternative, no impacts to visual resources are anticipated.

Alternative 2 – Floodwall and Stream Enhancement:

Under the Proposed Action Alternative, no impacts to visual resources are anticipated. The proposed floodwall would not be in a position to obstruct views from either the western or eastern areas. The view from the south is already obstructed by surrounding development or forested area.

3.4.3 Noise

Noise is generally defined as undesirable sound and is federally regulated by the Noise Control Act of 1972 (NCA). Although the NCA gives the USEPA the authority to prepare guidelines for acceptable ambient noise levels, it only charges those federal agencies that operate noise-producing facilities or equipment to implement noise standards; the USEPA's guidelines, and

those of many federal agencies, state that outdoor sound levels in excess of 55 decibels are "normally unacceptable" for noise-sensitive land uses such as residences, schools, and hospitals. The nearest sensitive receptors are residential properties adjacent to the east of the subject property. Two daycare facilities are located within a half-mile of the subject property; however, both are located south of Hull Street Road in commercial developments. A public library is located approximately three quarters of a mile west of the subject property; however, it is located south of Hull Street Road in a commercial development. There are no schools, hospitals, or nursing homes located within a mile of the subject property.

Alternative 1 – No Action:

Under the No Action Alternative, no impacts from noise are anticipated.

Alternative 2 – Floodwall and Stream Enhancement:

Under the Proposed Action Alternative, noise levels will be typical with construction activity and temporary in nature. Potential noise impacts will be mitigated by implementing BMPs consistent with any local, state and/or federal requirements. Operations at the AEWPLF will remain the same as existing conditions. Therefore, no increase in noise is anticipated after project completion. Therefore, under the Proposed Action Alternative impacts from noise are anticipated to be short-term and minor.

3.4.4 Public Services and Utilities

Public services and utilities are provided to the project locations by private industries, local municipalities, and the state of Virginia. Existing public services include police, fire, and emergency services. Utilities in the area include water, sanitary sewer, electric, phone and data service, natural gas, and stormwater systems.

Chesterfield County Fire and Emergency Medical Services is made up of four rescue squads, eight rescue stations, and 22 fire rescue stations. Services are provided by a combination of career and volunteer staff. The closest Fire Station is located on Hull Street Road approximately one mile west of the subject property. Police services in the area are provided by a combination of County and State law enforcement departments. The closest hospital is Saint Francis, 13710 Saint Francis Boulevard, in Midlothian, located approximately 5.5 miles to the northwest of the subject property.

Dominion Virginia Power has an existing utility easement that crosses the subject property and includes overhead power lines. A sanitary sewer line, owned and maintained by Chesterfield County, is located at the perimeter of the subject property. Natural gas service is provided to the facility by Columbia Gas of Virginia. Phone and data service is provided by Verizon.

The total population served by potable water produced at the AEWPLF is approximately 130,000. This population is made up of those who depend on Swift Creek Reservoir and the AEWPLF as their main source of potable water and those in the mixed zone who utilize the AEWPLF as a

secondary source of water. This population estimate was obtained from the Chesterfield Planning Department using the 2010 Census data.

Alternative 1 – No Action:

Under the No Action Alternative, a floodwall would not be constructed, and stream enhancement would not occur. Operations and equipment storage would remain consistent with current activities. The AEWPLF would continue to operate at risk of future shutdowns due to flooding. Long term shutdowns at the facility would jeopardize potable water supply to the population serviced by AEWPLF. Therefore, the No-Action alternative would have potential major negative impacts to utilities.

Alternative 2 – Floodwall and Stream Enhancement:

Under the Proposed Action Alternative, no impacts to public services are anticipated and short-term minor impacts to utilities during construction activities may occur. Utilities running along or crossing the proposed wall alignment will be addressed in the design. The sanitary sewer which runs along the perimeter of the subject property will need to be relocated for the construction of the wall. Temporary bypass lines will be provided to maintain service during the relocation. In addition, it is expected that new storm drain outfalls will be needed. The storm outfalls will pass beneath or through the new walls and will be outfitted with check valves. No interruption in utility services to the surrounding community is anticipated.

The proposed project would protect the AEWPLF and avoid shutdowns due to flood events. The facility would continue to provide drinking water to the county without interruption or extensive damage from flood events. Therefore, impacts to potable water utilities would be beneficial.

3.4.5 Traffic and Circulation

The Virginia Department of Transportation is responsible for building, maintaining, and operating the state's roads, bridges, and tunnels. The Chesterfield County Transportation Department manages road construction projects and assists in land use and transportation planning.

The AEWPLF is located on the north side of west-bound lanes of U.S. Route 360/Hull Street Road. In the vicinity of the subject property, U.S. Route 360 is an eight-lane thorough fare.

Alternative 1 – No Action:

Under the No Action Alternative there will be no change in the volume of traffic to or from the subject property. Therefore, no impacts to traffic or circulation are anticipated.

Alternative 2 – Floodwall and Stream Enhancement:

Under the Proposed Action Alternative, construction vehicles and equipment would be managed on site. The existing turn lane on U.S. Route 360 and the driveway at AEWPLF provides sufficient space for vehicle turn offs and entering the subject property, therefore backups onto U.S. Route

360 are not anticipated. Due to the existing high traffic volume on U.S. Route 360 and ongoing development and construction activities in the area, the temporary construction traffic may create a negligible increase in the existing vicinity's traffic conditions. No change in the volume of traffic to or from the subject property are anticipated after construction is complete. Therefore, the Proposed Action alternative is anticipated to have short-term negligible impacts on traffic and circulation.

3.4.6 Environmental Justice (Executive Order 12898)

EO 12898 (Environmental Justice in Minority Populations and Low-Income Populations) mandates that Federal agencies identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. Socioeconomic and demographic data for the project area were analyzed to determine if a disproportionate number of minority or low-income persons have the potential to be adversely affected by the proposed project.

Chesterfield County had a population of 343,551 in 2019 with a population density of 829 people per sq mile. The median household income was $82,599 and the poverty rate was 6.8%. Most of the population identified as white (67%). The next largest groups were black or African American (23%) and Hispanic or Latino (9%). Approximately 88% of the population was English speaking only and 7% of the population was Spanish speaking. The average age of a resident in Chesterfield county was 38.9 years old, with 76.1% of the population 18 years and older (U.S. Census Bureau 2020).

Alternative 1 – No Action:

Under the No Action Alternative there would be no disproportionately high or adverse impacts to minority or low-income populations.

Alternative 2 – Floodwall and Stream Enhancement:

Under the Proposed Action Alternative, there would be no disproportionately high and/or adverse effects on minority or low-income populations. The Proposed Action Alternative would comply with EO 12898 and would not result in long-term adverse socioeconomic impacts.

3.4.7 Safety and Security

To minimize risks to safety and human health, all construction activities would be performed using qualified personnel trained in the proper use of equipment, including all safety precautions. Additionally, all activities would be conducted in accordance with the standards specified in Occupational Safety and Health Administration (OSHA) regulations. EO 13045 (Protection of Children from Environmental Health Risks and Safety Risks) mandates that federal agencies identify and assess health risks and safety risks that may disproportionately affect children. Environmental health and safety risks include those that are attributable to products or substances that the child is likely to encounter or ingest (such as the air we breathe, the food

we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to).

Safety of site personnel is currently at risk in the event of a flood. Large-scale flooding carries the obvious risk of drowning, but smaller floods can result in dangerous electrical hazards, contamination risks, and serious injury.

The subject property is secured with a chain link fence around the perimeter and gated driveway entrance.

Alternative 1 – No Action:

Under the No Action Alternative, a floodwall would not be constructed, and stream enhancement would not occur. Operations and equipment storage would remain consistent with current activities. The AEWPLF and staff would continue to be at risk of future flooding. Therefore, the No Action alternative would have major impacts to safety and security.

Alternative 2 – Floodwall and Stream Enhancement:

The Proposed Action Alternative would require extensive construction activities associated with the floodwall and stream enhancement. Construction activities would require all personnel to have appropriate OSHA certifications and knowledge associated with their profession. Appropriate counter measures would be taken along with preparation and implementation of site-specific health and safety plans. As this location is secured away from the larger population of the community, significant short-term risks to the public during construction activities are not anticipated. During construction, appropriate signage and fencing would be implemented to ensure the public does not enter an active construction zone. Safety concerns for this alternative would be limited to short term development of the subject property and facilities and would not have a long-term adverse effect on safety or security. Over the long term, personnel at the facility would be at decreased risk in the event of flooding compared to current conditions. Therefore, the Proposed Action Alternative would have a beneficial impact to safety.

3.5 Historic and Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, 54 U.S.C. §306108, requires Federal agencies to consider the impact an undertaking has on historic properties. The review activities required under NHPA are referred to as the Section 106 process. According to 36 CFR 60.4, historic properties are defined as districts, sites, buildings, structures, and/or objects that are listed in or eligible for listing in the National Register of Historic Places (NRHP) (36 CFR 60.4). In accordance with the 36 CFR 800.4, federal agencies are required to identify historic resources within an undertaking's Area of Potential Effect (APE). As defined in 36 CFR Part 800.16(d), the APE "is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist." In consultation with the appropriate State Historic Preservation Officer and/or Tribal Historic Preservation Officer, federal agencies must evaluate

the identified historic resources for NRHP eligibility and assess the potential effects to those historic properties resulting from the proposed undertaking. If the undertaking is determined to have an adverse effect on historic properties, then the agency must attempt to avoid, minimize, or mitigate that adverse effect.

In September 2020, FEMA conducted an archive search of the Virginia Cultural Resource Information System (V-CRIS) for the APE. In a letter dated October 28, 2020 FEMA consulted with the Virginia Department of Historic Resources (VDHR) to assess potential impacts to cultural and historic resources.

Alternative 1 – No Action:

Under the No Action Alternative, there is no new undertaking from the continued operation of the current AEWPLF. Therefore, Section 106 does not apply and there is no potential to affect historic properties, archaeological resources, or tribal resources.

Alternative 2 – Floodwall and Stream Enhancement:

Under the Proposed Action Alternative FEMA defined the APE to be the approximately 2.26 acres of ground disturbance to install the proposed floodwalls at the AEWPLF and its surrounding viewsheds. According to a search of the V-CRIS database in September 2020, there are no recorded above ground historic resources within the viewshed of the APE. Historic aerials of the project show the APE to be undeveloped woodland prior to the initial construction of the Swift Creek Reservoir in 1965 and the AEWPLF in 1968. The AEWPLF itself is a series of utilitarian buildings with International-style features and would not be eligible for listing in the NRHP. The area of anticipated ground disturbance will be confined to a 25-foot distance on either side of the perimeter of the three floodwall segments, within the existing facility operational area for installation of the interior drainage storm sewer and pumping station, around the two deployable floodwalls, and within the area of the spillway outlet channel. The proposed location of the southern portion of the floodwall appears to be on previously undisturbed ground, while the proposed location of the western and northern portions of the floodwall as well as the deployable floodwalls around the PAC silo, interior drainage storm sewer, and outlet channel are within already disturbed areas of the AEWPLF and Swift Creek Reservoir. In consultation with the Virginia State Historic Preservation Officer (SHPO) on November 17, 2020, FEMA assessed that there is a low probability that significant archaeological remains would be identified within the project area based on unfavorable soils, pre-disturbed areas, and construction activities. Therefore, FEMA determined that the proposed undertaking would result in No Historic Properties Affected. Virginia SHPO concurred with FEMA's determination in a letter dated December 9, 2020. Copies of the correspondence between FEMA and VDHR are provided in Appendix E. As a condition on all FEMA grants, if ground disturbing activities occur during construction, applicant will monitor ground disturbance and if any potential archeological resources are discovered, applicant will immediately cease construction in that area and notify the State and FEMA to allow for additional Section 106 consultation.

3.6 Comparison of Alternatives

The following table summarizes the potential impacts analyzed for the No Action and Proposed Action alternatives.

Table 3- 5 Summary of Environmental Impacts

Affected Environment	No Action Impacts	Proposed Action Impacts	Mitigation For Proposed Action Impacts
Soils and Geology	• No impact and no FPPA compliance required.	• Short-term negligible impacts.	• Erosion and sediment control BMPs.
Water Resources and Water Quality	• Long term moderate impacts to drinking water.	• Short term (temporary) minor impacts to aquatic resources. • Long term (permanent) minor impacts to aquatic resources. • Long term beneficial impacts due to reduced sedimentation. • Beneficial impacts to drinking water.	• Removal of all temporary fill and return contours to pre-construction conditions. • Compliance with permit conditions.
Floodplain Management	• Moderate .	• Beneficial immediate and long term impacts.	• Impacts to floodplain will be consistent with National Flood Insurance Program requirements.
Air Quality	• No impact.	• Negligible short-term impacts.	• Construction BMPs, such as wet methods to contain fugitive dust.
Terrestrial and Aquatic Environment	• No impact.	• Negligible impacts to terrestrial environmental. • Short term (temporary) minor impacts to aquatic resources. • Long term (permanent) minor impacts to aquatic resources.	• Removal of all temporary fill and return contours to pre-construction conditions. • Compliance with permit conditions.

Affected Environment	No Action Impacts	Proposed Action Impacts	Mitigation For Proposed Action Impacts
Wetlands	• No impact.	• Short term (temporary) minor impacts to aquatic resources. • Long term (permanent) minor impacts to aquatic resources. • Long term beneficial impacts due to reduced sedimentation.	• Removal of all temporary fill and return contours to pre-construction conditions. • Compliance with permit conditions.
Threatened and Endangered Species	• No impact.	• No impact.	• Not Applicable.
Migratory Birds	• No impact.	• Negligible impacts.	• Not applicable.
Hazardous Materials	• Minor to major impacts depending on size of future flood events. .	• Beneficial impacts.	• Not applicable.
Zoning and Land Use	• No impact.	• No impact.	• Not applicable.
Visual Resources	• No impact.	• No impact.	• Not applicable.
Noise	• No impact.	• Minor short-term impact.	• Construction activity BMPs consistent with local, state, and/or federal requirements.
Public Service and Utilities	• Major impact.	• Beneficial impact.	• Not applicable.
Traffic and Circulation	• No impact.	• Negligible.	• Manage construction vehicles and equipment movement on-site.
Environmental Justice	• No disproportionately high or adverse impacts on minority or low-income populations.	• No disproportionately high or adverse impacts on minority or low-income populations.	• Not applicable.
Safety and Security	• Major impacts.	• Beneficial impacts.	• Not applicable.

Affected Environment	No Action Impacts	Proposed Action Impacts	Mitigation For Proposed Action Impacts
Historic and Cultural Resources	• No impact.	• No impact.	• Not applicable.
Archaeological Resources	• No impact	• No impact.	• In the event unidentified resources are discovered, VDHR would be notified.

SECTION FOUR: PUBLIC PARTICIPATION

The NEPA process requires that opportunities be provided for public review and comment of an EA. A public notice was published in the local newspaper of record, the Chesterfield Observer Newspaper, and posted on FEMA's website at https://www.fema.gov/emergency-managers/practitioners/environmental-historic/region/3. The Draft EA was available on FEMA's website for a 30-day public review and the comment period ran from June 9 to July 9, 2021.

No comments were received during the 30-day public comment period. The Draft EA became final and the initial Public Notice served as the final Public Notice. The public notice is attached in Appendix F.

SECTION FIVE: MITIGATION MEASURES AND PERMITS

The following are mitigation measures and conditions applicable to the Proposed Action Alternative.

- The applicant is responsible for obtaining and complying with all required local, State and Federal permit and approval processes.
- The applicant will monitor ground disturbance during the construction phase; should human skeletal remains, or historic or archaeological materials be discovered during construction, all ground-disturbing activities on the subject property shall cease and the applicant shall notify the coroner's office (in the case of human remains), FEMA, and the State Historic Preservation Office.
- If deviations from the proposed scope of work result in substantial design changes, the need for additional ground disturbance, additional removal of vegetation, or any other unanticipated changes to the physical environment, the applicant must contact FEMA so that the revised project scope can be evaluated for compliance with NEPA and other applicable environmental laws.
- The applicant/contractor must coordinate with the local floodplain administrator to receive a permit to conduct any activities that would occur within the Special Flood Hazard Area.
- Erosion controls will be in place prior to any ground disturbing activity.

- Work must be conducted in the fashion it is proposed in any permit applications. Changes to project design that would alter determinations presented in the EA would require reopening consultations with regulatory agencies.
- Heavy machinery and equipment to be used for the proposed action will meet federal clean air standards. In addition, all equipment used shall have sound control devices no less effective than those provided on the original equipment. No equipment shall have un-muffled exhaust.
- All equipment shall comply with pertinent equipment noise standards of the USEPA.
- Aquatic resources impacts would be permitted through the Virginia Joint Permit Application process to apply for permits through the Norfolk District USACE, VDEQ, and the Virginia Marine Resources Commission. It is anticipated that the following permits would be required:
  - USACE NWP 27 – Aquatic Habitat Restoration, Enhancement and Establishment Activities. All work authorized under USACE NWP 27 must be performed in compliance with the General Conditions of the NWPs and if applicable, any Regional General Conditions, and Special Conditions of the permit. This NWP has no limits to the impacts and compensatory mitigation is not required.
  - USACE NWP 33 – Temporary construction, Access, and Dewatering. All work authorized under USACE NWP 33 must be performed in compliance with the General Conditions of the NWPs and if applicable, any Regional General Conditions, and Special Conditions of the permit. This NWP has no limits to the impacts and compensatory mitigation is not required.
  - USACE NWP 43 – Stormwater Management Facilities. All work authorized under USACE NWP 43 must be performed in compliance with the General Conditions of the NWPs and if applicable, any Regional General Conditions, and Special Conditions of the permit. This NWP has a ½ acre impact limit; however, district and division engineers have been delegated a discretionary authority to modify authorizations under an NWP. Compensatory mitigation credits would be purchased from an approved mitigation bank.
  - VDEQ Water Quality Certification through the Virginia Water Protection Permit Program serves as Virginia's Section 401 certification program for federal Section 404 permits issued under the authority of the CWA. Compensatory mitigation credits would be purchased from an approved mitigation bank.
  - VMRC Habitat Permit - Subaqueous or Bottomlands. If required, compensatory mitigation credits would be purchased from an approved mitigation bank.
- Virginia Pollutant Discharge Elimination System General Permit VAR-10 authorizes discharges of stormwater from construction activities.
- Land Disturbance Permit - Chesterfield County
- Site Plan Permit – Chesterfield County
- Building Permit -Chesterfield County
- Buffer Modification Permit for Encroachment into Resource Protection Areas (Chesapeake Bay Preservation Area) – Chesterfield County

- Floodplain Encroachment Permit - Chesterfield County

SECTION SIX: CONSULTATIONS AND REFERENCES

Arcadis, 2021. Aquatic Resources Delineation Report. February 2021.

ASTM International (ASTM), 2013. Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, Designation E1527-13.

Chesterfield County, 2019. Moving Forward the Comprehensive Plan for Chesterfield County. May 22, 2019.

Chesterfield County, 2020a. Chesterfield County Department of Utilities Fiscal Year 2020 Information Brochure. Accessed at: https://www.chesterfield.gov/DocumentCenter/View/321/Chesterfield-Utilities-Informational-Brochure-PDF

Chesterfield County, 2020b. Zoning and Development Ordinances Map. Accessed at https://chesterfieldva.maps.arcgis.com/apps/webappviewer/index.html?id=c69c953b290e4dd4a5c1866fe1100b89

Chesterfield Observer, 2020. County Plans Flood Wall at Swift Creek Water Plant. September 9, 2020.

Clean Water Rule: Definition of "Waters of the United States", Final Rule, 40 Fed. Reg. 37054 – 37127 (June 29, 2015) (to be codified at 40 C.F.R. pts. 110, 112, 116, 117, 122, 230, 232, 300, 302, and 401).

Cowardin, Lewis M., Virginia Carter, Francis C. Golet, and Edward T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, FWS/OBS-79/31.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y87-1, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Prince, P.S., Occhi, M.E., and Heller, M.J., 2018. Geologic map of the Hallsboro Quadrangle, Virginia: Virginia Division of Geology and Mineral Resources Open-File Report 2018-05.

United States Army Corps of Engineers (USACE). 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountain and Piedmont Region (Version 2.0), ed. J.F. Berkowitz , J.S. Wakeley, R. W. Lichvar, C.V. Noble. ERDC/EL TR-12-9. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

USACE and United States Environmental Protection Agency (USEPA). Rule. 2020 "The Navigable Waters Protection Rule: Definition of 'Waters of the United States.'" Federal Register 85, no. 77 (21 April 2020): 22250. Accessed at https://www.federalregister.gov/documents/2020/04/21/2020-02500/the-navigable-waters-protection-rule-definition-of-waters-of-the-united-states.

United States Census Bureau, 2020. Chesterfield County, Virginia. Accessed at https://data.census.gov/cedsci/profile?g=0500000US51041

USEPA, 2020a. EnviroFacts. Accessed at https://enviro.epa.gov/enviro/enviroFACTS.quickstart?ve=11,37.415753,-77.665607&pSearch=23112,%20Midlothian,%20Virginia&miny=37.33367525429506&minx=-77.80327915185389&maxy=37.49783046277752&maxx=-77.52793430322144

USEPA, 2020b. NAAQS Designations Process. Accessed at https://www.epa.gov/criteria-air-pollutants/naaqs-designations-process

USEPA, 2020c. Search for Superfund Sites where You Live. Accessed at https://www.epa.gov/superfund/search-superfund-sites-where-you-live#map

USEPA, 2020d. Virginia Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. Accessed at https://www3.epa.gov/airquality/greenbook/anayo_va.html

United States Fish and Wildlife Service (USFWS), 2020a. Coastal Barrier Resources System. Accessed at https://www.fws.gov/cbra/

USFWS, 2020b. Information for Planning and Consultation (IPaC) Official Species List and Resource Report.

USFWS, 2021. National Wetlands Inventory (NWI) Wetlands Mapper: USFWS Accessed at https://fws.gov/wetlands/data/Mapper.html

Virginia Department of Environmental Quality (VDEQ), 2020a. Environmental Data Mapper. Accessed at https://apps.deq.virginia.gov/EDM/

VDEQ, 2020b. Federal Consistency Information Package for Virginia Coastal Zone Management Program. October 2020.

Virginia Department of Wildlife Resources (VDWR), 2020. Fish and Wildlife Information Service. Accessed at https://vafwis.dgif.virginia.gov/fwis/

SECTION SEVEN: LIST OF PREPARERS

Table 7- 1 List of Preparers

Name	Title	Role
Maria Hackey	Project Environmental Scientist, Arcadis	Primary Author
Chris Soldan	Senior Environmental Engineer, Arcadis	Project Manager
Anne Urenda	Principal Engineer, Chesterfield County	Applicant Project Management
Tanner Adamson	Environmental Protection Specialist, FEMA Region III	FEMA Project Management
Justin Hathaway	Environmental Protection Specialist, FEMA Region III	SHPO Consultation