U.S. Department of Homeland Security
Federal Emergency Management Agency
Region 3

One Independence Mall
615 Chestnut Street, 6th floor
Philadelphia, PA 19106-4404

FINDING OF NO SIGNIFICANT IMPACT

Loudoun Water Community Water Storage Project

Loudoun Water, Loudoun County, Virginia

PDMC-PJ-03-VA-2019-005

BACKGROUND

Loudoun Water has applied through the Virginia Department of Emergency Management to the Federal Emergency Management Agency (FEMA) for a grant under the Pre-Disaster Mitigation (PDM) grant program for funding to convert a former quarry into a raw water storage reservoir in Loudoun County, Virginia. The PDM program, which is authorized by Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, U.S. Code (U.S.C.) § 5133, is designed to assist states, territories, federally recognized tribes, and local communities in implementing a sustained pre-disaster, natural hazard mitigation program. The program goal is to reduce overall risks to the population and structures from future hazard events, while also reducing reliance on federal funding in future disasters. The PDM funds were made available through Congressionally directed spending in the Consolidated Appropriations Act, 2019 (Pub. L. No. 116-6).

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), and FEMA procedures for NEPA compliance (FEMA Directive 108-1 and FEMA Instruction 108-1-1), FEMA must fully understand and consider the environmental consequences of actions proposed for federal funding. This Environmental Assessment (EA) has been prepared to analyze the potential environmental consequences associated with the proposed project and to determine whether to prepare a Finding of No Significant Impact (FONSI) or a Notice of Intent to prepare an Environmental Impact Statement (EIS).

The purpose of the proposed project is to ensure a safe, reliable, and sustainable supply of drinking water for Loudoun Water's customers by constructing and operating a water storage and banking system as identified in the Potomac Water Supply Program (PWSP). The proposed project would allow Loudoun Water to store more than 1 billion gallons of water, offline from the Potomac River raw water intake. Providing the proposed raw water storage capacity would ensure a reliable water source for existing and future customers. During periods of drought, permitted water withdrawal from the Potomac River may be insufficient to meet Loudoun Water's demand, which could require the placement of water restrictions. Additionally, water cannot be withdrawn from the Potomac River during significant water quality impairments and alternative options must be utilized by Loudoun Water to ensure continued potable water service for its customers. The proposed project would address the need for a supplemental source of water during drought and water contamination events that would mitigate future risks of water shortages for Loudoun County's customers.

In accordance with federal laws and FEMA regulations, the EA process for a proposed federal action must include an evaluation of alternatives and a discussion of the potential environmental impacts. This EA was prepared in accordance with FEMA's regulations as required under NEPA. As part of this NEPA review, the requirements of other environmental laws and executive orders were addressed. This EA informed FEMA's decision on whether to prepare an EIS or a FONSI.

Alternatives discussed in this EA include No Action, Proposed Action, and Action Alternative, as well as additional alternatives considered and eliminated from further consideration.

Under the No Action Alternative, Loudoun Water would continue to withdraw water from the Potomac River in accordance with the PWSP and Virginia Water Protection (VWP) individual permit (IP) #10-2020. However, VWP IP #10-2020 stipulates various operating modes based on if water storage is available, and limits Loudoun Water's maximum daily withdrawal based on the Potomac River previous day's flow and Loudoun Water's previous day's treated water discharge. Based on the limitations of VWP IP #10-2020, water withdrawals from the Potomac River by Loudoun Water would be restricted during drought emergencies and potentially during water quality impairments of the Potomac River. Without the availability of raw water storage (such as under the No Action Alternative), Loudoun Water would be unable to maintain the necessary supply of treated water for its customers during drought conditions and impairments of water quality in the Potomac River.

The Proposed Action would convert a retired Luck Stone quarry (formerly known as Quarry A) into a raw water storage reservoir (known as Milestone Reservoir). The Proposed Action project area consists of the 48-acre reservoir site on the east side of Goose Creek and the 21-acre pump station site (also known as the Two Creeks Trail Area [TCTA]) on the west side of Goose Creek. Proposed activities at the reservoir site include installation of a quarry tunnel plug and a reservoir drain. Proposed project components that would be constructed at the pump station site (TCTA) include a pump station, raw water transmission mains, and a bridge and access road across Sycolin Creek. The pump station would be a 275-foot-deep shaft pump station configuration consisting of a main pump station building, a vertical deep shaft, and three horizontal tunnels under Goose Creek. The raw water transmission mains would fill and withdraw water from Milestone Reservoir and be used to drain the reservoir, if necessary. The proposed Sycolin Creek bridge would provide the main vehicular access to the TCTA. During construction, concrete box culverts would be installed in Sycolin Creek to provide a temporary construction access road. A storm sewer system would be constructed at the TCTA with a bioretention facility that would discharge to a riprapped drainage ditch to Sycolin Creek, which would also serve as the discharge location of the reservoir drain. The Proposed Action would result in approximately 11 acres of ground disturbance including 4 acres at the reservoir site and 7 acres at the TCTA, including approximately 6 acres of tree clearance at the TCTA.

The Action Alternative would convert Quarry A into a raw water storage reservoir (Milestone Reservoir) that includes the construction of a new quarry raw water pump station along the east rim of the proposed Milestone Reservoir where three horizontal tunnels would connect the pump station deep shaft to the adjacent reservoir. A raw water transmission main would be constructed around the eastern and southern sides of the reservoir and through a tunnel under Goose Creek to connect to existing infrastructure on the west side of the creek. This alternative would include a concrete quarry tunnel plug, an access point off of Jack Pit Lane, a secondary access point along the southwest reservoir rim, an emergency generator, and perimeter security.

Besides No Action, Proposed Action, and Action Alternative, three alternative courses of action (Quarry Rim Sites [two locations], Quarry Bypass Vault Site, and the Quarry Rim Intake Tower) were considered and dismissed in the EA. These alternatives were eliminated from further consideration due to substantial cost resulting from long tunnel lengths, stormwater concerns, and limited space for the pump station; buffer restrictions on construction adjacent to Goose Creek; and limited conveyance for construction work and future maintenance.

As part of this EA, FEMA conducted an evaluation as required by Executive Orders (EOs) 11988 and 11990 to determine the potential impacts of the proposed project, consider alternatives, and provide public notice of any actions in or affecting floodplains or wetlands. The Proposed Action area is located within Zone AE (1 percent annual chance floodplain) and Shaded Zone X (0.2 percent annual chance floodplain) of Sycolin Creek and Zone AE (1 percent annual chance floodplain) of Goose Creek as indicated in the Flood Insurance Rate Map, Panel Number 51107C0235E, dated 02/17/2017, for Loudoun County. The proposed Sycolin Creek bridge for accessing the pump station site would have an impact on the Sycolin Creek base flood elevation. However, the bridge deck would be set higher than both the 1 percent and 0.2 percent annual chance water surface elevations, therefore, minimizing the hydraulic impact. A floodplain easement area would be placed at the northern margin of Sycolin Creek, immediately downstream of the proposed bridge. The proposed water surface elevation changes include an increase of 0.24 feet at the floodplain easement area, and a decrease of between 0.17 feet at the proposed bridge to 0.05 feet at a location approximately 1,000 feet upstream of the bridge. The extent of the floodplain changes would be minimal, and the proposed floodplain easement area would offset any expected increase of the water surface elevation due to the placement of the Sycolin Creek bridge. The proposed work conforms to all applicable Virginia and Loudoun County floodplain regulations. Total permanent impacts to aquatic resources are anticipated to be approximately 192 linear feet (0.03 acre) of intermittent streams, 32 linear feet (less than 0.01 acre) of perennial streams, and 0.03 acre of wetlands jurisdictional to the United States Army Corps of Engineers (USACE). Surface water impacts would be permitted in accordance with the Clean Water Act through the permit issued by the USACE. The Proposed Action would follow permit conditions, and compensatory mitigation credits would be purchased through an approved mitigation bank. In accordance with 44 CFR Part 9.12(c), this FONSI will also constitute a final public notice for the floodplain and wetlands analysis required by EO 11988 and EO 11990.

A public notice was published in the local newspaper of record, the *Loudoun Times Mirror*; posted on FEMA's website at https://www.fema.gov/emergency-managers/practitioners/environmental-historic/nepa-repository; and made available for review at the Loudoun Water Dale C. Hammes Administration Building, 44865 Loudoun Water Way, Ashburn, VA 20147. The draft EA was available on FEMA's website for a 30-day public comment period from September 29, 2023 to October 30, 2023. The draft EA was also available for review at the Loudoun Water Dale C. Hammes Administration Building and the Ashburn Public Library, 43316 Hay Road, Ashburn, VA 20147. No comments were received during the 30-day public comment period.

FINDINGS

The Proposed Action would not affect seismicity, groundwater, coastal resources, threatened and endangered species (dwarf wedgemussel), hazardous materials, or historic and cultural resources. The Proposed Action may affect but would not likely adversely affect threatened and endangered species (northern long-eared bat and tricolored bat). Construction of the Proposed Action would result in short-term impacts on geology, soils, water resources and water quality, floodplains, air quality, terrestrial and

aquatic environments, wetlands, migratory birds, visual resources, noise, and transportation. The Proposed Action would be required to follow all applicable restrictions and regulations and implement best management practices during construction to minimize and mitigate adverse impacts to resources.

The Proposed Action would have long-term benefits on water resources and water quality (for drinking water), public services and utilities (drinking water), environmental justice, and safety and security. Long-term, adverse impacts are anticipated on geology, soils, floodplain, terrestrial and aquatic environments, wetlands, land use, visual resources, noise, and transportation. When necessary, conditions are required to avoid, minimize, and mitigate potential adverse impacts. With the implementation of these conditions, none of the potential adverse impacts would be significant. Additionally, because conditions and frameworks are in place to manage potential environmental impacts, no significant impacts are anticipated from the reasonably foreseeable past, present, and future projects near the Proposed Action area.

CONDITIONS

The following conditions must be met as part of the Proposed Action. Failure to comply with these conditions may jeopardize the receipt of federal funding.

1. The applicant is responsible for obtaining and complying with all required local, State and Federal permits and approvals, including the following:
    a. Aquatic resources impacts will be permitted through the Virginia Joint Permit Application process.
    b. VWP IP#10-2020 Major Modification from Virginia Department of Environmental Quality.
    c. Virginia Marine Resources Commission Permit 2022-1820.
    d. USACE Nationwide Permits #33 and #58 (NAO-2010-01843-rhs).
    e. Jurisdictional Determination: NAO-2018-01932, NAO-2020-0277, NAO-2021-03200, and NAO-2022-01240.
    f. Loudoun County Floodplain Study: Permit FPST-2022-0013.
    g. Loudoun County Floodplain Alteration.
    h. Conditional Letter of Map Revision: 23-03-0237R for the temporary bridge crossing and 23-03-0236 for the permanent bridge crossing.
    i. A Letter of Map Revision will be filed with as-built documentation following construction.
    j. Virginia Stormwater Management Program (Dewatering Permit).
    k. Loudoun County Site Plan Permit.
    l. Loudoun County Building Permit.
2. The applicant will implement the following time of year restrictions:
    a. Tree clearing (Northern long-eared bat, Tricolored bat) (April 1 through November 14)
    b. In-stream work (Green Floater) (April 15 through June 15 and August 15 through September 30).
3. 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 project site shall cease and the applicant shall notify the coroner's office (in the case of human remains), FEMA, and the Virginia State Historic Preservation Officer.

4. 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 Recipient must contact FEMA so that the revised project scope can be evaluated for compliance with NEPA and other applicable environmental laws.
5. The applicant/contractor must coordinate with the local floodplain administrator to receive a permit to conduct any activities that will occur within the Special Flood Hazard Area.
6. Erosion controls will be in place prior to any ground disturbing activity.
7. 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 will require reopening consultations with regulatory agencies.
8. Heavy machinery and equipment to be used 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 an unmuffled exhaust.
9. All equipment shall comply with pertinent equipment noise standards of the U.S. Environmental Protection Agency.

CONCLUSION

Based on the findings of the EA, coordination with the appropriate agencies, comments from the public, and adherence to the project conditions set forth in this FONSI, FEMA has determined that the Proposed Action qualifies as a major federal action that will not significantly affect the quality of the natural and human environment. As a result of this FONSI, an EIS will not be prepared (FEMA Instruction 108-1-1) and the Proposed Action as described in the attached EA may proceed.

APPROVAL

TESSA W NOLAN

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Date: 2023.11.08 14:46:59 -05'00'

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Date November 8, 2023

Tessa Nolan

Regional Environmental Officer

FEMA Region 3

Final Environmental Assessment

Loudoun Water Community Water Storage Project

Loudoun County, Virginia
November 2023

Prepared by

Arcadis U.S., Inc
4310 North Fairfax Drive, Suite 530
Arlington, VA 22203

Loudoun Water
44865 Loudoun Water Way
Ashburn, VA 20147

Prepared for
FEMA Region 3, Project ID: PDMC-PJ-03-VA-2019-005
615 Chestnut Street
Philadelphia, PA 19106

FEMA

List of Acronyms, Chemical Formulas, and Abbreviations

% – percent

AJD – approved jurisdictional determination

APE – Area of Potential Effect

Arcadis – Arcadis U.S., Inc.

BMP – best management practice

CFR – Code of Federal Regulations

CLOMR – Conditional Letter of Map Revision

CO – Carbon Monoxide

CWA – Clean Water Act

E&S – erosion and sedimentation

EA – Environmental Assessment

EJ – environmental justice

EL – elevation

EMS – Emergency Medical Service

EO – Executive Order

ESA – Endangered Species Act

FEMA – Federal Emergency Management Agency

FIRM – Flood Insurance Rate Map

FPAL – Floodplain Alteration

FPPA – Farmland Protection Policy Act

FPST – floodplain study

GIS – geographic information system

HUC – Hydrologic Unit Code

IP – individual permit

IPaC – Information for Planning and Consultation

IUCN – International Union for Conservation of Nature

JD – jurisdictional determination

JPA – Joint Permit Application

LOD – limit of disturbance

MBTA – Migratory Bird Treaty Act

mgd – million gallons per day

MRPS – Milestone Reservoir Pump Station

MRBV – Milestone Reservoir Bypass Vault

NEPA – National Environmental Policy Act

NLEB – Northern long-eared bat

NO_2 – Nitrogen Dioxide

NRCS – Natural Resources Conservation Service

NRHP – National Register of Historic Places

NWI – National Wetlands Inventory

NWP – Nationwide Permit

O_3 – Ozone

OSHA – Occupational Safety and Health Administration

Pb – Lead

PCB – Polychlorinated biphenyl

PEM – Palustrine Emergent Wetland

PFO – Palustrine Forest

PJD – preliminary jurisdictional determination

PM – particulate matter

PPE – personal protective equipment

PSS – Palustrine Scrub-Shrub Wetland

PRWPS – Potomac Raw Water Pump Station

PWSP – Potomac Water Supply Program

QN – Quarry Notification

QRWPS – Quarry Raw Water Pump Station

R3 – Riverine Upper Perennial

R4 – Riverine Intermittent

R6 – Riverine Ephemeral

RWTM – Raw Water Transmission Main

SFHA – Special Flood Hazard Area

SO_2 – Sulfur Dioxide

SSA – Sole Source Aquifer

TCTA – Two Creeks Trail Area

TMDL – Total Maximum Daily Load

TNT – TNT Environmental

TOYR – time-of-year restriction

TRWTF – Trap Rock Water Treatment Facility

U.S. – United States

U.S.C. – United States Code

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

VaFWIS – Virginia Fish and Wildlife Information Service

VA SHPO – Virginia State Historic Preservation Office

V-CRIS – Virginia Cultural Resource Information System

VDEQ – Virginia Department of Environmental Quality

VDOT – Virginia Department of Transportation

VDWR – Virginia Department of Wildlife Resources

VMRC – Virginia Marine Resources Commission

VPDES – Virginia Pollution Discharge Elimination System

VWP – Virginia Water Protection

W&OD – Washington and Old Dominion

WOTUS – Waters of the United States

WSSI – Wetland Studies and Solutions, Inc.

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SECTION ONE: BACKGROUND

1.1 Project Authority

Loudoun Water has received a grant, through the Virginia Department of Emergency Management, from the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation grant program, for funding assistance to convert Luck Stone Quarry A in Loudoun County, Virginia, which has ceased mining operations, into a raw water storage reservoir referred to herein as the Milestone Reservoir. The objectives of the FEMA's Pre-Disaster Mitigation grant program are to "develop hazard mitigation plans and rebuild in a way that reduces, or mitigates, future disaster losses to their communities", while also reducing reliance on funding from major disaster declarations (FEMA, n.d.).

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), 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. The purpose of this Environmental Assessment (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 location is west of Belmont Ridge Road and approximately 3.5 miles south of the Potomac River, at latitude N 39.07090 and longitude W 77.5195. The proposed Milestone Reservoir is located at Luck Stone Quarry (Quarry A) in Loudoun County, Virginia (Appendix A, Figures 1 and 2). The site for the proposed Milestone Reservoir Pump Station (MRPS) is at the Two Creeks Trail Area (TCTA) site which is located just north of the Washington and Old Dominion (W&OD) Trail and is between Sycolin Creek and Goose Creek, adjacent to the northwest area of the proposed Milestone Reservoir.

1.3 Purpose and Need

The purpose of the proposed project is to ensure a safe, reliable, and sustainable supply of drinking water for Loudoun Water's customers by constructing and operating a water storage and banking system as identified in the Potomac Water Supply Program (PWSP). The PWSP was Loudoun Water's water supply initiative and included the following facilities, which are completed and in operation: the Potomac River Raw Water intake and Potomac Raw Water Pumping Station (PRWPS), the Trap Rock Water Treatment Facility (TRWTF) and the transmission mains connecting the river pumping station to the water treatment facility. The PWSP also included the transmission mains connecting the TRWTF to the existing drinking water distribution system. The proposed project is the final element of the PWSP which was previously authorized under a Virginia Water Protection (VWP) individual permit (IP) No. 10-2020 and includes the implementation of a water

storage system, which would include converting a decommissioned rock quarry (Quarry A) to a water supply reservoir (the Milestone Reservoir) and construction of a quarry supply raw water pumping station to convey water from the Milestone Reservoir to the TRWTF. Providing the proposed raw water storage capacity would ensure a reliable water source for existing and future customers. The project would address the need for a supplemental source of water during drought and water contaminant events that would mitigate future risks of water shortages for Loudoun Water's customers.

The PWSP operational requirements include the use of the Milestone Reservoir for raw water storage. The Virginia withdrawal permit (VWP IP No. 10-2020) for the PWSP was prepared with the assumption that the Milestone Reservoir (Quarry A) would be part of the PWSP system and includes operational modes prior to Milestone Reservoir coming online and after Milestone Reservoir is in service. Operational modes refer to the permitted Potomac River withdrawal amounts/limits based on flows within the Potomac River. As described below, withdrawals are also restricted from the Potomac River during drought and low flow periods. In addition to the permitted withdrawals, the design of Loudoun Water's existing TRWTF assumed that the Milestone Reservoir would be part of the operational strategy for water treatment. The design assumed that when Potomac River turbidities exceed 50 nephelometric turbidity units, the river supply to the water treatment plant would be switched off and the cleaner quarry supply turned on.

Loudoun County is a rapidly growing jurisdiction located in the northern tip of the Commonwealth of Virginia approximately 25 miles northwest of Washington, D.C. Loudoun County contains 517 square miles, making it one of the largest counties in the region including rapidly developing suburban communities and Washington Dulles International Airport. According to the Metropolitan Washington Council of Governments regional forecasts, Loudoun County had the highest growth rate between 2010 to 2020 at 34.8% (Goodman, 2021).

Loudoun Water is the primary provider of drinking water and wastewater services in Loudoun County. Drinking water is sourced primarily from the Potomac River and secondarily from Goose Creek Reservoir. Also, Loudoun Water purchases water from Fairfax Water, which has the Potomac River as its main source for raw water. Drinking water from the Potomac River is fully treated by Loudoun Water at the TRWTF, and water from Goose Creek Reservoir is transferred to TRWTF in an emergency. Loudoun Water maintains over 1,300 miles of water distribution pipelines, over 1,000 miles of wastewater collection system pipelines and a growing reclaimed non-potable water system. Loudoun Water maintains a connection to Fairfax Water, whose supply is also subject to water quality and availability in the Potomac River.

Loudoun Water, with approximately 300,000 residential customers, along with all major potable water utilities in the region, relies on the Potomac River as their primary drinking water source. The Potomac River is susceptive to drought and water quality impairments, two risks that have become reality in the past and could have severe impacts on the ability of Loudoun Water and other neighboring utilities to provide sufficient and safe water to customers.

During periods of drought, the Cooperative Water Supply Operations on the Potomac helps manage the Washington Metropolitan Area water supply system by coordinating withdrawals from the Potomac River and Washington Metropolitan Area off-river reservoirs and recommends releases from upstream reservoirs when forecasted flow in the river is insufficient to meet expected needs. Permitted water withdrawal from the Potomac River during drought periods may be insufficient to meet Loudoun Water's demand, which could require the placement of water restrictions.

Loudoun Water's raw water supply (or the Potomac River) is also susceptible to intentional or unintentional contamination. During significant water quality impairments of the Potomac River, water cannot be withdrawn from the river and alternative options must be utilized by Loudoun Water to ensure continued potable water service for its customers. Contamination events in the Potomac River are well known and documented throughout its history (Interstate Commission on the Potomac River Basin, 2021).

Converting Quarry A into a raw water storage reservoir and constructing and operating a pumping station would allow Loudoun Water to store more than 1 billion gallons of water, offline from the Potomac River raw water intake. This would afford Loudoun Water the ability to suspend withdrawals of raw water from the Potomac River during droughts or poor water quality conditions, but still allow Loudoun Water to continue serving their commercial, residential, and public sector base. Critical customers include Loudoun County Public Schools, data centers, hospitals, and churches.

Loudoun Water has the capacity to treat 20 million gallons per day (mgd) of raw water from the Potomac River at the TRWTF. Even if this maximum volume is treated and distributed daily, the Milestone Reservoir could supply water for 30 days independent of withdrawal from any additional source.

In accordance with federal laws and FEMA regulations, the EA process for a proposed federal action must include an evaluation of alternatives and a discussion of the potential environmental impacts. This EA was prepared in accordance with FEMA's regulations as required under NEPA. As part of this NEPA review, the requirements of other environmental laws and Executive Orders (EO) are addressed.

1.4 Existing Facility

Rock mining operations started at the Quarry A site in 1880 when it was known as Arlington Stone. In 1969, Luck Stone Corporation acquired Quarry A and continued rock mining operations until 2019. In December 2008, Luck Stone Corporation and Loudoun Water entered into a Memorandum of Understanding and Master Real Estate Agreement for Luck Stone Corporation to provide an easement to Loudoun Water for the use of Quarry A as a raw water storage reservoir. In July 2013, Luck Stone Corporation and Loudoun Water signed a Deed of Easement to convey a perpetual and exclusive easement of the Quarry A property to Loudoun Water for use as a water

supply reservoir. Luck Stone ceased mining operations in October of 2019 and transferred control of the Quarry A site to Loudoun Water in January of 2020.

The TCTA was previously owned by the Northern Virginia Regional Park Authority and was used for outdoor recreation. Loudoun Water acquired the TCTA site in November 2022. The acquisition of the property was not funded with the FEMA grant and will not be discussed further in the EA.

SECTION TWO: ALTERNATIVE ANALYSIS

NEPA requires Loudoun Water to evaluate alternatives to the Proposed Action. The No Action Alternative, Proposed Action, and an Action Alternative are evaluated in this EA. Consistent with the purpose and need for the proposed project, focus was placed on an alternative action that would protect Loudoun Water's raw water supply and the Potomac River using the "water banking" system. Alternative analysis workshops were conducted as part of the alternative development process to identify options for the pump station locations which considered various criteria such as constructability, design complexity, operations safety, public impacts, future flexibility, and public health.

The Project Area encompasses the sites for the Proposed Action Milestone Reservoir and MRPS, and the Alternative Action Milestone Reservoir and east rim pump station (Quarry Raw Water Pump Station [QRWPS]).

2.1 Alternative 1 – No Action

Under the No Action Alternative, Loudoun Water would continue to withdraw water from the Potomac River in accordance with the PWSP and VWP IP #10-2020. However, that permit stipulates various operating modes depending on whether water storage is available. First, the VWP IP limits Loudoun Water's maximum daily withdrawal based on the Potomac River previous day's flow and Loudoun Water's previous day's treated water discharge. Under the No Action condition, when no water storage is available, Loudoun Water is limited to withdraw up to the previous day's treated water discharge from the Broad Run Reclamation Facility when flow at the United States Geological Survey (USGS) Point of Rocks Gaging Station (No. 01638500) is below 1,400 cubic feet per second. Secondly, the VWP IP anticipates the construction of a quarry reservoir, "a surface impoundment for the off-stream storage of raw water to be used to supply Loudoun County Water Treatment Plant during times of drought or high turbidity."

A drought emergency would reduce the Potomac River flows and Loudoun Water's permitted withdrawal amount. Also, an impairment of water quality may restrict the ability to withdraw water from the Potomac River. Given the limitations of VWP IP #10-2020 for Loudoun Water to withdraw water from the Potomac River, water withdrawals from the Potomac River would be restricted. Without the availability of raw water storage (under the No Action Alternative), Loudoun Water would be unable to maintain the necessary supply of treated water for its customers during drought conditions and impairments of water quality in the Potomac River.

2.2 Alternative 2 – Two Creeks Trail Area (Proposed Action)

Under the Proposed Action, Loudoun Water would convert Quarry A into a raw water storage reservoir (Milestone Reservoir), and construct and operate a raw water pump station (MRPS), raw water transmission main (RWTM), and an access road and bridge at the TCTA (see Appendix A, Figures 3.1 and 3.2). The Proposed Action encompasses 69 acres, including Quarry A and the TCTA site (Alternative 2 Project Area). A location map of the Proposed Action is in Appendix A. The limit of disturbance (LOD) is estimated to be 11 acres including 6 acres of tree removal.

Milestone Reservoir

The retired Luck Stone Quarry (Quarry A) would be converted to a raw water storage reservoir. Quarry A (future Milestone Reservoir) sits on a 48-acre site north of the W&OD Trail and east of Goose Creek (see Appendix A, Figures 3.1 and 3.2).

Loudoun Water received VWP IP No. 10-2020, issued on November 12, 2012, from the Virginia Department of Environmental Quality (VDEQ), authorizing the withdrawal of surface water from the Potomac River and quarry storage facilities for the purpose of public water supply. This permit anticipates the construction of the Milestone Reservoir to have a minimum usable storage volume of 1.02 billion gallons. The recommended normal pool water surface elevation for Milestone Reservoir is EL 200. "EL" refers to the elevation (in feet) above the project's survey reference datum, which is the North American Vertical Datum 1988 or NAVD 88. For reference, the bottom of the quarry is located at approximately EL -50, so the normal operating water surface level would be approximately 250 feet above the quarry bottom. Storage below EL -15 is dedicated as dead or unusable storage volume. The dead storage volume is approximately 12%, or 123 million gallons, of the projected total storage volume.

Access to the reservoir would be controlled with a perimeter security system. Perimeter security would be established with a security fence around the rim of the reservoir. In accordance with the approved Loudoun County Special Exception Permit (SPEX 2009-0020, CMPT 2009-006, SPEX 2009-0033 and SPMI 2009-2009), the security fence would be 10-foot-high, polyvinyl chloride-coated chain link, with double barbed wire. The fencing would coincide with the edge of the reservoir wall. A gate at the site access point, along the existing Jack Pit Lane, would be used to control access. The main gate would be locked to control access to the water supply reservoir. A secondary access point at the southwest reservoir rim at the approximate location of an existing gate off the W&OD Trail would also be provided. The secondary access point would be a lockable gate for manual access. Site signage would be provided to notify the public of access restrictions and would be provided in accordance with Loudoun Water standards for similar pump stations. Closed circuit television cameras would be provided for coverage at the exterior of the main access gate and the reservoir pool.

The reservoir access ramp located on the southeast corner of the reservoir would be improved to provide Loudoun Water safe access to the reservoir pool from the quarry rim. The existing ramp begins near the end of Jack Pit Lane at approximately EL 260 and runs down to the A-B Tunnel at approximately EL 176 where there is a tunnel between Quarry A and Quarry B, an actively mined

quarry to the south. The ramp is currently rutted due to water drainage. Drainage improvements and resurfacing the ramp to eliminate ruts is proposed. To resist future deterioration and allow for safe access, the ramp would be provided with hardscape improvements. These improvements are anticipated to consist of installation of articulated block to form the access ramp.

A concrete plug would be installed at the existing tunnel between quarries A and B to isolate Milestone Reservoir from Quarry B, which is to remain in service. The tunnel plug would be a reinforced concrete plug, approximately 20 feet in length. The plug would resist the hydrostatic load of the reservoir through shear friction or a combination of shear friction and bending moment depending on the final dimensions and external loads. The construction of the concrete plug would require removal of the existing shotcrete liner in the tunnel and scaling of the tunnel surface within the length of the plug to create a fresh surface for proper bonding. Structural elements to connect the plug to the rock may be needed depending on the final design of the plug. Some nominal additional rock reinforcements may be necessary depending on the condition of the rock. Permeation grouting of the tunnel perimeter around the plug location may also be performed to address the preferential seepage path around the plug. Grouting may also be necessary along the A-B quarry wall in the event of observed leakage.

Milestone Reservoir Pump Station

The Proposed Action includes constructing and operating a 17,302 square foot pump station (MRPS) to convey raw water stored in the Milestone Reservoir to the existing TRWTF for treatment and distribution to Loudoun Water customers (see Appendix A, Figure 3.2). The pump station structure height would be 45 feet supported on a concrete mat foundation, including a 5,000-square foot maintenance building to the north of the pump station. The pump station site would be graded to EL 245, with cuts in the existing terrain ranging from 10 to 15 feet on the south end of the site and filling of areas up to 5 to 10 feet on the north end of the site. Construction of building foundations would require excavations of approximately 4 to 6 feet below the depth of the leveled site. A sanitary sewer pump station would be provided to convey sanitary flows from the MRPS to the Goose Creek Industrial Park pump station. A gravity sewer would convey sewer flows from the MRPS to the adjacent MRPS sanitary sewer pump station. A force main from the MRPS's sanitary sewer pump station would then convey pumped sanitary flows to the Goose Creek Industrial Park Pump Station. The force main would be routed beneath Sycolin Creek in a trenchless crossing. Potable water would be supplied from a planned water line in Cochran Mill Road that would serve the MRPS with potable water and service water through yard hydrants. Electricity would be provided via existing Dominion Virginia Power supply lines that currently run parallel to the W&OD Trail. The existing site is forested, and a portion would be cleared, including 6 acres of trees, to construct the proposed MRPS.

The MRPS includes a 34-foot diameter deep shaft from grade at approximately EL 245 to an invert (or bottom of shaft) of approximately EL -25, for a total finished interior depth of approximately 270 feet, providing sufficient space at grade for pump spacing, roller gate removal openings and a center opening for insertion of a man basket by crane if needed. The shaft would be excavated by drill and blast methods down to EL -32 to allow for placement of a permanent 6.5-foot slab at

the shaft invert. Three 10-foot intake tunnels would be constructed at different depths from the shaft under Goose Creek to the Milestone Reservoir for raw water withdrawal. A 42-inch diameter reservoir fill pipe would be routed down the shaft and through the bottom tunnel. The inverts of the three withdrawal tunnels, at the existing quarry face, would be located at approximately EL 136, 66, and -5 and are dictated by water quality requirements based on water quality modeling results. The lengths of the three tunnels are 730, 812, and 816 linear feet, respectively. The tunnels are anticipated to be sloped towards the shaft for gravity drainage during construction. The recommended tunnel size and construction methodology for the intake tunnels consist of 10-foot by 10-foot horseshoe-shaped tunnels excavated by drill and blast methods. The tunnels are anticipated to be supported using typical tunnel support measures, including rock bolts, welded wire mesh, and shotcrete. The three tunnels would be shotcrete lined for protection.

An emergency generator would be located outside of the pump station building. The emergency generator includes a small diesel fuel storage tank, which would be installed in accordance with all federal, state, and local regulations. The pump station would use water treatment chemicals which are to be stored in tanks located inside the pump station. Normal operations include the delivery of treatment chemicals to the pump station.

Raw Water Transmission Main

An existing 42-inch RWTM currently conveys raw water from the PRWPS to the TRWTF, and connects to the existing Milestone Reservoir Bypass Vault (MRBV). The MRBV is located just south of the W&OD Trail. The Proposed Action includes the installation of two new 42-inch diameter lines that would be used to connect to the existing PRWPS-to-TRWTF RWTM at the MRBV. A separate new 36-inch line would be constructed to connect to the MRPS withdrawal piping and would be used as a reservoir drain line that would discharge into a proposed outfall channel located along Sycolin Creek. The raw water stored in the reservoir may need to be lowered using the reservoir drain if the reservoir water surface exceeds the normal or safe operating level or if maintenance is required on elements below the water surface. The RWTMs would be predominately installed in rock. As a result, blasting is anticipated for installation of this piping. Controlled blasting techniques such as line drilling may be necessary adjacent to existing utilities. Pipeline trenching depth for the large diameter pipelines would range from approximately 8 to 20 feet below existing grades. To ensure access to the RWTMs for future maintenance purposes, both RWTMs would be routed to avoid the retaining wall on the south side of the MRPS by turning west and then turning south to cross the W&OD Trail and finally tying into the MRBV.

The RWTM piping would cross the W&OD Trail as it passes from the proposed MRPS to the MRBV site. An open cut installation method across the trail is the lowest risk and least intrusive approach to install the crossing of the trail. Pedestrian and bike traffic would be maintained during construction. The area of the crossing would be restored to original conditions after work completion.

Sycolin Creek Access Road and Bridge

An access road and bridge would be constructed over and completely span Sycolin Creek north of the pump station site to provide primary access to the proposed MRPS. The continuous deck bridge would be 330 feet long with simple span breams and rated for highway loading-93 to accommodate delivery of chemicals and/or a truck-mounted crane for pump removal as part of required maintenance. The proposed bridge useable width would be 24 feet, which provides a single 12-foot lane with a 6-foot shoulder on each side. The foundations for the bridge would be drilled shafts socketed into rock for the bridge piers and drilled shafts or spread footings founded in or on rock for the bridge abutment. Minor grading is anticipated for the access road. Prior to bridge construction, a temporary Sycolin Creek crossing would be provided for site access. The temporary crossing would be assembled using box culverts. A floodplain easement area would be established at the northern margin of Sycolin Creek, immediately downstream of the proposed bridge.

2.3 Alternative 3 – East Rim Alternative (Action Alternative)

Under the Action Alternative, Loudoun Water would convert Quarry A into a raw water storage reservoir (Milestone Reservoir) that includes the construction of a new QRWPS along the east rim of the proposed Milestone Reservoir (Quarry A), a RWTM around the eastern and southern quarry rim, a tunnel under Goose Creek, and a concrete tunnel plug between quarries A and B (see Appendix A, Figures 4.1 and 4.2). This alternative would include the Quarry A access point off Jack Pit Lane, secondary access point along the southwest reservoir rim, emergency generator, and perimeter security described under Alternative 2.

Quarry Raw Water Pump Station

The QRWPS would be located along the existing quarry east rim adjacent to the existing rim access road (see Appendix A, Figures 4.1 and 4.2). The QRWPS would convey raw water stored in Milestone Reservoir to the TRWTF for treatment. Existing grades near the proposed site of the QRWPS vary from approximately EL 242 to EL 260. The pump station would be two levels and it is anticipated that the deeper portions would be supported on a rock foundation with a footprint of 8,400 square feet. The pump station arrangement would include a 34-foot diameter deep shaft, similar to that described under Alternative 2, along with three horizontal tunnels for raw water access. The QRWPS submersible pumps would be housed in the deep shaft, which would be approximately 280 feet deep from a top elevation at the QRWPS of EL 240 down to a bottom elevation of EL -40. Excavation of the shaft would be by drill and blast construction methods. Three intake tunnels would be constructed between the shaft and the quarry reservoir to provide for raw water access. The lowest tunnel would be located just above the dead storage elevation at EL -15. The two upper tunnels at EL 75 and EL 145 are located to optimize water quality of withdrawals. Isolation sluice gates would be provided to control the withdrawal elevation. The fill pipe would be routed through the wet shaft down to the lower tunnel, through the tunnel, and into the reservoir. Due to the depth of this installation, submersible vertical turbine pumps would be used to transfer raw water from the reservoir to the TRWTF.

Raw Water Transmission Main

Two RWTMs, 36-inch and 42-inch, would be routed from the QRWPS to the MRBV and used for the filling and withdrawal of the reservoir. The RWTM alignment would run along the rim of Quarry A (proposed Milestone Reservoir), on the north side of the W&OD Trail. The RWTMs would be routed down a vertical shaft when they reach the eastern edge of Goose Creek, turn 90-degrees below ground in a tunnel, rise on the west side of Goose Creek through a vertical shaft before tying into the existing MRBV. The crossing under the W&OD Trail and the crossing under Goose Creek would be tunneled. The two RWTMs would be installed side-by-side within the tunnel. The tunnel is anticipated to be approximately 13.5 feet high by 13.5 feet wide, horseshoe shaped, and excavated by drill and blast methods. There would be a shaft on the north side of the W&OD Trail on the east side of the Goose Creek crossing, and another shaft on the west side of Goose Creek to the south of the trail. The length of the tunnel segment under Goose Creek would be approximately 609 feet and the segment under the W&OD Trail would be approximately 150 feet, for a total tunnel length of 759 feet. The shafts would be excavated using drill and blast techniques, similar to the QRWPS intake shaft. An access shaft with a minimum diameter of 24 feet would be required for tunnel construction. The reception shaft minimum size needed for the pipe installation would be 13 feet in diameter.

Rock within the limits of the creek may be fractured, more weathered, and more pervious and would require additional stabilization and treatment measures. A grouted arch canopy over the tunnel for a length of 150 feet would be utilized for this additional support need and groundwater inflow control. Depth of rock within the creek is relatively shallow, such that the total depth of the tunnel under the creek is anticipated to be approximately 30 feet. Following installation of the two RWTMs, the tunnel would be grout filled.

2.4 Alternatives Considered and Eliminated from Further Consideration

Several alternatives were considered during the planning phase but were eliminated from further consideration. The alternatives are identified as: Quarry Rim Sites, Quarry Bypass Vault Site, and the Quarry Rim Intake Tower.

Quarry Rim Sites

Two alternative locations along the rim of Quarry A (proposed Milestone Reservoir) were considered for siting the raw water pump station: North Rim and Southeast Rim. The North Rim alternative would involve constructing the pump station on the north rim at a location near the terminus of the existing Quarry A rim road, which provides access to the Luck Stone Picnic Area. This alternative is constrained by scenic and conservation easements along Goose Creek, the Luck Stone Picnic Area, the floodplain adjacent Goose Creek and one of its unnamed tributaries, as well as the steep quarry face limiting the pump station buildable area. This alternative has the shortest horizontal separation distance for filling and withdrawal of water through a deep shaft configuration but the longest RWTM routing from the pump station to the MRBV. This alternative included slope stability concerns that challenged the RWTM routing around the rim and space constraints. Therefore, this alternative was eliminated from consideration.

The second Quarry Rim alternative involved construction of the pump station along the southeast rim where the wall between Quarry A and Quarry B, the A-B Wall, meets the eastern extent of Quarry A. This option is readily accessible from Jack Pit Lane and located within a depression that serves as an existing drainage conveyance and would require significant improvements for stormwater mitigation. This option requires the greatest amount of horizontal separation for its quarry connections, resulting in the longest tunnel lengths for the rim site alternatives, imposing a significant cost. This alternative is subjected to increased tunnel lengths relative to the other rim site locations, stormwater concerns, and limited space for the pump station. Therefore, this alternative was eliminated from consideration.

Quarry Bypass Vault Site

This alternative involves construction of the raw water pump station adjacent to the Quarry Bypass Vault, also known as the MRBV, on the west side of Goose Creek and south of the W&OD Trail. This alternative would minimize raw water transmission main piping between the Quarry Bypass Vault and pump station, creating a centralized facility with most operations at one location, and would have direct access from the TRWTF. The alternative has significant slope and grading challenges, as well as space restrictions with the ongoing Luck Stone mining operation to the west and Goose Creek to the east. The Virginia Outdoor Federation buffer along Goose Creek would also inhibit space for the pump station and construction activities. In addition, the proximity to the actively mined Luck Stone Quarry D site to the west would present a safety concern from ongoing blasting operations during construction and future operation. These blasting operations could also limit Loudoun Water's access to the site. A deep shaft with horizontal tunnels to access the reservoir raw water supply, like the other alternatives, would be used at this site to withdraw raw water from multiple water levels. The reservoir drain would be difficult to implement given the Virginia Outdoor Federation buffer restrictions on construction adjacent to Goose Creek. Therefore, this alternative was eliminated from consideration.

Quarry Rim Intake Tower

The third alternative consists of construction of an intake tower within the reservoir. The intake structure would house the raw water pumps and water supply access gates. The tower would be connected to the quarry rim with an access bridge. The alternative would reduce geotechnical work and eliminate some stormwater challenges compared to the Quarry Rim Alternative Sites. The 300-foot tower would be overly complex with limited access for concrete and access to the top of the bridge. An access road along the narrow area between the W&OD Trail and quarry rim edge would need to be constructed. The access road would limit conveyance for construction work and future maintenance. There is limited available space between the W&OD Trail and quarry rim edge for support structures. Easements from the Northern Virginia Regional Park Authority would likely be required for construction and future site access. Therefore, this alternative was eliminated from consideration.

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 Alternative, Proposed Action Alternative, and Action Alternative.

The categories that were eliminated from further assessment were Coastal Zone Management and Coastal Barrier Resources.

The Coastal Zone Management Act (16 United States Code [U.S.C.] § 1451 et seq.) provides for the management of the nation's coastal resources. The Virginia Coastal Zone Management Program is a network of state agencies and local governments, which administer enforceable laws, regulations, and policies that protect coastal resources and foster sustainable development. The VDEQ serves as the lead agency for Virginia's networked program. The Project Area is not 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, 2022a). Therefore, no further evaluation is required at this time.

The Coastal Barrier Resources Act of 1982 (16 U.S.C. 3501 et seq.) and subsequent amendments designated 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 and made these areas ineligible for most new federal expenditures and financial assistance. The proposed project is not located within or near the Coastal Barrier Resources System (USFWS, 2022). Therefore, no further evaluation is required.

3.1 Physical Environment

3.1.1 Geology, Seismicity and Soils

Loudoun County is located within the Piedmont physiographic province of Virginia. Hard, crystalline igneous and metamorphic formations dominate this region with some areas of sedimentary rocks. Based on the Geologic Map of Loudoun County the bedrock underlying the subject site is a high-titanium diabase intrusion in the Balls Bluff Siltstone (Southworth et al., 2006). The overlying weathered rock, saprolite, and soil has formed from weathering of the diabase bedrock.

Soils typically consist of a mixture of alluvial and residual soils with depths between 0 and 15 feet. Typical alluvium consists of dark brown to olive brown sandy silt. Residuum has been described as brown, orangish brown, greenish brown, yellowish brown, grey and light-yellow silty sand, sandy silt, clayey sand, sandy clay, lean clay with gravel, gravel with silt, and sand. The broader Project Area soil survey results can be found on drawing C204 of the January 2023 Site Plan (Appendix A). The localized soil survey for the Project Area is depicted in Appendix A, Figure 5. While the general soil association varies throughout the Project Area, the principal soil types are the Oakhill gravelly

silt loam (64D, 15-25% slopes, very stony) and the Jackland and Haymarket soils (67B, 67C, and 68C; 2-15% slopes, with the latter very stony); all formed from mafic rock (diabase, gabbro, and hornfel). The soil along Goose Creek and its tributaries comprises alluvial materials derived from upland soil materials weathered from mostly metamorphic and crystalline rocks (Codorus and Comus silty loams, 2A and 3A, 0-2% slopes) (NRCS, n.d.). The native fine-grained soils at the Project Area significantly restrict infiltration of precipitation and groundwater flow.

An unnamed normal fault runs north-south along the western edge of Quarry A and Quarry B, with both quarries located on the downthrown block. This fault extends northward and across Goose Creek. There are no associated seismic impacts from this fault (Southworth et al., 2006).

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, Part 658, established the farmland conversion impact rating system to evaluate impacts to federal programs on 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.

The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Web Soil Survey was consulted for detailed soil information (NRCS, n.d.). Within the Project Area for Alternative 2 and Alternative 3, there are two prime farmland soils identified along Goose Creek and its tributaries. The soils represent a small portion of the Project Area, approximately 9.20 acres total (2A is 7.75 acres, 3A is 1.45 acres).

- **Codorus silt loam, 0 to 2 percent slopes, occasionally flooded (2A):** This soil is observed along the east side of Goose Creek and along Sycolin Creek. The soil comprises alluvial materials derived from upland soil materials weathered from mostly metamorphic and crystalline rocks. It is somewhat poorly drained with no frequency of flooding or ponding. With a dual hydrologic soil group of B/D, the soil has a high runoff potential unless drained. There is no hydric soil rating. This soil is classified as prime farmland if protected from flooding or not frequently flooded during the growing season.

- **Comus silt loam, 0 to 2 percent slopes, occasionally flooded (3A):** This soil is observed along the east side of Goose Creek. The soil is well drained with a low runoff. There is no frequency of flooding. There is no hydric soil rating. This soil is classified as prime farmland if protected from flooding or not frequently flooded during the growing season.

The Project Area is classified as Level A under the seismic design category, indicating the lowest risk to seismic activity. Further, and based on the short-term and long-term USGS Earthquake hazard maps, which are modeled on seismicity, fault slip rates, and frequency of earthquakes, the Project Area has a less than 1% chance of damage from an earthquake and is classified as very low risk (USGS, n.d.a). As a result, seismic concerns are not discussed further. Geotechnical reports for the Project Area are located in Appendix F.

Alternative 1 – No Action:

Under the No Action Alternative, the geology and soils at the site would not be impacted. Normal geological weathering and geomorphological erosional processes would continue on a long-term basis. There would be no conversion of soils considered of prime farmland importance. No FPPA compliance actions are required.

Alternative 2 – Two Creeks Trail Area:

Soils within the Alternative 2 Project Area would be disturbed and exposed during construction activities including, clearing, grading, compacting, proof rolling, excavation, and trenching resulting in short-term construction impacts. Approximately 0.89 acres of impervious surfaces would result in permanent disturbances in the form of roadways and parking areas and 1.77 acres pervious surfaces would be permanently disturbed, totaling 2.66 acres of permanent disturbance. Other potential short-term impacts include soil erosion, soil compaction from stockpiled materials and heavy machinery, water table fluctuation from dewatering activities, and sediment deposition in surface water. The primary buildings/structures would be slab on grade or spread footings on top of rock. The current site elevation gradient ranges from 230 feet to 260 feet. The site would be cut to a final elevation of 245 feet. Only the northeastern portion of the site would require fill. The grading plan proposes a minimal total cut volume. Excavated materials, including topsoil, may be stored on the MRPS site, temporarily, in stockpile for future use. All excavated materials would be stored in accordance with the Virginia Erosion and Sediment Control Handbook requirements. Excavation and trenching for utilities would vary; however, installation would typically be a minimum of 24 to 36 inches below the surrounding exterior grade elevations.

A Virginia Pollution Discharge Elimination System (VPDES) permit would be required because the Proposed Action disturbs more than 1 acre of land surface. Under the VPDES permit, the project must minimize or prevent soil erosion and sedimentation (E&S) during construction using an E&S control plan and appropriate best management practices (BMPs) such as grass drainage swales, inlet and riprap outlet protection, a temporary sediment trap, placement of 18-inch compost filter socks, soil stabilization, and maintenance of a stabilized construction entrance. Compost filter socks would be used around temporary soil stockpiles to prevent erosion and sedimentation. The contractor would maintain positive drainage throughout the construction site to divert runoff to the sediment trap. Seeding and mulching would be used for temporary and permanent soil stabilization.

Minor, long-term impacts would result from an increase in impervious surfaces and disturbance to soil features. An increase in impervious surfaces from the new MRPS and parking lot would diminish natural soil infiltration and associated drainage on a small portion of the TCTA. Long-term stormwater drainage at the TCTA would be accomplished via a storm drain system that would collect stormwater and convey it to a proposed bioretention pond situated north of the MRPS. Outfall from the bioretention pond would be directed to a riprapped drainage ditch down to

Sycolin Creek. Placement of soils, rock, and other fill materials and compaction activities would be pursuant to the engineering and design plans.

The MRPS main deep shaft and tunnels connecting the shaft with the reservoir would be excavated through drill and blast methods. The blasts would be less powerful than those currently used by the Luck Stone operations at the Quarry D and B sites which are between 600 and 1,500 feet from the proposed MRPS, and formerly used at Quarry A which is 1,000 feet from the proposed MRPS. The deep shaft would have a diameter of 34 feet and a depth of 270 feet, resulting in 7,185 cubic yards of rock debris. Additionally, the three tunnels connecting the shaft to the reservoir are anticipated to be 10 feet by 10 feet horseshoe shaped tunnels of various lengths depending on site conditions. Rock debris would be generated through the tunnel blasting with total debris volume dependent on the length of the tunnel. Rock that meets the acceptable criteria would be transferred to Luck Stone Corporation. Any additional non-desirable rock or soil waste would be disposed off-site at a permitted landfill.

The proposed RWTM extension would consist of two new 42-inch pipelines routed north-south across the W&OD Trail between the MRPS and MRBV, and one new 36-inch line for the quarry drain line. One line would fill the quarry reservoir and one line would run from the MRPS back to the MRBV to send water from the reservoir to the TRWTF. The method of construction would be open cut excavation from the ground surface down to the pipe bedding. Depth of excavation varies. The pipe trench would be backfilled, and the area would be restored to original conditions. The W&OD Trail would be temporarily diverted to maintain access throughout construction. The impacts to soils and geology are limited to the excavated areas. Most of the excavated areas would include a soil overburden with rock below. The initial trench would be 13 feet wide at the pipe invert and would be set back to the surface at a 1:1 angle for safety reasons. The pipe bedding would be VDOT No. 78 stone up to 1-foot above the top of the pipe and then suitable bedding material, as defined on the drawings, would be placed up to finished grade.

Subject to FPPA requirements, a consultation was conducted with NRCS, with the determination that Alternative 2 would convert prime farmland and is subject to the FPPA, thus requiring completion of the AD-1006 (Farmland Conversion Impact Rating) form by the federal agency. FEMA completed the AD-1006 form, requested a land evaluation on April 17, 2023, and received the land evaluation response from NRCS on May 16, 2023. Alternative 2 would directly or indirectly convert 7.9 acres or prime farmland and 15.9 acres of farmland of statewide importance. No unique farmland or farmland of local importance would be converted. The relative value of farmland to be converted was rated 47 (on a scale of 0 to 100), while the total site assessment points was 29 (out of 160). Therefore, the combined total score for Alternative 2 was 76 (out of 260). Sites with a total score of less than 160 (out of 260) do not need to be given further consideration for protection and additional sites do not need to be considered. Thus, the completion of AD-1006 meets the compliance requirements for FPPA. The final AD-1006 form is in Appendix C.

Alternative 3 – East Rim Alternative:

The east rim area of the quarry was assessed for suitability for the construction of the QRWPS. The Alternative 3 Project Area would require a substantial amount of regrading within the quarry east rim area to accommodate the QRWPS footprint. Existing grades at the project site range from 242 feet to 260 feet. Regrading would be required to achieve a footprint of approximately 310 feet by 110 feet at an elevation of 256 feet. It is assumed that cuttings would be temporarily stored in piles on site.

A soil survey was completed for the Alternative 3 Project Area. Most of the site is designated as quarry/pit; this is likely a result of historical mining operations comprising much of the site during the original survey period. Soil testing identified the following soil types at the project site: Elbert Silty Loam (0 to 2 % slopes, frequently flooded, 20.2% of site area), Legore Loam (7 to 15 % slopes, very stony, 16.9% of site area), and Catlett gravelly silt loam (10 to 25 % slopes, 1.8% of site area).

Soils within the Alternative 3 Project Area would be disturbed and exposed during construction activities including, clearing, grading, compacting, proof rolling, excavation, and trenching resulting in minor, short-term impacts. These impacts may include soil erosion, soil compaction from stockpiled materials and heavy machinery, water table fluctuation from dewatering activities, and sediment deposition in surface water. Approximately 1.38 acres of impervious surfaces would result in permanent disturbances, in the form of roadway and parking areas, and 1.49 acres of pervious surfaces would be permanently disturbed, totaling 2.86 acres of permanent disturbance. Preliminary geotechnical investigations indicate that existing fill soils are likely not suitable for building foundations, although additional investigation is required. Based on the unsuitable soils for foundations, the primary buildings/structures would be constructed slab on grade.

A VPDES permit would be required due to Alternative 3 disturbing more than 1 acre of land surface. Under the VPDES permit, the project must minimize or prevent soil erosion and sedimentation during construction using an E&S control plan and appropriate BMPs such as grass drainage swales, inlet and riprap outlet protection, a temporary sediment trap, placement of 18-inch compost filter socks, soil stabilization, and maintenance of a stabilized construction entrance. Compost filter socks around temporary soil stockpiles would be used to help prevent erosion and sedimentation. The contractor would maintain positive drainage throughout the construction site to divert runoff to the sediment trap. Seeding and mulching would be used for temporary and permanent soil stabilization.

As with Alternative 2, minor, long-term impacts would result from an increase in impervious surface area and land disturbance. An increase in impervious surface from the new buildings, parking lot, and sidewalk would diminish natural soil infiltration and associated drainage on a small portion of the site. Long-term stormwater drainage at the Alternative 3 Project Area would be accomplished via installation of a box culvert on the north side of the QRWPS site to divert drainage around the pump station. Performance and placement of soils, rock, and other fill materials and compaction activities would be pursuant to the engineering and design plans.

A main shaft and tunnels connecting the shaft with the reservoir would be excavated through drill and blast methods. The blasting operations during construction would be much less powerful than those currently used by the Luck Stone mining operations at the adjacent Quarry B and D sites. The shaft would have a diameter of 34 feet and a depth of approximately 280 feet (equivalent to the surface at 256 feet elevation to -30 feet elevation). Additionally, the three tunnels connecting the shaft to the reservoir are anticipated to be 10 feet by 10 feet horseshoe shaped tunnels of various lengths dependent on-site conditions. Rock debris would be generated through the tunnel blasting with total debris volume dependent on the length of the tunnel. Rock that meets the acceptable criteria would be transferred to Luck Stone Corporation. Any additional non-desirable rock or soil waste would be disposed off-site. Localized quarry rim wall stabilization would be required for Alternative 3.

Alternative 3 was included in the same consultation with NRCS and evaluated on the same AD-1006 form as Alternative 2. Alternative 3 would directly or indirectly convert 6.1 acres of farmland of statewide importance, but would not convert any prime or unique farmland or farmland of local importance. The relative value of farmland to be converted was rated 44 (on a scale of 0 to 100), while the total site assessment points was 19 (out of 160). Therefore, the combined total score for Alternative 3 was 63 (out of 260). Sites with a total score of less than 160 (out of 260) do not need to be given further consideration for protection and additional sites do not need to be considered. Thus, the completion of AD-1006 meets the compliance requirements for FPPA. The final AD-1006 form is in Appendix C.

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, EO 11990 (Protection of Wetlands) requires Federal agencies to avoid, to the extent possible, adverse impacts to wetlands.

A desktop review of the Project Area 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 within the Project Area. Current USFWS National Wetlands Inventory (NWI) data indicate five NWI-mapped resources within the Project Area. These NWI-mapped resources include three riverine wetlands and two freshwater pond wetlands (Appendix A, Figure 6; USFWS, 2021).

The Project Area is located within the Big Branch-Goose Creek (USGS Hydrologic Unit Code [HUC] 020700080702), Sycolin Creek (USGS HUC 020700080703), and Cattail Branch-Goose Creek (HUC 020700080704) Subwatersheds, within the Lower Goose Creek (USGS HUC 0207000807) Watershed, and within the Middle Potomac-Catoctin (USGS HUC 02070008) Subbasin. The nearest surface water resources consist of wetlands and streams identified within or near the Project Area

by previous WOTUS delineation surveys as discussed in Tables 1, 2, 3, and 4. Wetlands and streams identified within the Project Area are discussed in Tables 6 and 7. These aquatic resources drain into Goose Creek followed by the Potomac River, often carrying local stormwater (United States Environmental Protection Agency [USEPA], n.d.).

Wetland Studies and Solutions, Inc. (WSSI) and TNT Environmental (TNT) have completed five WOTUS delineation surveys for larger survey areas that overlapped the Project Area between 2010 and 2022. The resulting reports were dated May 24, 2010, November 26, 2018, August 24, 2020, April 13, 2022, and May 2, 2022. Delineated aquatic resources, including wetlands and waterbodies such as streams or ponds, from these surveys that overlap the Project Area are presented in Appendix A, Figure 7.1. These delineations were conducted in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountain and Piedmont Region (Version 2.0)* (Berkowitz et al., 2012). The Supplement is intended to be utilized in association with the *USACE Wetlands Delineation Manual*. 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). On-site streams were evaluated to determine if they were ephemeral, intermittent, or perennial using methods developed by the North Carolina Division of Water Quality (North Carolina Division of Water Quality, 2010) and the Fairfax County Department of Public Works and Environmental Services (Fairfax County Department of Public Works and Environmental Services, n.d.). Rainfall and climatic conditions were also reviewed prior to the field work using the Palmer Drought Severity Index (Aiguo & National Center for Atmospheric Research Staff (Eds), 2019) and the U.S. Drought Monitor (National Drought Mitigation Center & National Oceanic and Atmospheric Administration, 2022). The May 24, 2010 survey entitled "Waters of the U.S. Delineation, Loudoun Water Intake and Pump Station" (also referred to as the Waterline 2010 survey) included an approximate 22-acre area that overlapped the western portion of the November 2018 survey area, discussed below. The Waterline 2010 survey overlapped approximately 2.7 acres of the Project Area. The coverage area of this delineation is depicted in Appendix A, Figure 7.4.

The November 26, 2018, WOTUS delineation, entitled the "Potomac Water Supply Program Quarry A Waters of the U.S. (Including Wetlands) Delineation Report" (also referred to as the Quarry A survey or report), consisted of an approximately 103.5-acre site, located southwest of Gloucester Parkway, 875 feet southwest of the intersection of Gloucester Parkway and Belmont Ridge Road (State Route 659) in Loudoun County, Virginia. The Quarry A survey overlapped approximately 57.7 acres of the Project Area. The coverage area of this delineation is depicted in Appendix A, Figure 7.4. Twenty WOTUS features were identified within the 103.5-acre delineation area, including five streams (S-1 through S-5) and 15 wetlands (W-1 through W-15). The wetlands were dominated by sassafras (*Sassafras albidum*), red maple (*Acer rubrum*), blackhaw (*Viburnum prunifolium*), Japanese stilt grass (*Microstegium vimineum*), green ash (*Fraxinus pennsylvanica*), blackberry (*Rubus* species), box elder (*Acer negundo*), and/or pawpaw (*Asimina triloba*). Indicators of hydrology that were observed included oxidized rhizospheres along living roots, sediment deposits, drift deposits, sparsely vegetated concave surface, geomorphic position, and facultative-neutral (FAC-neutral) test. Indicators of hydric soils included depleted matrix, redox dark surface,

and loamy gleyed matrix. Two non-jurisdictional features including an ephemeral ditch (E-1) and an erosional drainage feature (E-3), were identified during the survey. E-2, a non-jurisdictional settling basin excavated from uplands, was also identified during the survey but does not overlap the Project Area and is not depicted in Figure 7.1. A summary of all jurisdictional features identified within the report is provided in Table 1. Please refer to the "Potomac Water Supply Program Quarry A Waters of the U.S. (Including Wetlands) Delineation Report" in Appendix F.

Table 1. Summary of WOTUS Features from November 26, 2018, (Quarry A) WOTUS Report

Aquatic Resource	Cowardin Classification[1]	Area (acres)	Linear feet of Streambed	Location Relative to Project Area
S-1	R6	0.003	26	Outside
S-2 (Goose Creek)	R3	0.934	1,075	Within
S-3	R3	0.531	2,080	Within
S-4	R6	0.016	148	Within
S-5	R4	0.185	1,326	Within
W-1	PFO	0.007	N/A	Outside
W-2	PEM	0.015	N/A	Within
W-3	PEM	0.004	N/A	Within
W-3	PSS	0.016	N/A	Within
W-4	PSS	0.007	N/A	Within
W-5	PEM	0.047	N/A	Within
W-5	PFO	0.049	N/A	Within
W-6	PSS	0.016	N/A	Within
W-7	PFO	0.022	N/A	Within
W-8	PFO	0.002	N/A	Within
W-9	PFO	0.023	N/A	Within
W-10	PFO	0.003	N/A	Outside
W-11	PFO	0.017	N/A	Outside
W-12	PEM	0.007	N/A	Outside
W-13	PEM	0.002	N/A	Outside
W-14	PEM	0.049	N/A	Outside
W-14	PFO	0.016	N/A	Outside

Aquatic Resource	Cowardin Classification[1]	Area (acres)	Linear feet of Streambed	Location Relative to Project Area
W-15	PEM	0.032	N/A	Outside
W-15	PSS	0.002	N/A	Outside
Total WOTUS on Site from Quarry A Report:		**2.005**	**4,655**	

[1]R3 = Riverine Upper Perennial, R4 = Riverine Intermittent, R6 = Riverine Ephemeral, PFO = Palustrine Forested Wetland, PSS = Palustrine Scrub-Shrub Wetland, and PEM = Palustrine Emergent Wetland

The August 24, 2020, WOTUS delineation entitled "Wetland Delineation Report Baker Concrete, Loudoun County, Virginia" (also referred to as the Baker Concrete survey or report), consisted of an approximately 18.25-acre area located south of Cochran Mill Road. The Baker Concrete survey overlapped approximately 5 acres of the Project Area. The coverage area of this delineation is depicted in Appendix A, Figure 7.4. Two WOTUS features, including two unnamed intermittent streams (TNT-S1 and TNT-S2), a portion of Sycolin Creek, and a small, forested wetland (TNT-W1), were identified during the survey. The wetland was dominated by box elder, common persimmon (*Diospyros virginiana*), and eastern black walnut (*Juglans nigra*). Indicators of wetland hydrology that were observed included surface water at 2 inches, drainage patterns, and geomorphic position. The hydric soil indicator for depleted matrix was met. Sycolin Creek is classified as upper perennial (R3) and the unnamed tributaries are classified intermittent (R4). There were no other WOTUS features identified in the survey area. A summary of all jurisdictional features identified in the delineation is provided in Table 2. Please refer to the "Wetland Delineation Report Baker Concrete, Loudoun Virginia" report in Appendix F.

Table 2. Summary of WOTUS Features from August 24, 2020 (Baker Concrete) WOTUS Report

Aquatic Resource	Cowardin Classification[1]	Area (acres)	Linear feet of Streambed	Location Relative to Project Area
Sycolin Creek	R3	0.725	1,348	Within
TNT-S1[2]	R4	0.024	180	Within
TNT-S2[2]	R4	0.004	191	Outside
TNT-W1[2]	PFO	0.03	N/A	Within
Total WOTUS on Site from Baker Concrete Report:		**1.522**	**1,719**	

[1]R3 = Riverine Upper Perennial, R4 = Riverine Intermittent, and PFO = Palustrine Forested Wetland

[2]TNT-S1 and TNT-S2 are unnamed tributaries and TNT-W1 is an unnamed wetland, which were not provided unique identifiers in the initial survey report. As such, new identifiers were selected to better refer to these features in this EA.

The April 13, 2022, WOTUS delineation, entitled "Wetland Delineation Report, Webb Property, Loudoun County, Virginia" (also referred to as the Webb Property survey or report) consisted of an approximately 5.5-acre area located south of Cochran Mill Road, at 42217 Cochran Mill Road. The Webb Property survey overlaps approximately 2.6 acres of the Project Area. The coverage

area of this delineation is depicted in Appendix A, Figure 7.4. Two WOTUS features, including one unnamed ephemeral stream (TNT-S3 and TNT-S4) and one non-jurisdictional settling pond (TNT-P8), were identified during the survey. The unnamed stream was classified as ephemeral (R6) and flows beneath an unnamed road through a culvert. There were no other WOTUS features identified in the survey area. TNT P-8 is a non-jurisdictional settling pond, which was not provided a unique identifier in the report; therefore, a new feature identifier, TNT-P8, was assigned to the resource for this EA. A summary of all jurisdictional features identified in the delineation is provided in Table 3. Please refer to the "Wetland Delineation Report, Webb Property, Loudoun County, Virginia" report in Appendix F.

Table 3. Summary of WOTUS Features from April 13, 2022 (Webb Property) WOTUS Report

Aquatic Resource	Cowardin Classification[1]	Area (acres)	Linear feet of Streambed	Location Relative to Project Area
TNT-S3 and TNT-S4	R6	0.014	83	Within
Total WOTUS on Site from Webb Property Report:		**0.014**	**83**	

[1]R6 = Riverine Ephemeral

[2]TNT-S3 and TNT-S4 are portions of the same unnamed stream, which was not provided a unique identifier in the initial survey report. As such, new identifiers were selected as part of this report to better refer to these features.

The May 2, 2022, WOTUS delineation, entitled "Two Creeks Trail Area Waters of the U.S. (Including Wetlands) Delineation Report" (also referred to as the Two Creeks Trail Area survey or report), consisted of an approximately 18-acre area located south of Cochran Mill Road, approximately 0.20 mile southeast of the intersection of Cochran Mill Road and Samuels Mill Court in Loudoun County, Virginia. The TCTA survey overlaps approximately 18 acres of the Project Area. The coverage area of this delineation is depicted in Appendix A, Figure 7.4. Two WOTUS features, including two perennial streams, Goose Creek and Sycolin Creek, were identified during the survey. Both streams were classified as riverine upper perennial (R3). There were no other WOTUS features identified in the survey area. A summary of all jurisdictional features identified in the delineation is provided in Table 4. Please refer to the "Two Creeks Trail Area Waters of the U.S. (Including Wetlands) Delineation Report" in Appendix F.

Table 4. Summary of WOTUS Features from May 2, 2022, WOTUS (Two Creeks Trail Area) Report

Aquatic Resource	Cowardin Classification[1]	Area (acres)	Linear feet of Streambed	Location Relative to Project Area
Sycolin Creek	R3	1.43	2,211	Within
Goose Creek	R3	0.07	180	Within
Total WOTUS on Site from Two Creeks Trail Area Report:		**1.50**	**2,391**	

[1]R3 = Riverine Upper Perennial

Four jurisdictional determinations (JDs) have been issued which confirm the extents of jurisdictional features as determined in the above referenced WOTUS delineations completed by WSSI and TNT. A summary of these JDs is provided in Table 5. Please refer to Appendix F for a copy of the approved JD (AJD), NAO-2022-01240. The Joint Permit Application (JPA) in Appendix F also contains the current valid JDs, including AJDs and preliminary jurisdiction determination (PJD), as an attachment.

Table 5: Jurisdictional Determinations within the Project Area

NAO Project Number	Encompassing Area	PJD or AJD	Issuance Date
NAO-2018-01932	Milestone Reservoir (Quarry A) Parcel	AJD	January 31, 2019
NAO-2020-0277	Baker Concrete	PJD	November 25, 2020
NAO-2021-03200	Webb	AJD	April 15, 2021
NAO-2022-01240	Two Creeks Trail Parcel	AJD	August 23, 2022

A VWP IP (IP #10-2020) for the PWSP was issued November 27, 2012, through a JPA. Surface water impacts were permitted in accordance with the CWA. IP #10-2020 granted Loudoun Water authorization for permanent fill of 0.12 acre of PFO wetlands, 0.14 acre of PEM wetlands, 803 linear feet of stream bed in unnamed tributaries of Tuscarora, Goose, and Sycolin Creeks, and 165 linear feet of streambed in the Potomac River. The permanent conversion of 0.11 acre of PFO wetlands to 0.04 and 0.07 acre of PSS and PEM wetlands, respectively, was also permitted, as well as temporary fill impacts to 0.08 acre of PFO wetlands; 0.30 acre of PEM wetlands; 783 linear feet of streambed in unnamed tributaries of Tuscarora, Goose, and Sycolin Creeks; and 350 linear feet of the Potomac River. No impacts to the Potomac River would occur under the proposed project. As discussed in Section 1.3, the proposed project is the final phase of the PWSP. As such, it should be noted that IP #10-2020 includes authorizations for impacts completed under previous construction phases (i.e., additional portions of Goose and Sycolin Creeks and impacts to the Potomac River and Tuscarora Creek) which are not required or proposed as part of the proposed project.

Goose Creek and Sycolin Creek are listed as impaired under the 2020 305(b)/303(d) Water Quality Assessment Integrated Report (VDEQ, 2020). Goose Creek is impaired for aquatic life due to benthic macroinvertebrate bioassessments, fish consumption due to polychlorinated biphenyls PCBs in fish tissues, and recreation due to bacteria and microbes (*E. coli*). Probable sources of impairment include channel erosion, crop production, rangeland grazing, site clearance for development, livestock grazing and feeding, and sewage discharge from unsewered areas. Goose Creek is listed as a 303(d) impaired water, and as such, the USEPA and VDEQ have prepared a Total

Maximum Daily Load (TMDL) restoration plans for Goose Creek for fecal coliform, *E. coli*, and benthic and macroinvertebrate bioassessments (USEPA, 2020).

Sycolin Creek is impaired for boating and swimming, but its condition is listed as "good" for aquatic life. It is impaired by bacteria and microbes (*E. coli*) sourced from grazing in riparian zones, livestock feeding and grazing operations, and sewage discharge from unsewered areas. (USEPA, 2020). It is not listed as a 303(d) impaired water (USEPA, 2020), but is listed as a water needing a TMDL study (VDEQ, 2020). It is, however, currently incorporated into the 2003 Goose Creek Watershed TMDL to reduce *E. coli* (VDEQ, 2020).

Delineated Aquatic Resources within Alternative 2 – Two Creeks Trail Area:

Approximately 0.02 acre of PFO wetlands (TNT-W1) overlaps the Alternative 2 Project Area. Approximately 193 linear feet (0.028 acre) of an unnamed tributary of Sycolin Creek (TNT-S1) and 130 linear feet (0.15 acre) of Sycolin Creek also overlap Alternative 2 (Appendix A, Figure 7.2). Goose Creek is not within the LOD as the installation of the horizontal tunnels via drill and blast would occur beneath the bed of the stream. An account of total delineated resources (jurisdictional and non-jurisdictional) which are within the Alternative 2 Project Area is provided in Table 6.

Table 6. Summary of Aquatic Resources within Alternative 2 Project Area

Aquatic Resource	Cowardin Classification[1]	Area (acres)[3]	Linear feet of Streambed[3]
Sycolin Creek	R3	0.15	130
TNT-S1	R4	0.03	193
TNT-W1	PFO	0.02	N/A
Total WOTUS within Alternative 2[2]:		**0.20**	**323**

[1]R3 = Riverine Upper Perennial, R4 = Riverine Intermittent, and PFO = Palustrine Forested Wetland

[2]Totals represented in this table represent the dimensions of aquatic features within the Alternative 2 Project Area and is not necessarily indicative of proposed impact totals discussed in Section 3.2.2.

[3]Acreage measurements were rounded to the nearest hundredth and linear feet measurements were rounded to the nearest whole foot. These measurements may therefore not sum to the total area or length.

Delineated Aquatic Resources within Alternative 3 – East Rim Alternative:

Approximately 0.09 acre of PFO wetlands, 0.02 acre of PSS wetlands, and 0.05 acre of PEM wetlands (0.17 acre of wetlands total), and approximately 1,011 linear feet of streams (approximately 0.27 acre) overlap Alternative 3 (Appendix A, Figure 7.3). An account of total delineated resources (jurisdictional and non-jurisdictional) which are within the Alternative 3 Project Area is provided in Table 7.

Table 7. Summary of Aquatic Resources within Alternative 3 Project Area

Aquatic Resource	Cowardin Classification[1]	Area (acres)[3]	Linear feet of Streambed[3]
S-3	R3	0.24	782
S-4	R6	<0.01	60
S-5	R4	0.02	169
W-2	PEM	0.01	N/A
W-3	PSS	0.01	N/A
W-4	PSS	<0.01	N/A
W-5	PEM	0.04	N/A
W-5	PFO	0.05	N/A
W-6	PSS	<0.01	N/A
W-7	PFO	0.02	N/A
W-8	PFO	<0.01	N/A
W-9	PFO	0.02	N/A
E3	N/A	<0.01	N/A – non-jurisdictional feature
Total WOTUS within Alternative 3[2]:		**0.44**	**1,011**

[1]R3 = Riverine Upper Perennial, R4 = Riverine Intermittent, PFO = Palustrine Forested Wetland, and PEM = Palustrine Emergent Wetland
[2]Totals represented in this table represent the dimensions of aquatic features within the Alternative 3 Project Area and is not necessarily indicative of proposed impact totals discussed in the JPA.
[3]Acreage measurements were rounded to the nearest hundredth and linear feet measurements were rounded to the nearest whole foot. These measurements may therefore not sum to the total area or length.

Groundwater

Within Loudoun County, the availability and occurrence of groundwater varies due to the complex geology below the ground surface. Below surficial soil and sediment layers, bedrock occurs at various depths and locations. Within Loudoun County, there are over 60 different rock units, shear zones, igneous instructions, and cut by faults. Fractures and cracks within the bedrock will fill with groundwater if they are located below the water table. The location of these fractures and cracks varies, and therefore, so does the location of available groundwater available for wells (Loudoun County Department of Natural Resources, n.d.). The Project Area consists of existing quarries and recreational forested land; therefore, no significant groundwater use is identified within the Project Area.

The Project Area overlaps the Early Mesozoic Basin Aquifer, which is a sandstone aquifer. Bedding planes are the primary vehicle for groundwater movement in sandstone aquifers; however, vertical movement of groundwater may also occur in fractures and joints. Small pore space in

sandstone limits the hydraulic conductivity of this aquifer, which is low to moderate. Despite the low to moderate hydraulic conductivity, sandstone aquifers expand over large areas and consequently provide large amounts of water (USGS, n.d.b).

The Project Area is also approximately 2.6 miles southwest of the Poolesville Area Aquifer Extension of the Maryland Piedmont Aquifer Sole Source Aquifer (SSA). A SSA supplies at least 50% of the drinking water for its service area, and there are no reasonably available alternative drinking water sources if that SSA becomes contaminated (USEPA, 2015).

Drinking Water

Loudoun Water provides its customers in Loudoun County drinking water from the Potomac River and Goose Creek. The purpose of the proposed project is to increase the water storage capacity of drinking water for residential customers in Loudoun County. Please refer to Section 1.3 for more information regarding drinking water in Loudoun County. Two wells are located along the northern boundary of the Project Area. These wells are for water quality monitoring and do not constitute a drinking water source (Loudoun County Mapping GIS, 2011). Additionally, several individual water wells are located outside of but in the immediate vicinity of Project Area (Loudoun County Mapping GIS, 2011).

Alternative 1 – No Action:

Under the No Action Alternative, no impacts to surface water, groundwater, or drinking water are anticipated. However, adverse impacts to the water system are expected during water impairment events that would restrict water withdrawal from the Potomac River. During an impairment event such as a drought, Loudoun Water's withdrawal volume would be limited. Poor water quality in the Potomac River may prohibit raw water withdrawal altogether. Under the No Action Alternative, during these events, Loudoun Water would be unable to draw upon the quarry reservoir water source to produce drinking water for consumption or local firefighting needs.

Alternative 2 – Two Creeks Trail Area:

Alternative 2 would result in both short-term and long-term impacts to surface waters. Portions of stream TNT-S1 would be temporarily and permanently impacted. Wetland TNT-W1 and a portion of Sycolin Creek would be permanently impacted by construction. Please see Table 6 for information regarding surface waters (wetlands and streams) within the Alternative 2 Project Area which would be impacted.

A modified JPA for WOTUS impacts resulting from Alternative 2 was submitted August 3, 2022 (Appendix F). The JPA proposes major modifications to IP #10-2020, and requests permit authorization under USACE Nationwide Permits (NWPs) and the Virginia Marine Resources Commission (VMRC) for proposed impacts associated with construction within the Alternative 2 Project Area. The proposed modifications to IP #10-2020 consist of a net increase of 0.16 acre (6,808 square feet) of short-term and long-term impacts to jurisdictional wetlands and 307 linear feet of short-term and long-term impacts to jurisdictional streams. Long-term impacts proposed

under Alternative 2 include 0.03 acre (1,349 square feet) of PFO wetlands (TNT-W1), 192 linear feet (1,234 square feet/0.03 acre) of intermittent stream channel (TNT-S1), and 32 linear feet (183 square feet/less than 0.01 acre) of perennial stream channel (Sycolin Creek). Proposed short-term impacts include 83 linear feet (4,024 square feet/0.09 acre) of intermittent stream channel (TNT-S1). Authorization for these impacts was also requested under NWP 33 and NWP 58 for the construction of the temporary access road to the MRPS and for the installation of a waterline, respectively, because these impacts are concurrently jurisdictional to the USACE and VDEQ. A new VMRC permit was requested as part of the JPA due to the expiration date of the current VMRC permit on January 31, 2023. The new VMRC permit application requested authorization for impacts to 146 linear feet (9,916 square feet/0.23 acre) of perennial stream channel jurisdictional to the VMRC. Proposed impacts to WOTUS under Alternative 2 are further described under Section 3.2.2.

Impacts to surface waters from stormwater discharge would comply with the VPDES General Permit VAR-10 for discharges of stormwater from construction activities and the Virginia Stormwater Management Project regulations for post construction stormwater discharges.

No impacts to groundwater or drinking water resources are anticipated under Alternative 2. Due to the proposed implementation and routine maintenance of erosion and sediment control procedures and measures, Alternative 2 is not anticipated to impact the Potomac River or Goose Creek. Indirect impacts to Goose Greek as a result of construction activities are not anticipated. Stochastic weather events, such as heavy rain and storms may cause erosion and sediment control devices to fail; however, the risk of this is mitigated through BMPs, including routine inspections and preventative maintenance on devices such as silt fence. Alternative 2 is not anticipated to impact groundwater sources associated with the Poolesville Area Aquifer Extension of the Maryland Piedmont Aquifer SSA given the Alternative 2 Project Area's distance from the aquifer. Adverse impacts to wells that may provide drinking water is not anticipated. These wells exceed the depth of the planned excavation for the Proposed Action and are over 1,000 feet from Alternative 2. All other wells within the vicinity of Alternative 2 are industrial water wells or water quality monitoring wells (Loudoun County Department of Natural Resources, n.d.). Alternative 2 would have a beneficial impact to local drinking water supplies by establishing an additional water resource that would provide raw water for treatment during periods of drought or during water quality impairments in the Potomac River.

Alternative 3 – East Rim Alternative:

Under Alternative 3, short- and long-term impacts to surface waters would occur. These impacts would be permitted under IP #10-2020, which is valid until November 26, 2027. The impacts were also previously authorized under a now expired NWP 12 (NAO-2010-1844). A new or reauthorized NWP in accordance with the CWA would be required to proceed with Alternative 3. Proposed impacts according to NAO-2010-1844 included 0.56 acre of wetland and stream impacts, which include 1,768 linear feet of stream impacts. Of these impacts, 0.55 acre of streams and wetlands, including 1,677 linear feet of streams, would be permanently impacted. These wetland impacts were calculated based on 30% design drawings and final impacts would likely change through final

design. Proposed impacts to WOTUS under Alternative 3 are further described under Section 3.2.2.

Impacts to surface waters from stormwater discharge would be in compliance with the VPDES General Permit VAR-10 for discharges of stormwater from construction activities and the Virginia Stormwater Management Project regulations for post construction stormwater discharges.

No impacts to groundwater or drinking water are anticipated under Alternative 3. Alternative 3 is not anticipated to impact drinking water sources associated with the Poolesville Area Aquifer Extension of the Maryland Piedmont Aquifer SSA given the distance between Alternative 3 and the aquifer. Wells were not located within the Alternative 3 Project Area (Loudoun County Mapping GIS, 2011). Several individual water wells were located in the immediate vicinity of Alternative 3; however, no adverse impacts to wells that provide potential drinking water are anticipated as they exceed the depth of the planned excavation for Alternative 3 (Loudoun County Department of Natural Resources, n.d.). All other wells within the vicinity of Alternative 3 are industrial water wells or water quality monitoring wells (Loudoun County Department of Natural Resources, n.d.). Alternative 3 would have a beneficial impact to local drinking water supplies by establishing an additional water resource that would provide raw water for treatment during periods of drought or during water quality impairments in the Potomac River.

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. FEMA uses Flood Insurance Rate Maps (FIRMs) to identify properties located within the Special Flood Hazard Area (SFHA).

The community of Loudoun County, Virginia, participates in the National Flood Insurance Program and the Project Area falls within the 100-year (Zone AE) and 500-year (Shaded Zone X) floodplains of Sycolin Creek and the 100-year (Zone AE) floodplain of Goose Creek as indicated in the FIRM, panel # 51107C0235E, for Loudoun County (Appendix A).

FEMA applies the Eight-Step Decision-Making Process to ensure that it funds projects consistent with EO 11988. The NEPA compliance process involves 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 (Appendix B).

A hydraulic model was developed to evaluate potential impacts of the Proposed Action on the effective floodplain of Sycolin Creek. The model, which includes an Existing Conditions model and a Proposed Conditions model, was built using the USACE Hydrologic Engineering Center's River Analysis System. Current Light Detection and Ranging (LiDAR) topography data from the USGS, and the hydrology data and cross-section information from the current FEMA Flood Insurance Study were utilized to create an Existing Conditions hydraulic model for Sycolin Creek. The Proposed Action access road bridge over Sycolin Creek and the proposed floodplain easement

area just downstream of the bridge were 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 Action. The modeling efforts were based on preliminary design drawings and as such are considered an initial evaluation of the effects of the access road bridge and floodplain easement area.

Alternative 1 – No Action:

Under the No Action Alternative, no activities would take place in the established Effective FEMA SFHA.

Alternative 2 –Two Creeks Trail Area:

Under Alternative 2, a 330-foot-long bridge would be constructed over Sycolin Creek north of the TCTA to provide primary access to the proposed MRPS. The proposed bridge would have short-term, minor impacts (less than 3 inches) to the Sycolin Creek Base Flood Elevation values due to the placement of two separate piers. The bridge deck low chord elevation is set to be higher than both the 100- and 500-year water surface elevations, therefore, minimizing the hydraulic impact on the Sycolin Creek floodplain.

To remove impervious area and restore more natural grade in the existing floodplain, a small area on the western shore of Sycolin Creek would be regraded. The total area to be regraded within the floodplain is approximately 0.2 acres.

Loudoun Water prepared a Floodplain Alteration Study (FPAL) that defined impacts to the existing floodplain and submitted it to Loudoun County. Floodplain impacts would require acquisition of an additional easement addressed in the FEMA Conditional Letter of Map Revision (CLOMR) submitted to FEMA on December 15, 2022. The FPAL approval is pending the County's review of the FEMA CLOMR approval. The floodplain easement will authorize the County's use of the area for the expected increase of the water surface elevation due to the placement of the bridge. The easement area would be at the northern margin of Sycolin Creek, near Goose Creek, south to the intersection of Sycolin Creek and the W&OD Trail.

The floodplain impacts due to the bridge and floodplain easement placement are long-term and negligible. The greatest water surface elevation changes, due to the Proposed Action, for the 100-year flood event would be an increase of 0.24 foot at the floodplain easement location and a decrease of between 0.17 foot at the proposed bridge to 0.05 foot at a location approximately 1,000 feet upstream of the bridge. Floodplain delineation changes were also minimal. Figure 8, located in Appendix A, details the proposed Zone AE (100-year floodplain) and Shaded Zone X, 0.2 percent annual chance flood hazard (500-year floodplain) as a result of Alternative 2.

Alternative 3 – East Rim Alternative:

Under Alternative 3, the QRWPS would be located along the existing Quarry A east rim, adjacent to the existing rim access road. Alternative 3 would not adversely impact the established 100-year floodplain (Zone AE) of Goose Creek. There would be no buildings placed within the Zone AE

floodplain. The only proposed features that would be placed within Goose Creek Zone AE floodplain would be a stretch of 285 feet of the perimeter fence northwest of the proposed Milestone Reservoir and 60 feet of the proposed reservoir access ramp, resulting in short-term impacts to a minor floodplain. Those features would not alter the floodplain delineation or change the base flood elevation.

3.1.4 Air Quality

The Clean Air Act requires the USEPA to set National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment. The Clean Air Act establishes two types of national air quality standards: 1- Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly; and 2- Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. Current criteria pollutants are Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Ozone (O_3), Lead (Pb), Particulate Matter (PM_{10} and $PM_{2.5}$), and Sulfur Dioxide (SO_2).

The USEPA evaluates air quality and identifies geographic areas within a state that do or do not consistently meet air quality standards. Areas which consistently do not meet National Ambient Air Quality Standards are identified as nonattainment areas. Loudoun County is currently classified by the USEPA as a non-attainment/marginal area for the 8-hour O_3 standard. For all other federal standards, Loudoun County is in attainment or unclassified (USEPA, 2022a).

To regulate the emissions levels resulting from a project, federal actions located in nonattainment areas are required to demonstrate compliance with general conformity guidelines established in *Determining Conformity of Federal Actions to State or Federal Implementation Plan* (Rule) (40 CFR Part 93). The Rule sets applicability standards for projects through the establishment of *de minimis* levels for annual criteria pollutant emissions. The *de minimis* levels are set according to criteria pollutant nonattainment area designations. Projects below the *de minimis* thresholds are not subject to the Rule.

The *de minimis* thresholds for O_3 precursors Volatile Organic Compounds and Nitrogen Oxides in nonattainment areas are 50 and 100 tons per year, respectively. If a project were to exceed these *de minimis* thresholds, a conformity analysis would be required.

Climate change refers to long-term shifts in temperatures and weather patterns. These shifts may be natural, such as through variations in the solar cycle. But since the 1800s, human activities have been the main driver of climate change, primarily due to burning fossil fuels like coal, oil, and gas. Currently, no standard methodology exists to determine how a project's relatively small incremental contribution to Greenhouse Gases (GHGs) translates into physical effects on the global environment.

Alternative 1 – No Action:

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

Alternative 2 – Two Creek Trail Area:

Implementation of Alternative 2 would result in minor, short-term impacts on overall air quality from construction equipment exhaust, daily worker commute exhaust, delivery exhaust, and fugitive dust generation from construction related activities. After construction is completed, the operation of the MRPS including use of an emergency diesel generator during testing and intermittent emergency use is not expected to exceed the *de minimis* thresholds. Therefore, a conformity determination is not required.

Alternative 3 – East Rim Alternative:

Implementation of Alternative 3 would result in minor, short-term impacts on overall air quality from construction equipment exhaust, daily worker commute exhaust, delivery exhaust, and fugitive dust generation from construction related activities. After construction is completed, operation of the QRWPS including use of an emergency diesel generator during testing and intermittent emergency use would not be expected to exceed these *de minimis* thresholds. Therefore, a conformity determination is not required.

3.2 Biological Environment

3.2.1 Terrestrial and Aquatic Environment

The Project Area is located in a mixed recreational and light industrial/commercial area surrounded by several quarries, businesses, parks/trails, and forested land. It is comprised of predominantly forested land, containing portions of the Old Washington, Old Dominion, and Two Creeks Trail recreation areas and the retired Luck Stone Quarry A. Developed areas associated with Riverbend Sawmill overlap the northern edge of the Project Area, and Goose Creek and Sycolin Creek overlap the central and northern portions of the Project Area, respectively. Forested land within the Project Area associated with the TCTA is contiguous to a larger swath of forested land to the northeast which is currently limited by encroaching development. The Virginia Department of Wildlife Resources (VDWR) did not indicate that terrestrial or aquatic environments were present within the Project Area.

The Project Area likely has limited value for terrestrial plant and wildlife species due to its location within a developed matrix and present use as a recreational trail space/quarry. Although the TCTA likely has some habitat value, it is restricted by nearby habitat fragmentation and regular foot traffic. Potential wildlife that may occur within the Project Area would be typical for those land use types. A typical wildlife community would likely include foraging and nesting passerines as well as foraging raptors; common reptiles (such as several species of salamander, snakes, and turtles); and non-chiroptera mammals including various rodents (rats, mice, squirrels), musteloids (raccoons and skunks), opossums, bats, and feral cats. Goose Creek and Sycolin Creek may contain valuable habitat for aquatic and amphibious species such as frogs and fish (VDWR, 2022).

The dominant vegetation in the forested upland areas of the Project Area consists of boxelder (*Acer negundo*), black walnut (*Juglans nigra*), Virginia rye (*Elymus virginicus*), silky wild rye (*Elymus*

villosus), Japanese stilt grass (*Microstegium vimineum*), American sycamore (*Plantus occidentalis*), blackgum (*Nyssa sylvatica),* multiflora rose (*Rose multiflora*), Chinese privet (*Ligustrum sinense*), roundleaf greenbrier (*Smilax rotundifolia*), Japanese honeysuckle (*Lonicera japonica*), muscadine grape (*Vitis rotundifolia*), pawpaw (*Asimina triloba*), coral berry (*Symphoricarpos orbiculatus*), Japanese bristlegrass (*Setaria faberi*), eastern red cedar (*Juniperus virginiana*), false nettle (*Boehmeria cylindrica*), and autumn olive (*Elaeagnus umbellata*). The dominant vegetation in the wetland forested areas of the Project Area includes sassafras (*Sassafras albidum*), red maple (*Acer rubrum*), blackhaw (*Viburnum prunifolium*), Japanese stilt grass, green ash (*Fraxinus pennsylvanica*), blackberry (*Rubus* sp.), box elder (*Acer negundo*), common persimmon (*Diospyros virginiana*), and pawpaw. The dominant vegetation in the herbaceous upland areas consists of small carpetgrass (*Arthraxon hispidus*), red dead-nettle (*Lamium purpureum*), Pennsylvania smartweed (*Persicaria pennsylvanica*), and unknown grass species (*Poa* spp.)

Alternative 1—No Action:

Under the No Action Alternative, no impacts to terrestrial or aquatic environments would occur.

Alternative 2 – Two Creeks Trail Area:

Under Alternative 2, impacts to terrestrial and aquatic environments, including forested areas and streams and wildlife within, would occur as part of the MRPS development. Approximately 7 acres of land would be developed or disturbed under Alternative 2, including approximately 6 acres of tree-clearing, resulting in long-term, minor impacts. Minimal tree clearing would occur within the Milestone Reservoir area to install the perimeter fencing. Long-term, minor terrestrial impacts to portions of the upland forest community would occur from development of the proposed MRPS.

Wildlife may be adversely affected under Alternative 2 due to habitat loss and overall decline in habitat value from fragmentation which leads to an increase in forest edges. In general, forest edges and disturbed areas constitute poor habitat for many wildlife species, which prefer large swaths of contiguous forest.

Aquatic environments (wetlands and streams) would be permanently and temporarily impacted and/or converted within Alternative 2 as part of the MRPS development. These impacts would be permitted in accordance with the CWA through the Virginia JPA process and would be implemented adhering to permit conditions. Please refer to Section 3.3.2 for additional information regarding the JPA. Long-term, minor impacts to aquatic resources would total approximately 0.03 acre of PFO wetland (TNT-W1) and 194 linear feet of intermittent stream (TNT-S1) to construct a permanent bridge crossing, as well as 32 linear feet of perennial stream (Sycolin Creek) for the installation of outfall protection. Short-term, minor impacts would include impacts to 114 linear feet of perennial stream (Sycolin Creek) to construct a temporary bridge crossing and install a sanitary force main, which would be installed through an existing casing. Short-term impacts may include equipment access and placement of temporary fill materials, and the temporary redirection of stream features while permanent stream crossings are established. Temporary fills within aquatic features would be placed on geo-fabric overlain with clean fill, and all temporary fill materials would be removed at project completion. Short-term impact areas

would be restored to pre-construction grade at the completion of work. Additionally, three 10-foot diameter horizontal tunnels would be installed via drill and blast under Goose Creek. The installation of these tunnels would occur beneath the soil surface and would not result in short-term or long-term impacts to streams or wetlands.

Long-term, minor impacts to aquatic resources are anticipated to total approximately 0.034 acre (224 linear feet) of streams and 0.03 acre of PFO wetlands. In compliance with current permit regulations, compensatory mitigation credits would be purchased from approved mitigation banks as required. Impacts to aquatic resources are, therefore, considered minor. Proposed impacts to aquatic resources, potential permits required, and proposed mitigation measures are discussed further in Section 3.2.2.

Alternative 3 – East Rim Alternative:

Under Alternative 3, impacts to terrestrial and aquatic environments, including forested areas and streams, would occur as part of permitted activities for construction. Long-term, minor terrestrial impacts would be required for the development. Approximately 4 acres of land would be developed or disturbed under Alternative 3, including approximately 1 acre of tree-clearing.

Aquatic environments (wetlands and streams) would be permanently and temporarily impacted and/or converted within Alternative 3. These impacts would be permitted in accordance with the CWA through the Virginia JPA process and would be implemented adhering to permit conditions. Please refer to Section 3.2.2 for additional information regarding NAO-2010-1844 received for Alternative 3. Long-term, minor impacts would include the permanent fill or conversion of PFO and PEM wetlands and unnamed tributaries of Goose Creek to install water transmission lines and construct/alter access roads, and pump stations. Short-term, minor impacts would include temporary fill and/or disturbance of PFO, PSS, and PEM wetlands and an unnamed tributary of Goose Creek. Temporary fills within aquatic features would be placed on geo-fabric overlain with clean fill, and all temporary fill materials would be removed at project completion. Short-term, minor impact areas would be restored to pre-construction grade at the completion of work.

Long-term, minor impacts to aquatic resources would total approximately 0.55 acre of wetlands and streams, including 1,677 linear feet of streams jurisdictional to the USACE and VDEQ. Short-term, minor impacts to USACE and VDEQ aquatic resources would total approximately 0.01 acre of wetlands and 91 linear feet of streams and rivers. Additionally, 14 linear feet (0.04 acre) of permanent stream impacts jurisdictional to VMRC would be required. In compliance with current permit regulations, compensatory mitigation credits would be purchased from approved mitigation banks as required. 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 requires that federal agencies take actions to minimize the destruction, loss, or degradation of wetlands. These actions include ensuring that practicable alternatives are considered and that construction practices minimize harm to wetlands to the extent practicable.

In the pursuit of these goals, agencies shall consider a proposed project's potential to affect the survival and quality of the wetlands by considering factors such as public health and safety, maintenance of natural systems including conservation and habitat diversity, and recreational and cultural land uses in the public interest. 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, previous WOTUS delineations conducted by WSSI and TNT between October 2018 and March 2022 have shown that portions of Sycolin Creek, Goose Creek, unnamed intermittent and ephemeral streams, as well as PFO, PSS, and PEM wetlands, which are under the jurisdiction of the VDEQ, are located within the Project Area (Tables 1 through 4). Four JDs have been issued from the USACE, which together encompass the full Project Area and the WOTUS resources therein. The USACE has provided Preliminary and AJDs (NAO-2002-00277, NAO-2018-01932, NAO-2022-01240, and NAO-2021-03200) corresponding to the areas shown in Appendix F and described in Table 5. Please refer to Appendix F for a copy of the NAO-2022-01240 AJD. The JPA in Appendix F contains an attachment with the current valid JDs.

VWP IP #10-2020, along with an NWP 12 Verification (NAO 2010-1844) and a VMRC Permit (2010-2020) have been issued for previously completed components of the PWSP. Five components of the PWSP have been permitted, constructed, and are in operation. As discussed in Section 1.3, the proposed project is the final phase of the PWSP.

Alternative 1 – No Action:

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

Alternative 2 – Two Creeks Trail Area:

Under Alternative 2, short- and long-term impacts to WOTUS and Waters of the State would occur. Total long-term impacts to WOTUS features are anticipated to consist of 0.03 acre of PFO wetland (TNT-W1), 192 linear feet of intermittent stream (TNT-S1), and 32 linear feet of perennial stream (Sycolin Creek). In accordance with EO 11990, long-term impacts to WOTUS resources would be avoided or minimized to the furthest practical extent. Impacts to wetlands are addressed in the eight-step documentation included in Appendix B.

Loudoun Water submitted a JPA on August 3, 2022, for the MRPS portion of the Alternative 2 Project Area (Appendix F), which would cover all impacts proposed for Alternative 2. As a result of changes to design, the JPA requested major modifications to an existing VWP IP that covered the PWSP and sub-projects. The modifications requested included additional impacts, a new VMRC permit for the PWSP to include Milestone Reservoir and MRPS impacts (the original VRMC permit expired January 31, 2023), and verification under NWP 33 and 58 for the Milestone Reservoir and MRPS. More information on the requested modifications to these permits is provided in Section 3.1.2.

Surface water impacts would be permitted in accordance with the CWA. The JPA proposes a net increase from the impacts authorized under IP#10-2020 of 6,808 square feet (0.16 acre) and 307 linear feet of impacts to jurisdictional WOTUS, including long-term impacts to 1,349 square feet (0.03 acre) of PFO wetlands, 192 linear feet (0.03 acre) of intermittent stream channel, and 32 linear feet (less than 0.01 acre) of perennial stream channel.

Short-term, minor impacts would be necessary to facilitate the proposed stream crossing and install the temporary Sycolin Creek crossing. Short-term impacts associated with temporary construction access would be permitted by the USACE under NWP 33 – Temporary Construction Access and Dewatering. Proposed impacts are shown in the permit application and described in Table 8. Please refer to the permit application (Appendix F) for detailed descriptions of each impact.

Table 8: Wetland Impacts Under Alternative 2

Impact ID	Impact Acreage (Linear Feet/Acres)	Cowardin Classification	Impact Type	Jurisdictional to	Impact Purpose
Impact MR-1	0.03	PFO	Permanent	USACE/ VDEQ	Road/Utility Crossing
	192/0.03	R4			
Impact MR-2	83/0.093	R3	Temporary	USACE/ VDEQ	Cofferdam
Impact MR-3	32/0.004	R3	Permanent	USACE/ VDEQ	Outfall Protection
Impact MR-4	1/<0.001	R3	Temporary	VMRC	Underground Pipe
Impact MR-5	30/0.13	R3	Temporary	VMRC	Underground Pipe

Note: Impact MR-1 contains a combined stream and PFO impact. For clarification purposes, the impact components have been separated according to Cowardin classification in the above table. Source: JPA.

There are no practicable alternatives to impacting wetlands, but most proposed impacts are short-term. A portion of the PFO wetland at Impact MR-1, which would not be cleared but is expected to experience indirect impacts due to fragmentation, has been included within the impact area. No other wetland areas are expected to experience indirect impacts as a result of Alternative 2. Therefore, impacts are minimal and are not expected to reduce the quality or survival potential for wetlands as natural systems and habitat diversity would be maintained.

Construction practices would be implemented to minimize harm to wetlands using E&S plans and BMPs to minimize secondary downstream impacts. Following project completion, all temporary fill materials would be removed, and contours would be adjusted to final grade. Wetland impacts would be avoided or minimized where possible. Compensatory mitigation is not required for NWP 33 activities including short-term impacts from construction access. However, compensatory mitigation consisting of the purchase of 0.06 wetland credits from a mitigation bank approved by VDEQ would be made for long-term impacts to wetlands (0.03 acre, TNT-W1). Should credits not be available for purchase, mitigation bank credits would be purchased from an in-lieu fund. Therefore, Alternative 2 would be in compliance with EO 11990.

Alternative 3 – East Rim Alternative:

Under Alternative 3, short- and long-term impacts to WOTUS and Waters of the State would occur. In accordance with EO 11990, long-term impacts to WOTUS resources would be avoided or minimized to the furthest practical extent. Proposed impacts consist of 0.56 acre of wetland and stream impacts, including 1,768 linear feet of stream impacts. Of these impacts, 0.55 acre of streams and wetlands, including 1,677 linear feet of streams, would result in long-term impacts.

NAO-2010-1844 and IP #10-2020 authorized all long-term and short-term impacts to WOTUS and Waters of the State proposed under Alternative 3 in accordance with the CWA (Appendix F). NAO-2010-1844 expired as of March 18, 2022. IP #10-2020 remains valid until November 26, 2027. Permitted wetland and stream impacts are described in the permit approvals (Appendix F) and are described in Table 9. Please refer to the permit approvals in Appendix F for detailed descriptions of each impact.

Table 9: Wetland Impacts Under Alternative 3

Impact ID	Impact Acreage (Linear Feet/Acres)	Cowardin Classification	Impact Type	Jurisdictional to
Impact QA1	0.04	PFO	Permanent	USACE/ VDEQ
	128/0.02	R4		
Impact QA2	0.02	PSS	Permanent	USACE/ VDEQ
	<0.01	PEM		
	940/0.15	R3		
Impact QA3	0.01	PEM	Permanent	USACE/ VDEQ
	537/0.15	R3		
	72/0.01	R6		
Impact QA4	0.05	PFO	Permanent	USACE/ VDEQ
	<0.01	PSS		
	0.03	PEM		
	91/0.01	CULVERT	Temporary	
Impact QA5	14/0.04	R3	Permanent	VMRC

Note: Impacts QA1-QA4 contain impacts to multiple wetland classes within the same impact. For clarification purposes, the impact components have been separated according to Cowardin classification in the above table. Source: JPA.

It should be noted that wetland impacts for Alternative 3 have not been permitted under the JPA process. Alternative 3 would require an updated JPA permit featuring the proposed impact area estimates in accordance with this revision.

All temporary fill materials would be removed at project completion and contours would be returned to original grade. Required compensatory mitigation would be purchased. Alternative 3 would be implemented consistent with permit conditions, BMPs would be implemented to minimize secondary downstream impacts, and compensatory mitigation would be purchased from

an approved mitigation bank in order to minimize impacts to aquatic resources as much as possible. Therefore, Alternative 3 would be in compliance with EO 11990.

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 and critical habitat. The ESA requires any federal agency that funds, authorizes, or carries out an action to ensure that their action is not likely to jeopardize the continued existence of any endangered or threatened species (including plant species) or result in the destruction of adverse modification of designated critical habitats. Critical habitat is defined in the ESA as specific areas within the geographical extent of the area occupied by the species which are found to contain physical or biological features essential to species conservation and/or may require special management considerations for protection, as well as areas outside of the species range determined essential for species conservation (USFWS, 1973).

Coordination regarding the presence or absence of threatened and endangered species with the USFWS and VDWR in accordance with the ESA or Fish and Wildlife Coordination Act was completed during the preparation of the JPA for the Alternative 2 – TCTA Project Site submitted August 3, 2022 (Appendix F). An additional unofficial resource list generated in January 2023 from IPaC for the Project Area is consistent with these results. Additionally, the VDWR Virginia Fish and Wildlife Information Service (VaFWIS) database was also reviewed for the Project Area to determine any state-listed species with a confirmed species occurrence within 2 miles of the Project Area and is consistent with these results. Given the Project Area encompasses both Alternative 2 and Alternative 3 and these database searches rely on measures of proximity to potential habitat, the threatened and endangered species identified within each Alternative Project Area corresponds to the Project Area results.

Based on the results of the threatened and endangered species consultation, two federally listed endangered species, one state-listed species, one candidate species, and one proposed federally listed endangered species have been identified with the potential to occur within the Project Area. Project review in the USFWS IPaC system indicates that the federally endangered northern long-eared bat (NLEB) (*Myotis septentrionalis*) and dwarf wedgemussel (*Alasmidonta heterodon*) have the potential to occur within the vicinity of the Project Area. The tricolored bat (*Perimyotis subflavus*), a proposed federally endangered species, and the monarch butterfly (*Danaus plexippus*), a candidate species, were also identified. The state threatened green floater (*Lasmigona subviridis)* has been confirmed within a 2-mile radius of the Project Area. A summary of federally listed species with the potential to overlap the Project Area as identified through IPaC project review and state-listed species with a confirmed species occurrence within 2 miles of the Project Area as identified from VDWR VaFWIS database search results is provided below in Table 10.

Table 10: Summary of Federally Listed Species identified through IPaC and State Listed Species Confirmed within 2 miles of the Project Area Identified through the VaFWIS

Federally Listed Species	Listing Status
NLEB	Endangered
Dwarf Wedgemussel	Endangered
Tricolored Bat	Proposed Endangered
Monarch Butterfly	Candidate
State Listed Species	**Listing Status**
Green Floater	Threatened

The green floater is a mussel species which inhabits quiet pools and eddies with gravel and sand substrates in small to medium sized freshwater streams with good to excellent water quality (Kipp et al., 2019). The dwarf wedgemussel typically inhabits running waters of all sizes with slow to moderate flow conditions (New Hampshire Fish and Game Department, n.d.) and are typically found in hydrologically stable areas within a variety of substrates, including gravel, coarse sands, fine sands, and clays where they are often burrowed among the root systems of trees (North Carolina Wildlife Resources Commission, 2022). Suitable habitat for both mussel species may be found within portions of Sycolin and Goose Creeks in the Project Area.

Preferred foraging habitat for the NLEB includes mature forested areas with open understories in proximity to large water bodies. The NLEB may utilize snags, tree cavities, old mines, or dilapidated structures as potential roosting habitat (WI Department of Natural Resources, 2017). Forested areas in close proximity to large water bodies within the Project Area is likely suitable summer-phase habitat for the NLEB. Former regulations regarding the NLEB only enforced a time-of-year restriction (TOYR) on tree-clearing within NLEB summer-phase habitat if the proposed action is within 0.25 miles of a known hibernacula or within 150 feet of a known maternity roost, neither of which have been recorded within Loudoun County. However, the final rule to reclassify the NLEB from threatened to endangered was released on November 29, 2022 and took effect on March 31, 2023. This rule nullified the 4(d)rule and regulations regarding the NLEB were revised. The implementation of a more rigorous TOYR (April 1 through November 14) for tree clearing are now expected.

Tricolored bats overwinter in caves and abandoned mines. In areas where caves are sparse, tricolored bats are known to roost in road-associated culverts. In the spring, summer, and fall, tricolored bats are found in forested areas where they roost in trees, primarily in leaves of live or recently deceased deciduous hardwoods. They may also utilize Spanish moss, pine trees, and occasionally human structures (USFWS ECOS, 2023). On September 14, 2022, the USFWS announced a proposal to list the tricolored bat as endangered under the ESA. As a proposed endangered species, federal agencies must confer with the USFWS if their action would jeopardize

the continued existence of proposed species. The proposed rule would extend ESA take prohibitions to the tri-colored bat, which at its current standing are not afforded to this species, and critical habitat is not regulated (USFWS, 2022).

The monarch butterfly has recently been recognized as endangered by the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, but its habitat is not currently protected under the ESA (Young, 2022). It was upgraded to a candidate for listing under the ESA in December 2020 and the USFWS currently considers protection for this species as "warranted but precluded" by other higher priority species facing greater risk (IUCN, 2022). In its current standing as a candidate species, the monarch butterfly's critical habitat is not currently regulated under the ESA, and no further consultation for the species' habitat is necessary (US National Park Service, n.d.).

The USFWS Information for Planning and Consultation (IPaC) review did not identify any critical habitat within the Project Area.

Similarly, the bat survey does not encompass the full extent of the Alternative 3 Project Area, it is not possible to negate the presence of or impact to bat species under the Alternative 3 without further research or additional information.

Alternative 1 – No Action:

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

Alternative 2 – Two Creeks Trail Area:

Under Alternative 2, there is a potential for construction activities to adversely affect federally and state-listed threatened and endangered species.

Results of a freshwater mussel survey titled "Survey for Protect Freshwater Mussels in Sycolin Creek, Loudoun County, Virginia" conducted in July 2022 (Appendix F), indicates that suitable habitat for both the green floater and dwarf wedgemussel is present within the Alternative 2 Project Area. However, no evidence of species presence was recorded in Sycolin Creek and Goose Creek for either the dwarf wedgemussel or green floater. Surveyors determined that it was "extremely unlikely" that freshwater mussels inhabit the surveyed reach, which includes the extents of Sycolin and Goose Creeks within the Alternative 2 Project Area. Based on the results of this survey, there is a low probability of species presence of either the dwarf wedgemussel or green floater in the vicinity of the Alternative 2 Project Area, and therefore, no impacts to these species are anticipated. TOYRs regarding the green floater mussels would be April 15 to June 15 and August 15 to September 30 for in-stream work in Sycolin Creek and Goose Creek.

In anticipation of the regulatory changes regarding the NLEB, an acoustic bat survey was conducted within the area covered under the TCTA WOTUS delineation, encompassing the mature deciduous forest area within the Project Area, which was identified as having the highest potential for suitable bat species habitat (Appendix F). The results of this survey indicated that there is a

high probability of suitable habitat/species presence of the federally listed NLEB, the proposed endangered tricolored bat, and the state-listed Indiana Bat in the Alternative 2 Project Area. While the Indiana Bat is a state-listed species identified by the habitat survey, it was not identified under the confirmed species occurrence database result within 2 miles of the Project Area according to the VaFWIS, so this species is not included in Table 10. Due to highly probable presence of bat species, including the NLEB, Indiana bat, and tricolored bat, tree clearing associated with Alternative 2 may adversely affect these species. FEMA submitted a Section 7 consultation letter to the USFWS Virginia Ecological Services Field Office on May 5, 2023, for a review of Alternative 2. In this consultation letter, FEMA determined the Proposed Action may affect, but is not likely to adversely affect the NLEB and tricolored bat, and would have no effect on the dwarf wedgemussel. USFWS concurred with these determinations on July 10, 2023 provided that a conservation measure for TOYR for tree clearing (April 1 to November 14) is implemented. Correspondence is included in Appendix C. To minimize adverse effects, VDWR also recommended that TOYRs would likely be required to restrict tree-clearing between April 1 and November 14 (VDWR 2021).

Under Alternative 2, measures would be implemented to minimize potential adverse effects to federally listed and state species by adhering to mandated TOYRs for species with likely presence (NLEB, green floater mussel, and Indiana Bat). In coordination with the USFWS, no additional measures beyond the tree clearing TOYR were identified. Erosion and sediment control measures would be implemented to minimize indirect effects on identified species.

Alternative 3 – East Rim Alternative:

Under Alternative 3, there is a potential for construction to adversely affect federally and state-listed threatened and endangered species.

Freshwater mussel species (dwarf wedgemussel and green floater) may be adversely affected by Alternative 3 construction activities due to the presence of suitable habitat. Habitat surveys have not been conducted for impact areas associated with Alternative 3, so definitive presence or absence of these species is unknown. Without habitat survey data negating the presence of suitable habitat or species occurrences, TOYRs for freshwater mussels would likely need to be implemented. IP #10-2020 specifies a TOYR for in-stream work regarding freshwater mussel species in the Potomac River (April 15 through June 15 and August 15 through September 30). This TOYR would likely be extended to include proposed stream impact areas under Alternative 3. Alternative 3 construction areas would not include Sycolin Creek but would include the unnamed tributary located to the east of the QRWPS.

Alternative 3 construction activities would avoid a majority of the mature deciduous forest that comprises the suitable habitat for the NLEB, tricolored bat, Indiana bat, and other bat species. Tree clearing would still be required in various areas for Alternative 3. Approximately one acre of tree clearing is proposed, which would result in potential adverse effects to these species. Habitat surveys have not been conducted for relevant areas of tree clearing associated with Alternative 3, so definitive presence or absence of these species or their habitat is unknown. Without habitat

survey data negating the presence of suitable habitat or species occurrences, as well as Alternative 3's close proximity to the Alternative 2 Project Area in which these species were confirmed, TOYRs would likely be required to restrict tree-clearing between April 1 and November 14, as required by USFWS and recommended by VDWR to minimize adverse effects from Alternative 2 (VDWR, 2021; USFWS, 2023).

Under Alternative 3, measures would be implemented to minimize potential adverse effects to state and federally listed species by adhering to mandated TOYRs for species with likely presence (dwarf wedgemussel, green floater, Indiana Bat, tricolored bat, and the NLEB). Additional recommendations or requirements may be identified during USFWS coordination.

3.2.4 Migratory Birds

The Migratory Birds Treaty Act (MBTA) of 1918 (16 U.S.C. §§ 703-712) implements four international conservation treaties that the U.S. entered into with Canada, Mexico, Russia, and Japan to ensure the sustainability of populations of protected migratory bird species (USFWS, n.d.). All native migratory birds, including waterfowl, shorebirds, passerines, hawks, owls, vultures, and falcons are afforded protection under the MBTA.

The MBTA makes it illegal to take, possess, import, export, transport, sell, purchase, barter, or offer for sale any migratory bird or the parts, nests, or eggs of such a bird except under the terms of a valid Federal permit (50 CFR Subchapter B, Part 10) (USFWS, n.d.). Take is defined to include any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof (USFWS, n.d.). The Migratory Bird Treaty Reform Act of 2004 amended the MBTA by clarifying that the act applies only to those species which are native to the U.S. and its territories, and defines a native species as one that is present as a result of natural biological or ecological processes (USFWS, n.d.). The Bald and Golden Eagle Protection Act affords additional protections to all bald and golden eagles.

The IPaC tool identified 10 migratory bird species with the potential to occur within the Project Area which are on the USFWS Birds of Conservation Concern list, as well as the bald eagle (*Haliaeetus leucocephalus*). These species include the black-billed cuckoo (*Coccyzus erythrothalmus*), cerulean warbler (*Dendroica cerulea*), chimney swift (*Chaetura pelagica*), Kentucky warbler (*Oporornis formosus*), king rail (*Rallus elagans*), prairie warbler (*Dendroica discolor*), prothonotary warbler (*Protonotaria citrea*), red-headed woodpecker (*Melanerpes erythrocephalus*), rusty blackbird (*Euphagus carolinus*), and the wood thrush (*Hylocichla musteline*). Table 11 provides a summary of these species and their basic habitat requirements.

Table 11: MBTA Species Identified within the Project Area and their Habitat Requirements

Species Name	Habitat Requirements
Black-billed cuckoo	• Prefers densely wooded eastern forests and thickets. • Found most often in mixed hardwood forest areas.
Cerulean warbler	• Prefers to breed in large tracts of older deciduous forest and nest on north and east facing slopes

Species Name	Habitat Requirements
	• Typically avoid red oak and red maple for nesting
Chimney swift	• Utilize urban and suburban habitats with high concentrations of chimneys for nesting but may also nest in caves and tree cavities
Kentucky warbler	• Breeds in lowland hardwood forests near streams with a dense understory • Requires large tracts of forest habitat (over 1,200 acres) for nesting
King rail	• Breed in freshwater and low-salinity brackish marshland • Prefers specifically shallow marshes with patches of deeper, open water
Prairie warbler	• Breeds in shrubby habitats with open canopies and forest/prairie border areas • Have been known recently to utilize strip-mine soil ridges
Prothonotary warbler	• Breed in flooded bottomland forests, wooded swamps, and forests near lakes and streams. • Avoid forest patches smaller than 250 acres
Red-headed woodpecker	• Breed in deciduous woodlands and areas with open forest conditions (forest edges, orchards, burned areas, grasslands with scattered trees) • During the start of the breeding season, they move from forest interiors to forest edges or disturbed areas
Rusty blackbird	• Breeds in wet forests including areas with fens, bogs, and beaver ponds
Wood thrush	• Breeds throughout mature deciduous and mixed forests. • Somewhat successful in fragmented forests if enough suitable trees (preferred 50+ feet tall) are present
Bald eagle	• Nest in forested areas adjacent to large bodies of water. • Avoids heavily developed areas

Habitat information for MBTA species identified in Table 11 is available at the Cornell Ornithology Laboratory's All about Birds website (The Cornell Ornithology Lab, 2022).

Migratory Birds in Alternative 2:

All identified migratory bird species with the potential to occur within the Project Area are also identified within the Alternative 2 Project Area. Of these species, suitable habitat is likely only present for the chimney swift, prairie warbler, red-headed woodpecker, wood thrush and the bald eagle in the area covered by Alternative 2. If present, the wood thrush, chimney swift, and red-headed woodpecker may utilize fragmented forested areas and disturbed areas within the Alternative 2 Project Area. If present, the prairie warbler may find suitable habitat at the edge of the quarry because of the species' recorded use of strip-mine ridges. Bald eagles have been known to utilize disturbed areas and may find suitable habitat within the Alternative 2 Project Area due to proximity to water resources, but no bald eagle nests were identified within 3 miles of Alternative 2 by VaFWIS. The open forest habitat preferred by the woodpecker was not found in the vicinity of the Alternative 2 area, therefore, the woodpecker's presence is unlikely.

The fragmented and heavily foot-trafficked nature of the forested area within the Alternative 2 Project Area is not likely suitable habitat for the black-billed cuckoo, cerulean warbler, or the Kentucky warbler, which require dense forest conditions and/or large tracts of unfragmented forested areas. The king rail, prothonotary warbler, and rusty blackbird prefer wet forest to swampy/marshland conditions, which is not found within the Project Area or its immediate vicinity.

Migratory Birds in Alternative 3:

All identified migratory bird species within the Alternative 3 Project Area were identified under Migratory Birds in Alternative 2. Suitable habitat within the Alternative 3 Project Area is likely only present for the chimney swift, prairie warbler, red-headed woodpecker, wood thrush and the bald eagle. If present, the wood thrush, chimney swift, and red-headed woodpecker may utilize fragmented forested areas and disturbed areas within the Alternative 3 Project Area. If present, the prairie warbler may find suitable habitat at the edge of the quarry because of the species' recorded use of strip-mine ridges. Bald eagles have been known to utilize disturbed areas and may find suitable habitat within Alternative 3 due to proximity to water resources. However, no bald eagle nests were identified within 3 miles of Alternative 3 by VaFWIS. The open forest habitat preferred by the woodpecker is not found within the Alternative 3 Project Area, so its presence is unlikely.

Most of the Alternative 3 Project Area is partially disturbed/cleared land, which is not suitable habitat for the black-billed cuckoo, cerulean warbler, or the Kentucky warbler, which require dense forest conditions and/or large tracts of unfragmented forested areas. The king rail, prothonotary warbler, and rusty blackbird prefer wet forest to swampy/marshland conditions, which is not found within the Alternative 3 Project Area or its immediate vicinity.

Alternative 1 – No Action:

Under the No Action Alternative, no impacts to migratory birds would occur.

Alternative 2 – Two Creeks Trail Area:

Under Alternative 2, potential impacts to migratory birds are anticipated to be short-term and negligible. The bald eagle, red-headed woodpecker, and all other migratory birds are unlikely to be adversely affected given low probability of species presence.

If these species are present within the Alternative 2 Project Area and mitigation is absent (i.e., no TOYR for tree removal specific to migratory birds), Alternative 2 may adversely affect the wood thrush, chimney swift, and prairie warbler due to habitat disturbance. However, any potential adverse effects are expected to be negligible and short term in duration during tree clearing that would occur during the 15-day period prior to the April 1st NLEB TOYR for tree clearing.

Alternative 3 – East Rim Alternative:

Alternative 3 would have the same impacts as Alternative 2. However, with only one acre of tree clearing proposed, potential adverse effects to migratory bird species (if present) as a result of habitat loss from tree clearing would be minimal.

3.3 Hazardous Materials

Databases maintained by the USEPA and the VDEQ were reviewed to evaluate the past and present environmental condition for the Project Area. Database listings for the Project Area were

searched within radiuses consistent with environmental due diligence conformance standards per the American Society for Testing and Materials. The search identified no Superfund sites, and two Resource Conservation and Recovery Act Corrective Action sites within 1 mile of the Project Area (USEPA, 2022b, 2022c). Both Resource Conservation and Recovery Act sites generate small quantities of waste (CVS Pharmacy #4296, 0.3 tons in 2013; LCPS – Belmont Station Elementary School, small quantity generator) and are not located within the Project Area. No state listed hazardous waste sites or petroleum releases were identified within a 0.5 mile of the Project Area (VDEQ, 2022b).

There are no underground storage tanks or aboveground storage tanks currently located within the Project Area (USEPA, 2022d). The USEPA Enforcement and Compliance History Online database did not identify any USEPA statute violations within the Project Area (USEPA, 2022e). The VWP IP #10-2020 states no hazardous materials would be disposed of at the Project Area.

Alternative 1 – No Action:

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

Alternative 2 – Two Creeks Trail Area:

Under Alternative 2, water treatment chemicals would be stored in tanks located in the MRPS. Diesel fuel would be stored in a designated tank located adjacent to the MRPS. Chemical storage and diesel fuel storage would include provisions for secondary containment. 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 construction and implementation of Alternative 2 would be disposed of and handled in accordance with applicable local, state, and federal regulations. Alternative 2 would result in no impacts from potential contamination with the provisions for secondary containment that would avoid potential adverse impacts.

Alternative 3 – East Rim Alternative:

Under Alternative 3, water treatment chemicals would be stored in tanks located in the QRWPS, which would be on the east rim of the Milestone Reservoir. Given the proximity of the tanks to the Milestone Reservoir, measures would be in place to protect against any water contamination. Diesel fuel would be stored in a designated tank adjacent to the QRWPS and would also include secondary containment. 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 construction and implementation of the Alternative 3 would be disposed of and handled in accordance with applicable local, state, and federal regulations. Alternative 3 would result in no impacts from potential contamination with the provisions for secondary containment that would avoid potential adverse impacts.

3.4 Socioeconomics

3.4.1 Zoning and Land Use

The proposed project is located in an unincorporated area of Loudoun County, Virginia. The Project Area includes portions of the tax parcels identified in Table 12.

Table 12: Property Owners within the Project Area

Parcel Identification Number (PIN)	Property Owner
114256156	Luck Stone Corporation & Luck Towers LLC
151377403	Luck Stone Corporation
151490112	Loudoun Water
116490941	Northern Virginia Regional Park Authority
151488568	Cochran Mill Twin Creeks 4 LLC
151491670	Cochran Mill Twin Creeks 5 LLC
151494358	Cochran Mill Twin Creeks LLC

The Project Area is primarily zoned by Loudoun County as part of the Mineral Resource/Heavy Industry Zoning District (Appendix A, Figure 9). This designation is further defined as "diabase resource extraction operations (quarries) co-located with compatible heavy industrial uses" (Loudoun County, 2014b). Smaller sections of the Project Area are zoned as Planned Development-General Industrial and Joint Land Management Area-3, and additional zoning in the surrounding vicinity includes Agricultural/Residential and Single Family Residential-1.

The Project Area also overlaps with the Loudoun County Quarry Notification (QN) Overlay District and the Floodplain Overlay District. The QN Overlay District encompasses all parcels within 3,000 feet of a property approved for quarrying operations, regardless of active blasting work. This District exists to acknowledge the unique impact of quarries on neighboring land uses and codifies the need to notify property owners of neighboring quarry activities. The Floodplain Overlay District is a mapped zone comprised of Loudoun County's Major Floodplain and Minor Floodplain. The Major Floodplain is based on FEMA's SFHA (typically with a minimum drainage area of 1 square mile), and the Minor Floodplain continues upstream (typically with a drainage area of 100 acres up to 1 square mile).

Regarding specific land usage, the Project Area supports the retired Luck Stone Quarry A, as well as the former TCTA and a short stretch of the W&OD Trail. Both Goose Creek and Sycolin Creek, along with associated tributaries, cross the Project Area. A Conservation Easement held by the Virginia Outdoors Foundation and Goose Creek Scenic River Advisory Board is in place immediately west of the W&OD Trail, along the banks of Goose Creek.

Alternative 1 – No Action:

Under the No Action Alternative, there would be no project-related changes to zoning or land use patterns in the Project Area. The Luck Stone Quarry A would not be repurposed for water storage and, thus, would remain in its inactive state for an unknown duration. If no action is taken, it is

possible that the quarry could be redeveloped in the future for a use consistent with its current zoning (Mineral Resource/Heavy Industry) or for an alternate use requiring a variance.

Alternative 2 – Two Creeks Trail Area:

Alternative 2 is expected to cause long-term, negligible changes to zoning/land use in the Alternative 2 Project Area. Ultimately, the technical land use of the existing Quarry A area would shift to water storage, but the area's industrial nature would remain. There would also be a land use change from recreation to water storage use at the TCTA site, with the development of the site to support storage infrastructure, including the MRPS, in lieu of recreational trails. However, the function of the neighboring W&OD Trail as a significant recreational amenity would remain the same. In the immediate work area at the RWTM trail crossing, the W&OD Trail would be temporarily diverted to the north and south of the existing trail for 325-feetl to provide continued and safe public access along the Trail during construction. Post-construction, the W&OD Trail would be returned to its pre-construction condition after completion of work activities.

The Alternative 2 Project Area is designated as part of the QN Overlay District, indicating the potential for blasting work to surrounding properties. As such, any required blasting for the RWTM installation (discussed under Section 2.2) would not represent a deviation from accepted and known uses. Overall, the scope of work for Alternative 2 is permitted under existing zoning with special exceptions. An application for Special Exceptions to the Revised 1993 Loudoun County Zoning Ordinance was submitted early in project development, and was approved by the Loudoun County Board of Supervisors on April 12, 2010. Under this approval, the vegetation around the proposed Milestone Reservoir is permitted to satisfy buffer requirements in lieu of the standard Type Four Buffer described by the Zoning Ordinance. Specifically, vegetation equivalent to 7 acres of tree canopy coverage – to be supplemented through additional plantings approved by an urban forester if needed – is permitted to fulfill buffer requirements. The special exceptions, as approved by the Board of Supervisors, also authorize the following: repurposing of the quarry for water storage under the use "water storage tank" for the Mineral Resource/Heavy Industry Zoning District and consideration of the proposed project as a "structure or use required for the operation of a public facility" for the Floodplain Overlay District. No additional exceptions to the Zoning Ordinance are proposed under Alternative 2, and all conditions accepted as part of the approval from the Loudoun County Board of Supervisors are set to be observed. The Special Exceptions application and associated approval are included in Appendix F. Therefore, this alternative would have no adverse impact on land use or zoning.

***Alternative 3* – East Rim Alternative:**

Alternative 3 would have the same overall layout as that discussed for Alternative 2. The primary difference would be construction of the proposed QRWPS along the east rim of the proposed Milestone Reservoir, requiring regrading to bring the elevation of the area to approximately 250 feet. Construction work would not impact the Loudoun County Conservation Easement. However, the tunnel crossing south of the W&OD Trail bridge for the RWTM alignment would require an easement from the Virginia Outdoors Federation. The same types of Special Exceptions to the

Loudoun County Zoning Ordinance, as described under Alternative 2, would apply to Alternative 3. As such, the impacts to zoning and land use associated with Alternative 3 would be comparable to those anticipated for Alternative 2.

3.4.2 Visual Resources

Visual resources at the Project Area include the view of the waters and natural areas associated with Goose Creek, existing views within and of the TCTA, and Sycolin Creek and surrounding areas. While the Project Area is located adjacent to Goose Creek and other associated natural areas, it does not obstruct views of these areas from adjacent parcels as it is not in the line-of-sight. Views from adjacent properties are generally obstructed by forested areas or topography. Further, the other properties immediately adjacent to Goose Creek are heavily industrialized with the construction of large quarries, and as such, much of the scenic integrity has been lost. In order to protect the viewsheds in this area, Loudoun County has instituted a Scenic Creek Valley Buffer which limits above ground construction within 250 feet of the Goose Creek waterline. This project would comply with the Loudoun County Scenic Creek Valley Buffer requirements. Unobstructed views of Goose Creek in the vicinity of the Project Area are only available from the W&OD Trail, which runs alongside the majority of the south side of the Project Area before crossing Goose Creek.

Alternative 1 – No Action:

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

Alternative 2 – Two Creeks Trail Area:

Under Alternative 2, there would be short-term, minor impacts during construction activities. Construction activities would be visible from the W&OD Trail during winter months; however, heavy vegetation during spring and summer would decrease visibility from the W&OD Trail. Portions of the MRPS would be visible from the W&OD Trail. However, the proposed design includes several elements to minimize impacts including lowering the MRPS site elevation relative to the Trail, vegetative buffers, plantings, and berming. Currently, the TCTA is undeveloped and long-term, minor impacts are expected from development of the site including the addition of lighting under the Proposed Action. Alternative 2 would not be in a position to obstruct views of Goose Creek from the north because Goose Creek is located to the east of this heavily wooded area. Alternative 2 would also not obstruct or otherwise impact the views of the Goose Creek area from the W&OD Trail. Further, the scenic integrity of Goose Creek and its associated natural areas has previously been diminished due to the construction of large quarries and other industrial and commercial development to the northwest and southeast.

Alternative 3 – East Rim Alternative:

Under Alternative 3, there would be short-term, minor impacts during construction activities and long-term, moderate impacts given the pump station location and visibility from the W&OD Trail. Minor impacts from the addition of site lighting are also expected. Vegetation coverage would be

limited. Alternative 3 would take place within an area formerly used as a quarry and would not obstruct views of Goose Creek or any other resources. Further, the scenic integrity of Goose Creek and its associated natural areas has previously been diminished due to the construction of the large quarries and other industrial and commercial development in the vicinity, and this alternative would not introduce any new visual impacts to the setting.

3.4.3 Noise

Noise is generally defined as undesirable sound and is federally regulated by the Noise Control Act of 1972. Although, the Noise Control Act 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. There are no state, county, or local numerical sound level limits that apply to the proposed project (except time restriction limits); Loudoun County's Noise Ordinance (Chapter 654.02) suggests that unreasonable noises should be avoided and provides time restrictions on operation of machinery, equipment, pump, fan, or similar equipment between the hours of 11:00 p.m. and 7:00 a.m.

The Project Area is mainly surrounded by industrial and commercial land uses. The closest sensitive receptor to the Alternative 2 Project Area is the W&OD Trail located just south of the pump station; the trail is located more than 0.5 miles west of the Alternative 3 Project Area. The closest residences are located approximately 3,800 feet east of Alternative 2 Project Area, along VA State Route 659 near the intersection with Gloucester Parkway and intersection with Belmont Station Drive. The closest residences to the Alternative 3 Project Area are located approximately 1,530 feet east of the construction area. There are no schools, hospitals, or nursing homes within 1 mile of the Alternative 2 and Alternative 3 Project Areas.

Alternative 1 – No Action:

Under the No Action Alternative, there would be no change to existing noise levels. Therefore, no impacts to noise would occur.

Alternative 2 – Two Creeks Trail Area:

Under Alternative 2, noise impacts from construction would be short-term and limited to the duration of construction activities. The closest sensitive receptor to the Alternative 2 Project Area is the W&OD Trail located west of the proposed MRPS (less than 500 feet). There are no residences located within 0.5 miles of the TCTA site. Construction activities at the TCTA site, including movement of delivery trucks and construction of the Sycolin access road and bridge, would result in short-term noise increases at the W&OD Trail. However, people using the W&OD Trail would only experience intermittent noise increases for a short time when they are passing. Noise would also be generated during blasting and rock hammering at the TCTA site. As the closest residential properties are located approximately 3,800 feet east of the proposed construction area (near the intersection of VA State Route 659 and Gloucester Parkway), noise from blasting activities, rock

hammering, and other the construction equipment would be reduced significantly and barely perceptible to these residences. Construction activities would be performed during the day and at night with shaft excavation and tunneling as the primary night activities. The equipment and machinery used at the site would be required to meet all local, state, and federal time restriction limits for noise produced by construction activities.

After construction is completed, the operation of the MRPS would not increase the ambient noise level of the surrounding area. Noise from the shaft housing and the four submersible vertical pumps, would not be noticeable at the closest noise-sensitive receptors. The emergency diesel generator usage at the MRPS would be intermittent (i.e., for periodic testing and during a power outage). The generator would be specified with a sound attenuating enclosure for minimum noise impact. Trucks delivering supplies to the MRPS during operations and maintenance would generate intermittent noise in the immediate vicinity, particularly along the W&OD Trail. However, because the area already experiences noise from an active quarry to the south (Quarry B), the noise impacts from intermittent truck traffic to/from the TCTA site are not expected to be significant. Therefore, long-term impacts to noise levels in the surrounding area are anticipated to be minor.

Alternative 3 – East Rim Alternative:

Under Alternative 3, noise impacts from construction would be short-term and limited to the duration of construction activities. There are a few noise-sensitive receptors located within 0.5 miles of the QRWPS. The W&OD Trail is adjacent to the Alternative 3 Project Area. People using the W&OD Trail would only experience intermittent noise increases for a short time when they are passing. Noise would also be generated during blasting and rock hammering at the Alternative 3 Project Area. The closest noise-sensitive receptors are residential properties located approximately 1,530 feet east of the proposed construction area (near the intersection of VA State Route 659 and Belmont Station Drive), allowing for some attenuation of the construction noise. At this distance (1,530 feet), noise from the blasting activities, rock hammering, and other construction equipment would be reduced significantly and barely perceptible to these residences. Construction activities would be performed during the day and at night with shaft excavation and tunneling as the primary night activities. The equipment and machinery used at the site would be required to meet all local, state, and federal time restriction limits for noise produced by construction activities.

After construction is completed, the operation of the QRWPS would not increase the ambient noise level of the surrounding area. Noise from the shaft housing, the four submersible vertical pumps, would not be noticeable at the closest noise-sensitive receptors. The emergency diesel generator usage at the QRWPS would be intermittent (i.e., for periodic testing and during a power outage) and would be specified with sound attenuating enclosure for minimum noise impact. Trucks delivering supplies to the QRWPS during operations and maintenance would generate intermittent noise in the immediate vicinity. However, because the area already experiences noise from active quarry operations to the south and because truck traffic to/from the Alternative 3

Project Area would be intermittent, impacts are not expected to be significant. Therefore, long-term impacts to noise levels in the surrounding area are anticipated to be minor.

3.4.4 Public Services and Utilities

Public services in the Project Area include schools, fire and rescue departments, police, and other community resources (e.g., recreation). Utilities in the Project Area includes water, electric, natural gas, sanitary sewer, storm water systems, and others.

The Project Area overlaps with two separate school zones, both of which are divided into elementary, middle, and high schools. The closest fire station is Ashburn Station 22, operated by the Ashburn Volunteer Fire and Rescue Department as part of the Loudoun County Combined Fire and Rescue System. The Project Area east of Goose Creek is part of the Lansdowne First Due Area for Fire and Emergency Medical Service (EMS) Response, under the jurisdiction of Ashburn Station 22. The Project Area west of Goose Creek is part of the Leesburg First Due Area for Fire Response, under the jurisdiction of Leesburg Station 20, and EMS jurisdiction is split between Leesburg and Lansdowne. An additional fire station, Ashburn Station 6, is located near the Project Area and includes a 24/7 advanced life support ambulance. The nearest hospital is Inova Loudoun Hospital located at 44045 Riverside Parkway, Leesburg, Virginia 20176 (about 4 miles from Project Area).

The presiding law enforcement patrol sector for the Project Area is the Loudoun County Sheriff's Department. The Ashburn Station of the Loudoun County Sheriff's Department is located at 20272 Savin Hill Drive (about 5 miles from Project Area). Recreation amenities in the immediate area include the W&OD Trail and, formerly, the TCTA.

In terms of existing utilities, major transmission/distribution power lines operated by Dominion Energy, Inc. run along the W&OD Trail, and a telecommunications tower is located approximately 0.5 miles southeast of the Project Area at 43069 Builders Lane. As previously discussed, an existing 42-inch RWTM conveys water from the Potomac Raw Water Pump Station to the Trap Rock Water Treatment Facility, which connects to the existing MRBV south of the W&OD Trail. A number of stormwater structures (e.g., stormwater pipes, inlets, manholes, underground detention features, etc.) are located in a self-storage facility lot about 0.8 miles from the Project Area off Belmont Ridge Road, and further stormwater structures (including stormwater ponds) are located among the residential communities across the roadway. Additionally, a number of private drinking water wells, drain fields, and Loudoun Water fire hydrants occur in neighboring areas, and three active water quality monitoring wells occur within the Project Area.

The Property Information Map, included as Drawing No. C203 (Appendix A), displays existing utility easements and lease areas in the immediate proposed project vicinity. These include the existing Virginia Electric and Power Company (subsidiary of Dominion Energy, Inc.) distribution line easement, a Nextel Communications lease area, a 40-foot Washington Gas easement, and others.

Alternative 1 – No Action:

Under the No Action Alternative, no disturbance of existing utilities would occur. However, the No Action Alternative would result in continued potential for limitations on the availability of drinking water in the event of restrictions to the raw water supply from the Potomac River during a severe drought or source water quality issues. The need to keep using the Potomac River during high turbidity events would present treatment challenges with higher chemical usage and an increase in the production of treatment residuals.

Alternative 2 – Two Creeks Trail Area:

Alternative 2 would involve connection of the proposed Milestone Reservoir and associated components (e.g., MRPS) to the existing Loudoun Water supply system, as well as installation of new utilities. It is anticipated that Alternative 2 would have the long-term, beneficial impact of improving the quality and consistency of the public water supply, primarily by increasing the reliability of water access and reducing the impacts of contamination events. Completion of the Milestone Reservoir and its tie-in would require construction work (e.g., excavation, trenching, blasting, crane operation) with the potential to encounter existing utilities in the area, such as existing power lines and underground piping. To minimize this risk, an 811 call would be placed to ensure a comprehensive mark-out of public utilities at least 48-hours prior to ground disturbance. Additionally, the project team would communicate directly with utility providers with easements and/or lease areas in the Alternative 2 Project Area vicinity and review any available site plans for utility placement. The project team would also coordinate with public authorities to manage traffic and minimize conflict with services, such as emergency transport and recreation, over the course of construction work. As previously discussed, the TCTA would be converted from recreation to water storage use, while the W&OD Trail would be preserved, and public access maintained through construction via a minor, short-term diversion. No long-term, adverse impacts to utilities are expected to result from Alternative 2.

Alternative 3 – East Rim Alternative:

Alternative 3 would also involve connection of the proposed Milestone Reservoir and associated components to the existing Loudoun Water supply system, along with installation of new utilities. Therefore, Alternative 3 would improve the public water supply by increasing the quality and consistency of drinking water access. As with Alternative 2, completion of the Milestone Reservoir and its tie-in would require construction with the potential to encounter existing utilities. The risk for utility impacts is slightly greater under Alternative 3, given the need for significant regrading and other work along the quarry east rim in the area of the existing gas easement to complete the QRWPS construction. An 811 call would be placed to ensure mark-out of utilities is conducted at least 48-hours prior to ground disturbance, and the project team would coordinate with both utility providers and public authorities to minimize potential conflicts. Easements would be required for the construction of a new waterline out to Belmont Ridge Road. Additionally, the sanitary sewer connection for Alternative 3 would involve a disruptive crossing of Belmont Ridge Road and require discharge to a sanitary sewer manhole located in a residential neighborhood.

Ultimately, Alternative 3 would avoid the impacts to recreation at the TCTA site associated with Alternative 2 but would have a greater impact to utilities.

3.4.5 Traffic and Circulation

The Loudoun County Department of Planning has developed traffic analysis zones for the county. The traffic analysis zones for the Project Area (Numbers 2287, 2293, and 2294) are depicted as having a low population and associated traffic density. The closest major roadway is Belmont Ridge Road (State Route 659), approximately 0.8 miles from the center point of the Project Area. This is a secondary State highway managed by the Virginia Department of Transportation (VDOT) and is heavily used by suburban commuters. In the immediate Project Area vicinity, Belmont Ridge Road is comprised of two northbound lanes and two southbound lanes.

The Project Area is not included as part of a transit station or Metrorail service district. The closest Loudoun County Park & Rides are in Leesburg, with two locations limited to carpool/vanpool options. Additional local bus stops are located near State Route 7. There are plans to increase public transit accessibility through new/modified metro connection bus routes as part of the Metrorail Silver Line, but the immediate Project Area appears outside the planning scope.

The heaviest pedestrian traffic in the proposed project vicinity stems from the recreation areas (i.e., TCTA and the W&OD Trail). There is a public parking lot for the W&OD Trail located off Jackpit Lane.

Alternative 1 – No Action:

Under the No Action Alternative, no impacts are expected. No construction-related traffic (e.g., from equipment, personnel vehicles) or operation-related traffic would be generated. Existing traffic patterns and circulation would remain the same with minor increases in traffic volumes associated with growth and development in the region.

Alternative 2 – Two Creeks Trail Area:

Under Alternative 2, short-term, minor impacts are expected during construction activities with traffic including heavy construction equipment and delivery of materials. Alternative 2 would include the construction of an access road and bridge over Sycolin Creek to an identified industrial zone. Access road and bridge design features would be rated highway loading-93 and would provide permanent access to the MRPS. Once the pump station is in operation, it is anticipated that these features would be subject to limited routine use restricted to site vehicles. Use of the access road is expected to peak during the construction period, and a minor localized surge in traffic volume is also expected on Cochran Mill Road and surrounding roadways, including the heavily traveled Belmont Ridge Road. As part of the planning process, the project team would consult with the appropriate authorities (e.g., VDOT, County Planning, local police, local school systems) to ensure that traffic is appropriately managed over the course of construction. For example, any lane closures would be planned in advance to minimize conflicts with local transportation, such as school bus routes, and appropriate safety measures (e.g., signage, traffic

cones, flaggers) would be employed. Additionally, advance notice would be provided regarding any temporary closures or other access restrictions to public amenities (e.g., trails, parking facilities). No long-term disruptions to existing traffic patterns are expected; however, long-term, minor impacts are expected due to traffic for maintenance operations.

Alternative 3 – East Rim Alternative:

Under Alternative 3, short-term, minor impacts are expected during construction activities. The route for the construction equipment and materials would pass through the W&OD Trail parking area, located off Belmont Ridge Road along Jackpit Lane. This parking area, used by the public for access to recreational activities along the trail, would be subjected to increased hauling for blasted rock, concrete and other construction materials. During operations, long-term, moderate impacts are expected with the traffic for utility access and chemical deliveries needing to be routed through the parking area. Overall, Alternative 3 is anticipated to have greater impacts to traffic patterns than Alternative 2.

3.4.6 Environmental Justice (Executive Order 12898)

Executive Order 128898 directs federal agencies "to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States." Socioeconomic and demographic data for the Project Area were analyzed using USEPA's Environmental Justice Screening and Mapping Tool (known as EJScreen) to determine if a disproportionate number of minority or low-income persons have the potential to be adversely affected by the proposed project.

The affected environment of this environmental justice (EJ) analysis is an area within a 1-mile radius of the center of the Project Area, which is the geographic area where project-related impacts, including noise, transportation, and water and air quality impacts, could occur potentially causing a disproportionately high and adverse impact on surrounding minority and low-income populations. For this analysis, minority and/or low-income populations exist if either or both of the following criteria are met: 1) the minority and/or low-income population within the affected environment equals or exceeds the 50th percentile compared to the statewide average, and 2) one or more of the EJScreen Environmental Justice Indexes (known as EJ Indexes) for the affected environment equals or exceeds the 80th percentile compared to the statewide average. EJScreen includes 13 EJ Indexes reflecting environmental indicators that consider air quality, traffic, hazardous wastes and pollutants, proximity to environmental risks, underground storage tanks, and wastewater dischargers, combined with socioeconomic indicators that consider minority and low-income populations, unemployment, language spoken, education level, and age.

The affected environment has a population of 1,144 and population density of 364 people per square mile as reported by USEPA's EJScreen, which uses data from the U.S. Census Bureau's American Community Survey 2017-2021 5-year Summary. The per capita income was $68,499 and 8% of the population is low-income. Slightly more than half of the affected environment identified as white (55%) with the next largest groups being Asian (34%), Two or More Races (10%), and

Black (2%). Approximately 64% of the affected environment spoke English at home, while the remainder (36%) spoke a language other than English. Approximately 71% of the population was 18 years and older (USEPA, 2023). Based on the criteria identified above for EJ populations, the affected environment includes minority and low-income populations due to the minority population exceeding the 50th percentile compared to the statewide average (65th percentile) and the Superfund Proximity exceeding the 80th percentile compared to the statewide average (83rd percentile).

For comparison, Loudoun County had a population of 420,959 in 2020 with a population density of 795 people per square mile. The median household income in the County was $153,506 and the poverty rate was 3.5%. Most of the County population identified as white (53.7%). The next largest groups were Asian alone (21.3%), Two or More Races (10.6%), and Black or African American (7%). Approximately 68.3% of the County population was English speaking only and 31.7% of the population spoke a language other than English. The average age of residents in Loudoun County was 37.6 years old, with 68.7% of the population 18 years and older (U.S. Census Bureau, 2020).

Alternative 1 – No Action Alternative:

Under the No Action Alternative, Quarry A would not be converted to a water storage reservoir for the Loudoun Water system and surrounding EJ communities would not experience impacts from construction. As such, the issues that currently impact the Loudoun Water service area, including the potential for potable water outages due to drought and contamination, would persist. Implementation of conservation measures and limitations on the availability of potable water would potentially adversely impact all Loudoun Water customers and, therefore, would not have a disproportionately high or adverse impact on EJ communities.

Alternative 2 – Two Creeks Trail Area:

Alternative 2 is not expected to generate any significant adverse impacts to EJ communities in the immediate Alternative 2 Project Area, affected environment, or larger service area. An increase in construction noise, traffic, and airborne pollution in the form of exhaust/airborne dust/other particulate matter may result from the proposed construction work (e.g., excavation, blasting) and associated equipment. However, this increase is anticipated to be temporary and localized primarily to the work area through use of control measures (e.g., dust suppression, monitoring, appropriate coverage of staging spaces, etc.). In the long-term, Alternative 2 is expected to benefit identified EJ communities by improving the reliability of the public drinking water supply.

Alternative 3 – East Rim Alternative:

Alternative 3 is not expected to generate any significant adverse impacts to EJ communities in the immediate Alternative 3 Project Area, affected environment, or larger service area. An increase in construction noise, traffic, and airborne pollution in the form of exhaust/airborne dust/and other particulate matter may result from the proposed work and associated equipment. However, this increase is anticipated to be temporary and localized primarily to the work area through use of

control measures (e.g., dust suppression, monitoring, appropriate coverage of staging spaces, etc.). In the long term, Alternative 3 would benefit identified EJ communities by improving the reliability of the public drinking water supply.

3.4.7 Safety and Security

To minimize risks to safety and human health, construction activities must be performed using qualified personnel trained in the proper use of the appropriate equipment. Additionally, activities must be conducted in a safe manner in accordance with the standards specified in Occupational Safety and Health Act (OSHA) regulations. EO 13045, Protection of Children from Environmental Health Risks and Safety Risk, 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 a 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).

Per WebLogis mapping, the Project Area is located in a steep slope zone, indicating increased fall potential. Recreational amenities, namely the W&OD Trail and associated parking, currently provide public access to certain portions of the Project Area. However, the quarry itself is fairly isolated by physical barriers (e.g., dense vegetation, steep sidewalls, etc.). Moreover, the W&OD Trail is paved, clearly demarcated with signage, and separated from the quarry by vegetation. No mapped remediation sites or recognized pollutant sources are present within the Project Area.

Alternative 1 – No Action:

Under the No Action Alternative, no construction work would be performed at the existing quarry. Thus, potential safety risks associated with construction (e.g., excessive noise, equipment hazards) would not be a factor resulting in long-term, moderate impacts. However, if no action is taken, existing hazards at the quarry site (e.g., steep slopes, uneven terrain) may progress due to lack of routine use and maintenance, and any further hazard investigations planned under the project scope would not occur. The lack of additional fencing would leave the quarry site hazards exposed to the public. Additionally, water supply limitations during periods of drought may pose public safety risks, both in terms of drinking water availability and availability of water for other emergency purposes (e.g., firefighting), especially if compounded by adverse environmental conditions (e.g., prolonged drought).

Alternative 2 – Two Creeks Trail Area:

Under Alternative 2, access to the Alternative 2 Project Area would be properly restricted through fencing, signage, and other precautions. As previously discussed, the proposed work would result in the permanent restriction of access to the TCTA. Construction-related noise would be considered, and equipment would be selected to minimize noise impacts wherever possible. The Milestone Reservoir would be enclosed by new fencing and security lighting, and regular maintenance and security checks would be performed during its operation providing a net improvement to site safety. All access and storage features would be appropriately designed and

rated for secure handling of expected materials (e.g., chemicals, construction equipment). All activities would be conducted in a safe manner in accordance with OSHA regulations, and personal protective equipment (PPE) and monitoring devices would be selected based on current site conditions, site history, and any identified hazards in the surrounding area. To prevent impacts during blasting, construction workers and members of the public would be kept at a safe distance from the events, would be implemented. Given the identified steep slopes, fall risk and uneven terrain would also be assessed prior to construction work, and appropriate fall protection equipment would be employed.

As a result of the above, Alternative 2 would result in long-term, beneficial impacts to safety and security in improving slope and terrain stability and providing security measures.

Alternative 3 – East Rim Alternative:

Alternative 3 would occupy the same area for the Milestone Reservoir as discussed under Alternative 2. Work would still occur in the steep slope zone, requiring particular attention to fall risk/uneven terrain and selection of appropriate fall protection equipment. Likewise, Alternative 3 would still require an evaluation of construction-related noise and minimization of noise impacts wherever possible. All activities would be conducted in a safe manner in accordance with OSHA regulations, and PPE and monitoring devices would be selected based on current site conditions, site history, and any identified hazards in the surrounding area. To prevent impacts during blasting, construction workers and members of the public would be kept at a safe distance from the events.

Access to the Alternative 3 Project Area would be properly restricted through fencing, signage, and other precautions. The proposed Milestone Reservoir would be protected through several measures including routine maintenance and security checks, additional security fencing, new security lighting, the existing vegetative buffer, and other structural and administrative barriers – and all reservoir features would be appropriately designed for secure handling of anticipated materials (e.g., chemicals, equipment). As a result of the above measures, Alternative 3 would result in long-term, beneficial impacts to site safety, and no notable adverse impacts to safety and security are expected.

3.5 Historic and Cultural Resources

Section 106 of the National Historic Preservation Act 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 the National Historic Preservation Act of 1966 are referred to as the Section 106 process. According to 36 CFR Part 60.4, historic properties are districts, sites, buildings, structures, and/or objects that are listed in, or meet the criteria to be eligible for listing in the National Register of Historic Places (NRHP). In accordance with the 36 CFR Part 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 of areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." In consultation with the appropriate State Historic

Preservation Officer (SHPO) and/or Tribal Historic Preservation Officer (THPO) or representatives of Tribal Nations (Tribes), federal agencies must evaluate the identified cultural resources or historic and archeological 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.

The APE for this undertaking is defined as a 69-acre area comprising Quarry A east of Goose Creek and the former TCTA located west of Goose Creek, as well as the area's immediate viewshed. The LOD is 11 acres, including 7 acres within the former TCTA area and 4 acres within the Quarry A area, as shown in Appendix A, Figure 2. The *Phase I Archeological Investigation of the Loudoun Water Proposed Pump Station and Water Transmission Line*, was conducted adjacent to the west side of the Project Area by Thunderbird Archeology in 2010, overlapping the Project Area north of Sycolin Creek and at the Project Area's western border. No resources were recorded within the Project Area as a result of this investigation. In July 2022, FEMA conducted an archive search of the Virginia Cultural Resource Information System (V-CRIS) for the APE. In July 2022, Thunderbird Archaeology completed a Phase IB Cultural Resources Investigation for Milestone Reservoir on approximately 16.8 acres of the Milestone Reservoir property; in December 2022, additional shovel testing was conducted at three geotechnical boring locations that were originally outside the Proposed Action LOD. A summary of these results and subsequent Section 106 processes is provided below.

FEMA evaluated the undertaking's (Alternative 2 - Proposed Action) potential effects to historic resources through consultation with the Virginia State Historic Preservation Officer (VA SHPO)-tribes with ancestral lands in the APE. The following tribes have ancestral lands in the APE: the Catawba Indian Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, and Monacan Indian Nation. A summary of research and survey results and the consultation process is provided below.

FEMA consulted with the VA SHPO and Tribes in three rounds to 1) initiate consultation after archaeological survey and geotechnical testing occurred, 2) disseminate updated archaeological survey results , and 3) to consult on the full proposed construction phase of the undertaking (Alternative 2 – Proposed Action). In November 2022 FEMA sent an initial consultation letter to the VA SHPO and the THPOs for the Catawba Indian Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, and Monacan Indian Nation. The Delaware Tribe of Indians chose not to participate in continuing consultation for this project in a letter dated December 2, 2022. All other parties agreed to engage in consultation for the Proposed Action. In February 2023 FEMA sent all consulting parties the updated Phase IB Cultural Resources Investigation for Milestone Reservoir in a letter that concluded there was 'No Adverse Effect to Historic Properties'. On February 21, 2023, VA SHPO concurred with no adverse effect to historic resources. On March 17, 2023, the Catawba Indian Nation responded with "no immediate concerns with regard to traditional cultural properties, sacred sites or Native American archaeological sites within the boundaries of the proposed project areas." No response was received from the Eastern Shawnee Tribe of Oklahoma or the Monacan Indian Nation.

In June 2023, FEMA sent a final consultation letter addressing the undertaking (Alternative 2 – Proposed Action). The recommendation was "No Adverse Effect to Historic Properties". On July 12, 2023, VA SHPO concurred with "no adverse effect". On July 18, 2023, the Catawba Indian Nation responded with "no immediate concerns with regard to traditional cultural properties, sacred sites or Native American archaeological sites within the boundaries of the proposed project areas. However, the Catawba are to be notified if Native American artifacts and / or human remains are located during the ground disturbance phase of this project." On July 19, 2023, the Monacan Indian Nation responded that they do "not have any comments or recommendations at this time. We do request that if any inadvertent discoveries are made during the duration of the project, such as indigenous remains or artifacts, that the Tribe be notified immediately." No response was received from the Eastern Shawnee Tribe of Oklahoma as of July 21, 2023. Concurrence from the Eastern Shawnee Tribe of Oklahoma is assumed as more than 30 days have passed from initial consultation and no response was received from a follow-up email dated July 12, 2023. All correspondences are included in Appendices C and D.

3.5.1 Historic Structures

A review of V-CRIS identified one NRHP-eligible resource, the W&OD Railroad Historic District (053-0276), within and immediately adjacent to the Project Area. The W&OD Railroad Historic District has been previously determined eligible for NRHP listing under Criterion A, for its association with commerce and transportation in the last half of the 19th and first half of the 20th centuries. The extant contributing elements consist of the W&OD Railway alignment, grading, bridge, culverts, and depots (VDHR 2022). Of these contributing features, the Goose Creek Bridge, the highest and longest on the route (278 feet long) is located within the direct APE. Additionally, a segment of the original railway alignment, now a pedestrian and bike path, is within the direct APE.

Alternative 1 – No Action:

Under the No Action Alternative, there is no new undertaking. Therefore, Section 106 does not apply and there is no potential to affect historic properties.

Alternative 2 – Two Creek Trail Area:

Under Alternative 2, the APE is approximately 69 acres (Alternative 2 Project Area) and its surrounding viewshed, and the LOD is 11 acres total. The W&OD Trail is located mostly outside of the LOD along its southwest side; however, the LOD and the NRHP-eligible resource (W&OD Railroad Historic District [053-0276]) intersect where two 42-inch raw water transmission mains would be installed across the W&OD Trail through excavation and trenching. The area surrounding the W&OD Railroad Historic District has seen extensive industrial development, including nearby quarries, which has significantly compromised the viewshed of the resource in the immediate vicinity of the APE. As such, there would be no adverse effect to the resource. The current project design for the W&OD Trail crossing includes the open cut installation of two proposed 42-inch RWTMs, fiber communications, and electric power. The trench width would be 40-45 feet at the surface at a depth of 10-15 feet. Additionally, approximately 325 linear feet of the W&OD Trail

would be impacted for the installation a temporary bypass around the construction work in order to allow continued public access to the trail. Phasing of the work would also facilitate continued public access to the trail. Relative to other construction methods, the phased approach for the open cut installation offers improved safety, reduced time of trail diversions, and improved constructability.

The proposed work also includes measures to monitor existing structures during the construction process as well as measures to monitor the geotechnical stability of the quarry reservoir after it is placed into service. To monitor the existing bridge along the W&OD Trail that crosses Goose Creek during construction, the following temporary measures are proposed: 1) two small (10-inch x 4.63-inch x 4.25-inch) seismographs would be placed next to each of the bridge piers on either side of Goose Creek to measure ground vibrations, 2) three small (30-millimeter) survey markers would be placed on the bridge deck to monitor movement, 3) three small (5.94-inch x 2.00-inch x 1.44-inch) reflective lens prisms would be temporarily affixed to the structural steel beneath the bridge decking to measure movement, and 4) several crack monitoring gages (number and location to be determined) would be affixed to the structure to detect and record the possible movement of cracks in the structure. These temporary monitoring methods would be utilized to confirm there is no damage to the existing structure during construction. Additional permanent monitoring methods are proposed to ensure the geotechnical integrity of Milestone Reservoir post-construction. The instrumentation includes five sets of vibrating wire piezometers and inclinometers set in small (4.5-inch) bore holes located on Luck Stone or Loudoun Water property adjacent to the W&OD Trail. Electrical power would be supplied through small conduits routed underneath the W&OD Trail and not visible from the ground surface. Following construction, the W&OD Railroad Historic District (Trail) and surrounding area would be restored to their original condition. As such, Alternative 2 is expected to have No Adverse Effect on the NRHP-eligible W&OD Railroad Historic District. FEMA's consultations with the VA SHPO and consulting Tribal Nation THPOs is described above and the correspondences can be found in Attachments C and D. The conclusion of the consultation is a finding of 'No Adverse Effect to Historic Properties'. Consultation was concluded on July 21, 2023.

Alternative 3 – East Rim Alternative:

Potential impacts to cultural resources under Alternative 3 were considered and approved under NAO-2010-1844 (Appendix F). This permit expired as of March 18, 2022. IP #10-2020 is valid until November 26, 2027. The original JPA (December 2010) determined that the proposed work on the reservoir site would take place entirely within the currently disturbed footprint of the quarry and, therefore, there would be no impacts resulting from construction. Alternative 3 would also include measures to monitor existing structures during the construction process as well as measures to monitor the geotechnical stability of the quarry reservoir after it is placed into service. To monitor the existing bridge along the W&OD Trail that crosses Goose Creek during construction, the following temporary measures are proposed: 1) two small (10-inch x 4.63-inch x 4.25-inch) seismographs would be placed next to each of the bridge piers on either side of Goose Creek to measure ground vibrations, 2) three small (30-millimeter) survey markers would be placed on the bridge deck to monitor movement, 3) three small (5.94-inch x 2.00-inch x 1.44-inch) reflective lens

prisms would be temporarily affixed to the structural steel beneath the bridge decking to measure movement, and 4) several crack monitoring gages (number and location to be determined) would be affixed to the structure to detect and record the possible movement of cracks in the structure. These temporary monitoring methods would be utilized to confirm there is no damage to the existing structure during construction. Additional permanent monitoring methods are proposed to ensure the geotechnical integrity of the quarry reservoir post-construction. The instrumentation includes five sets of vibrating wire piezometers and inclinometers set in small (4.5-inch) bore holes located on Luck Stone or Loudoun Water property adjacent to the W&OD Trail. Electrical power would be supplied through small conduits routed underneath the W&OD Trail and not visible from the ground surface. Current project designs of Alternative 3 include boring of a tunnel shaft beneath the W&OD Railroad Historic District. While boring methods would introduce a temporary and minor vibrational and auditory impact to the W&OD Railroad Historic District, project activities would not introduce any permanent or long-term impacts that would affect the resource's integrity or significance, and the resource and surrounding area would be restored to their previous condition after construction is complete. As such, Alternative 3 is expected to have No Adverse Effect on the NRHP-eligible W&OD Railroad Historic District.

3.5.2 Archaeological Resources

According to a preliminary search of V-CRIS, one previously recorded archaeological site, a prehistoric camp site (44LD0197), is located adjacent to the southeast corner of the Project Area, outside of the LOD. According to previous site information, material culture was deeply buried and recovered between 2.30 and 3.28 feet below the ground surface. Site 44LD0197 has not been previously evaluated for NRHP eligibility. Phase IB archaeological investigations were conducted by Thunderbird Archaeology in 2022 that encompass the entire current Project Area. No cultural resources were identified within the Project Area as a result of these investigations. Shovel testing within the boundary of Site 44LD0197 at the north bank of Goose Creek recovered a single fence staple approximately 2 feet below the ground surface, suggesting that the previous ground surface has been buried. Shovel testing on the south bank of Goose Creek indicated the area has been previously disturbed by quarry activities and only yielded late 20th century refuse. No elements of Site 44LD0197 were found within the Project Area.

Alternative 1 – No Action:

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

Alternative 2 – Two Creek Trail Area:

Alternative 2 would include horizontally drilled tunnels that extend from the MRPS beneath Site 44LD0197 and Goose Creek. This disturbance would occur approximately 100 feet below the ridgetop and 75 feet below the floodplain within the borders of Site 44LD0197. As this activity would occur far below the archaeological resource, it is anticipated that Alternative 2 would have No Adverse Effect on the site and no further work is recommended. 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. The known archaeological resource is outside of the LOD, and no construction work is anticipated in this area. FEMAs consultations with the VA SHPO and consulting Tribal Nation THPOs is described above and the correspondences can be found in Attachments C and D. The conclusion of the consultation is a finding of 'No Adverse Effect to Historic Properties'. Consultation was concluded on July 21, 2023. As a condition on all FEMA grants, if ground disturbing activities occur during construction, the applicant would monitor ground disturbance and if any potential archaeological resources are discovered, the applicant would immediately cease construction in that area and notify the State and FEMA to allow for additional Section 106 consultation.

Alternative 3 – East Rim Alternative:

Potential impacts to archaeological resources under Alternative 3 were considered and approved under NAO-2010-1844 (Appendix F). This permit expired as of March 18, 2022. IP #10-2020 remains valid until November 26, 2027. The original JPA (December 2010) determined that the proposed work on the reservoir site would take place entirely within the currently disturbed footprint of the quarry and therefore there would be no impacts resulting from construction. The JPA permit authorized installation of a new QRWPS and transmission line for raw water connecting to the MRBV.

3.5.3 Tribal Coordination and Religious Sites

EO 13175 (Consultation and Coordination with Indian Tribal Governments) directs federal agencies "to establish regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, to strengthen the U.S. government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes…."

Coordination was started with federally recognized tribal nations with potential interests in the proposed project. On November 4, 2022, FEMA initiated consultation on Phase 1 of the proposed project (geotechnical testing) with the following tribal nations: Catawba Indian Nation, Delaware Tribe of Indians, Eastern Shawnee Tribe of Oklahoma, and Monacan Indian Nation. FEMA sent a letter to each tribal nation with a brief description of the proposed project and associated geotechnical testing, the proposed project location and a map of the geotechnical boring locations, and a proposal that a Phase IB (subsurface) archaeological survey be conducted in the vicinity of three boring locations. The letter requested that each tribal nation provide a response indicating if they would participate in the consultation and agree to the proposed archaeological survey. Responses were received from all four tribal nations and the VA SHPO by December 15, 2022. The Catawba Indian Nation, Eastern Shawnee Tribe of Oklahoma, Monacan Indian Nation, and VA SHPO agreed to the proposed archaeological survey. Additionally, the Catawba Indian Nation stated they had no concerns regarding known traditional cultural properties, sacred sites, or Native American archaeological sites and the Eastern Shawnee Tribe of Oklahoma found the proposed work had No Adverse Effect to known sites. The Delaware Tribe of Indians declined to

comment on the proposed project and future phases of the project. Correspondence with the tribal nations is provided in Appendix D.

Alternative 1 – No Action:

Under the No Action Alternative, no impacts are anticipated.

Alternative 2 – Two Creek Trail Area:

Under Alternative 2, no adverse impacts are anticipated.

Alternative 3 – East Rim Alternative:

Under Alternative 3, no adverse impacts are anticipated. However, if Alternative 3 is selected, three of the tribes have requested to be consulted.

3.6 Comparison of Alternatives

The following table summarizes the potential impacts analyzed for the No Action Alternative, Alternative 2, and Alternative 3. The primary impact for the No Action Alternative is a continued potential for insufficient raw water supply when water withdrawal restrictions are in place during drought or water impairment events. The major difference between Alternative 2 and Alternative 3 is the location of the pump station (i.e., TCTA vs. East Rim) with both having long-term beneficial impacts to drinking water supply and quality.

Table 13 Summary of Environmental Impacts

Affected Environment	No Action	Alternative 2 (TCTA)	Alternative 3 (East Rim)	Mitigation
Geology, Seismicity and Soils	• No short-term impacts. Normal weathering and erosion process. No FPPA compliance requirements.	• Long-term, minor impacts from addition of impervious surface and ground disturbance. • Short-term impacts for ground disturbance during construction activities. • VPDES Permit required; 2.67 acres disturbed. • No FPPA compliance requirements.	• Long-term, minor impacts from addition of impervious surface and ground disturbance. • Short-term impacts for ground disturbance construction activities. • VPDES Permit required; 2.85 acres disturbed. • No FPPA compliance requirements.	• E&S Control Plan. • BMPs.
Water Resources and Water Quality	• Adverse impacts to the drinking water system, restricted water withdrawal from Potomac River in drought or water impairment events.	• Long-term, beneficial impacts to drinking water. • Short-term and long-term, beneficial, minor impacts to water resources.	• Long-term, beneficial impacts to drinking water. • Short-term and long-term, beneficial, minor impacts to water resources.	• E&S Control Plan. • BMPs. • Compliance with VPDES General Permit VAR-10.
Floodplain Management	• No activities within established Effective FEMA SFHA.	• Short-term, minor impacts to major floodplain of Sycolin Creek. • Long-term, negligible impacts in establishing a floodplain easement on adjacent properties.	• Short-term impacts to a minor floodplain. • FPST and FPAL would be required.	• Impacts to floodplain would be consistent with National Flood Insurance Program requirements.

Affected Environment	No Action	Alternative 2 (TCTA)	Alternative 3 (East Rim)	Mitigation
		• Short-term, minor impacts to the Base Flood Elevation. • CLOMR requested.		
Air Quality	• No impact.	• Short-term, minor impacts during construction.	• Short-term, minor impacts during construction.	• Construction BMPs, such as wet methods to contain fugitive dust.
Terrestrial and Aquatic Environment	• No impact.	• Long-term, minor impacts to 11 acres disturbed, including 6 acres of tree clearing. • Long-term, minor terrestrial impacts. • Short-term, minor impacts to aquatic resources: 0.22 acre (114 linear feet) of stream. • Long-term, minor impacts to aquatic resources: 0.03 acre (224 linear feet) of streams and 0.03 acre PFO wetlands.	• Long-term, minor impacts to 4 acres disturbed, including 1 acre of tree-clearing. • Long-term, minor terrestrial impacts. • Short-term, minor impacts to aquatic resources: 0.01 acre (91 linear feet) of streams and 0.01 acre of wetlands. • Long-term, minor impacts to aquatic resources: 0.37 acre (1,691 linear feet) of streams and 0.18 acre wetlands.	• Removal of all temporary fill and return contours to pre-construction conditions. • Compliance with permit conditions. • TOYRs.
Wetlands	• No impact.	• Long-term impacts to 0.03 acre of wetlands (192 linear feet of intermittent stream channel). • Short-term, minor impacts for stream crossing and RWTM infrastructure.	• Long-term impacts to 0.55 acres of streams and wetlands (1,677 linear feet of streams).	• Removal of all temporary fill and return contours to pre-construction conditions. • Compliance with permit conditions.

Affected Environment	No Action	Alternative 2 (TCTA)	Alternative 3 (East Rim)	Mitigation
Threatened and Endangered Species	• No impact.	• Negligible impacts during construction activities. • May affect, but not likely to adversely affect NLEB and tricolored bat. • No effect on dwarf wedgemussel. • Long-term, minor impacts for tree-clearing.	• Same as Alternative 2. • Effect on threatened and endangered mussel species is undetermined without a survey.	• TOYRs. • BMPs. • USFWS coordination.
Migratory Birds	• No impact.	• Short-term, negligible impacts.	• Same as Alternative 2.	• None Required
Hazardous Materials	• No impact.	• No impact.	• No impact.	• BMPs. • Secondary containments.
Zoning and Land Use	• No impact.	• Long-term, negligible impacts on land use with existing industrial use patterns.	• Same as Alternative 2.	• Not applicable.
Visual Resources	• No impact.	• Short-term, minor impacts during construction activities. • Long-term, minor impacts to lighting around property area. • Long term, moderate impacts with visibility from the W&OD Trail.	• Short-term, minor impacts during construction. • Long term, minor impacts to lighting around the property area. • Long-term, moderate impacts with visibility from W&OD Trail.	• Reduce site grading relative to the W&OD trail to minimize visual impacts. • Addition of vegetative buffers and plantings • Provide berms where feasible to minimize visual impacts

Affected Environment	No Action	Alternative 2 (TCTA)	Alternative 3 (East Rim)	Mitigation
Noise	• No impact.	• Short-term, minor impacts during construction. • Long-term, negligible impacts from pump station.	• Same as Alternative 2.	• Construction activities during normal business hours. • BMPs consistent with local state, and/or federal requirements.
Public Service and Utilities	• Long-term, major, adverse impacts to access drinking water during droughts or water impairment events.	• Long-term, beneficial impacts to access safe drinking water.	• Same as Alternative 2.	• Not applicable.
Traffic and Circulation	• No impact.	• Short-term, minor impacts from construction equipment. • Long-term, minor impacts from utility traffic.	• Short-term, minor impacts to W&OD parking area. • Long-term, minor impacts from utility traffic.	• Manage construction vehicles and equipment movement on-site.
Environmental Justice	• Long-term, major adverse impacts to access drinking water during droughts or water impairment events.	• Long-term, beneficial impacts on minority or low-income populations.	• Same as Alternative 2.	• Not applicable.
Safety and Security	• Long-term, moderate impacts due to normal weathering and erosion.	• Long-term, beneficial impacts (i.e., slope and terrain stability improvements, fencing).	• Same as Alternative 2.	• BMPs. • OSHA regulations, PPE.

Affected Environment	No Action	Alternative 2 (TCTA)	Alternative 3 (East Rim)	Mitigation
Historic Structures	• No impact.	• No adverse effect.	• Same as Alternative 2.	• BMPs consistent with local state, and/or federal requirements.
Archaeological Resources	• No impact.	• No adverse effect.	• Same as Alternative 2.	• BMPs consistent with local, state, and/or federal requirements.
Tribal and Religious Sites	• No impact.	• No adverse effect.	• Same as Alternative 2. • If selected, Tribal coordination requested.	• In the event unidentified resources are discovered, VA SHPO will be notified.

SECTION FOUR: CUMULATIVE IMPACTS

The Council on Environmental Quality (CEQ) defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions" (CEQ, 1997). Through the NEPA process, identifying the direct and indirect effects of Alternative 2 and Alternative 3 are important from a cumulative effects perspective.

The cumulative effects analysis is bordered within the Project Area (Appendix A, Figure 2), incorporating both Alternative 2 and Alternative 3 actions. Based on the Loudoun County Capital Projects Active and Planning interactive map there is one known past project within Alternative 2 and no known past projects within Alternative 3. Within the Alternative 2 Project Area, past projects also include the RWTM and the MRBV. As part of Loudoun Water's PWSP, the RWTM was completed in 2016 and the MRBV was completed in 2017. Alternative 2 currently has one active project and Alternative 3 has no known active projects outside of the scope presented in the EA. Reasonably foreseeable future actions in the area encompasses the Goose Creek Industrial Park Project, which is located north of Sycolin Creek and includes the decommissioning of an existing wastewater treatment plant and replacement with a sanitary pump station. A pipeline from this pump station would be routed through the TCTA to the TRWTF as part of a separate ongoing construction project.

The past, present, and reasonably foreseeable future projects combined are expected to have minor beneficial cumulative impacts on the affected environment, and long-term (permanent) beneficial impacts related to access to and availability of a safe, reliable source of drinking water. Table 13 in Section 3.6 summarizes the No Action, Alternative 2, and Alternative 3 impacts by affected environments. The impact from the No Action Alternative is the reduced ability of Loudoun Water to provide adequate drinking water supplies and the potential implementation of drinking water restrictions during drought and other impairment conditions. Alternative 2 and 3 do not have a trajectory of long-term cumulative adverse impacts. Alternatively, the proposed project offers long-term (permanent) cumulative benefits to the quality of life for Loudoun County and surrounding areas in accessing safe drinking water and reduces the future risks of water shortages.

SECTION FIVE: 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 Loudoun Times-Mirror and was posted on FEMA's website at https://www.fema.gov/emergency-managers/practitioners/environmental-historic/nepa-repository. The Draft EA was available on FEMA's website for a 30-day public review; the comment period started September 29, 2023 and ended October 30, 2023.

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

SECTION SIX: MITIGATION MEASURES AND PERMITS

The following are mitigation measures and conditions applicable to Alternative 2:

- The applicant is responsible for obtaining and complying with all required local, State and Federal permits and approvals. They include the following:
  - Aquatic resources impacts would be permitted through the Virginia JPA process.
  - VWP IP#10-2020 Major Modification, received from the VDEQ on May 26, 2023.
  - VMRC Permit 2022-1820 received March 1, 2023.
  - USACE Nationwide Permits #33 and #58 (NAO-2010-01843-rhs issued September, 2023.
  - Jurisdictional Determination: NAO-2018-01932, NAO-2020-0277, NAO-2021-03200, and NAO-2022-01240.
  - Loudoun County FPST: Permit FPST-2022-0013 issued September 28, 2022.
  - Loudoun County FPAL: Approved August 2023.
  - CLOMR: 23-03-0237R for the temporary bridge crossing approved July 20, 2023 and 23-03-0236 for the permanent bridge crossing approved on July 24, 2023.
  - A Letter of Map Revision will be filed with as-built documentation following construction.
  - Virginia Stormwater Management Program (Dewatering Permit): in regulatory review.
  - Loudoun County Site Plan Permit: Conditional Approval received on October 10, 2023 for Site Plan STPL-2019-0027 (Milestone Reservoir Site) and on October 13, 2023 for Site Plan STPL-2022-0037 (Milestone Pump Station Site).
  - Loudoun County Building Permit to be submitted in November 2023.
- The applicant would implement the following TOYRs:
  - Tree clearing (NLEB, Tricolored bat) (April 1 through November 14)
  - In-stream work (Green Floater) (April 15 through June 15 and August 15 through September 30)
- The applicant would 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 project site shall cease and the applicant shall notify the coroner's office (in the case of human remains), FEMA, and the VA SHPO.
- 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 Recipient 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 SFHA.

- Erosion controls would 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 would 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 an un-muffled exhaust.
- All equipment shall comply with pertinent equipment noise standards of the USEPA.

SECTION SEVEN: CONSULTATIONS AND REFERENCES

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SECTION EIGHT: LIST OF PREPARERS

- Leigh Hagan, Environmental Protection Specialist, FEMA Region 3 (FEMA Project Management)
- MacKensie Cornelius, Senior Environmental Protection Specialist, FEMA Region 3 (SHPO Consultation)
- Pam Kenel, Executive Director of Planning and Water Resources, Loudoun Water, (Senior Reviewer)
- Savita Schlesinger, Director of Capital Programs, Loudoun Water (Senior Reviewer)
- Samuel Flores, Senior Project Manager, Loudoun Water (Project Manager)
- Christopher Waters, Project Principal, Arcadis U.S., Inc. (Project Manager)
- Richard Gilmour, Principal Planner, Arcadis U.S., Inc. (Senior Reviewer)
- Whitney Withrow, Senior Environmental Scientist, Arcadis U.S., Inc. (EA Manager)

Appendix A

Maps and Figures

LOUDOUN COUNTY, VA

LOUDOUN WATER COMMUNITY STORAGE PROJECT

USGS TOPOGRAPHIC MAP

1 inch equals 6,667 feet

ARCADIS

FIGURE 1

LOUDOUN COUNTY, VA

LOUDOUN WATER COMMUNITY STORAGE PROJECT

LOCATION MAP

1 inch equals 1,000 feet

ARCADIS

FIGURE 2

LOUDOUN COUNTY, VA

LOUDOUN WATER COMMUNITY STORAGE PROJECT

SITE LAYOUT ALTERNATIVE 2

1 inch equals 350 feet

ARCADIS

FIGURE 3.1

LOUDOUN COUNTY, VA

LOUDOUN WATER COMMUNITY STORAGE PROJECT

PUMP STATION ALTERNATIVE 2

1 inch equals 200 feet

ARCADIS

FIGURE 3.2

Proposed Fence
Proposed Guardrail
Proposed Gravel Access
Proposed Road Improvement
Proposed Road/ Paved Surface
Proposed Structure
East Rim Limit of Disturbance
Project Area

LOUDOUN COUNTY, VA

LOUDOUN WATER COMMUNITY STORAGE PROJECT

SITE LAYOUT ALTERNATIVE 3

1 inch equals 300 feet

ARCADIS

FIGURE 4.1

LOUDOUN COUNTY, VA

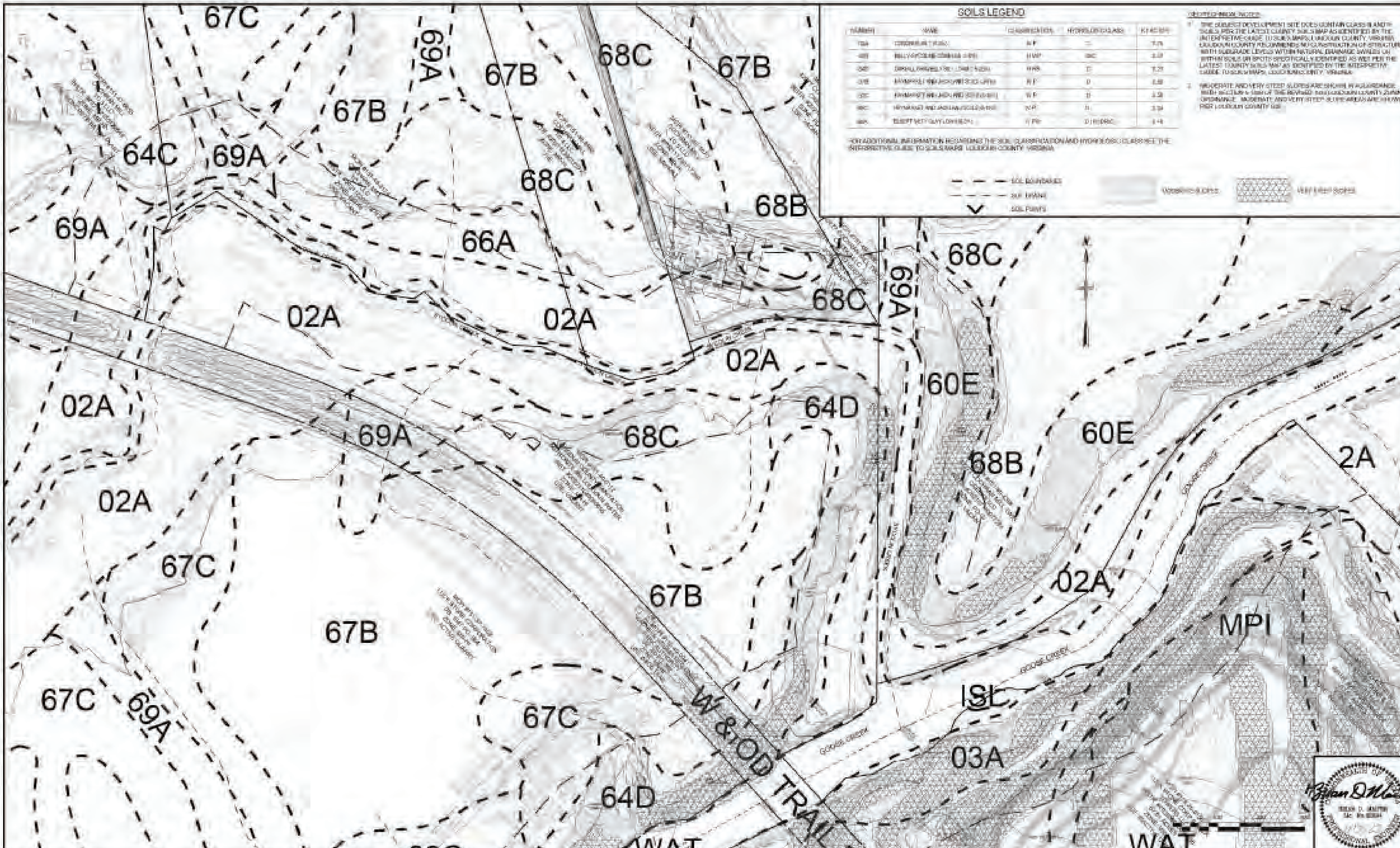
LOUDOUN WATER COMMUNITY STORAGE PROJECT

PUMP STATION ALTERNATIVE 3

1 inch equals 200 feet

ARCADIS

FIGURE 4.2



LOUDOUN WATER

SCALE NOTE

ARCADIS

urban

LOUDOUN WATER
MILESTONE RESERVOIR
AND PUMP STATION

MRPS SITE
CIVIL
SOILS MAP AND BORING PLAN

C204

LOUDOUN COUNTY, VA

LOUDOUN WATER COMMUNITY STORAGE PROJECT

NRCS SOILS MAP

1 inch equals 750 feet

ARCADIS

FIGURE 5


Durham Ct
Cochran Mill Rd
PUBHh
PFO1A
Goose Glen Ln
PUBHx
R5UBH
PUBHx
PUBHx
PFO1A
PFO5F
R4SBC
Builders Ln
Belmont
Belmont Station Dr
R5UBH
R4SBC
PUBHh
R5UBH
Lucky Ln
PUBHh
1. March 2019 aerial imagery obtained through ArcGIS Online Streaming Service
2. National Wetlands Inventory (NWI) data, February 2020, obtained from the US Fish and Wildlife Service at www.fws.gov.
Project Area
Estuarine and Marine Deepwater
Estuarine and Marine Wetland
Freshwater Emergent Wetland
Freshwater Forested/ Shrub Wetland
Freshwater Pond
Lake
Riverine
LOUDOUN COUNTY, VA
LOUDOUN WATER COMMUNITY STORAGE PROJECT
NWI WETLANDS MAP
1 inch equals 700 feet
ARCADIS
FIGURE
6

LOUDOUN COUNTY, VA

LOUDOUN WATER COMMUNITY STORAGE PROJECT

PROJECT AREA AQUATIC RESOURCES

1 inch equals 400 feet

ARCADIS

FIGURE 7.1

LOUDOUN COUNTY, VA

LOUDOUN WATER COMMUNITY STORAGE PROJECT

ALTERNATIVE 2 AQUATIC RESOURCES

1 inch equals 150 feet

ARCADIS

FIGURE 7.2

LOUDOUN COUNTY, VA

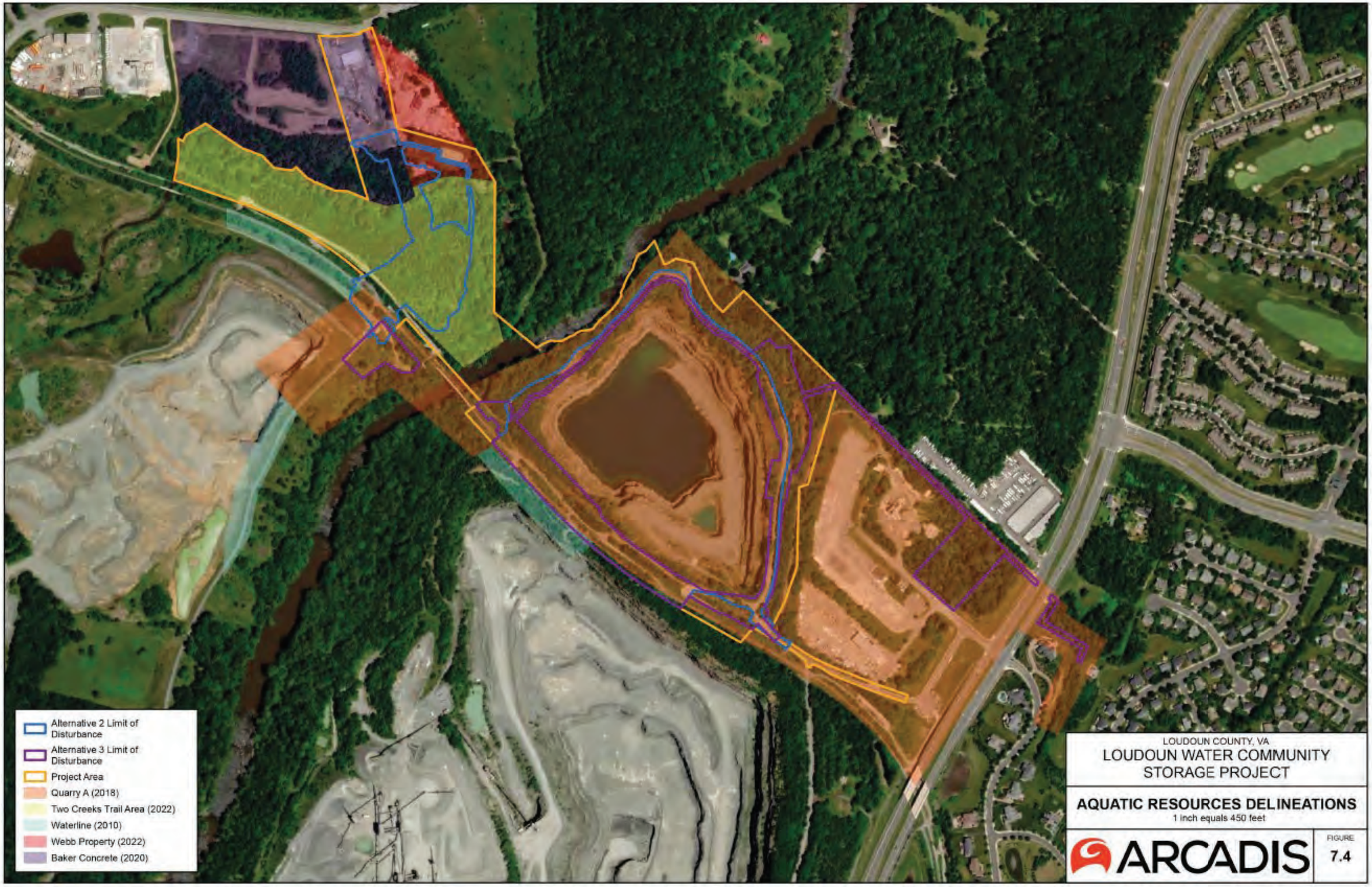
LOUDOUN WATER COMMUNITY STORAGE PROJECT

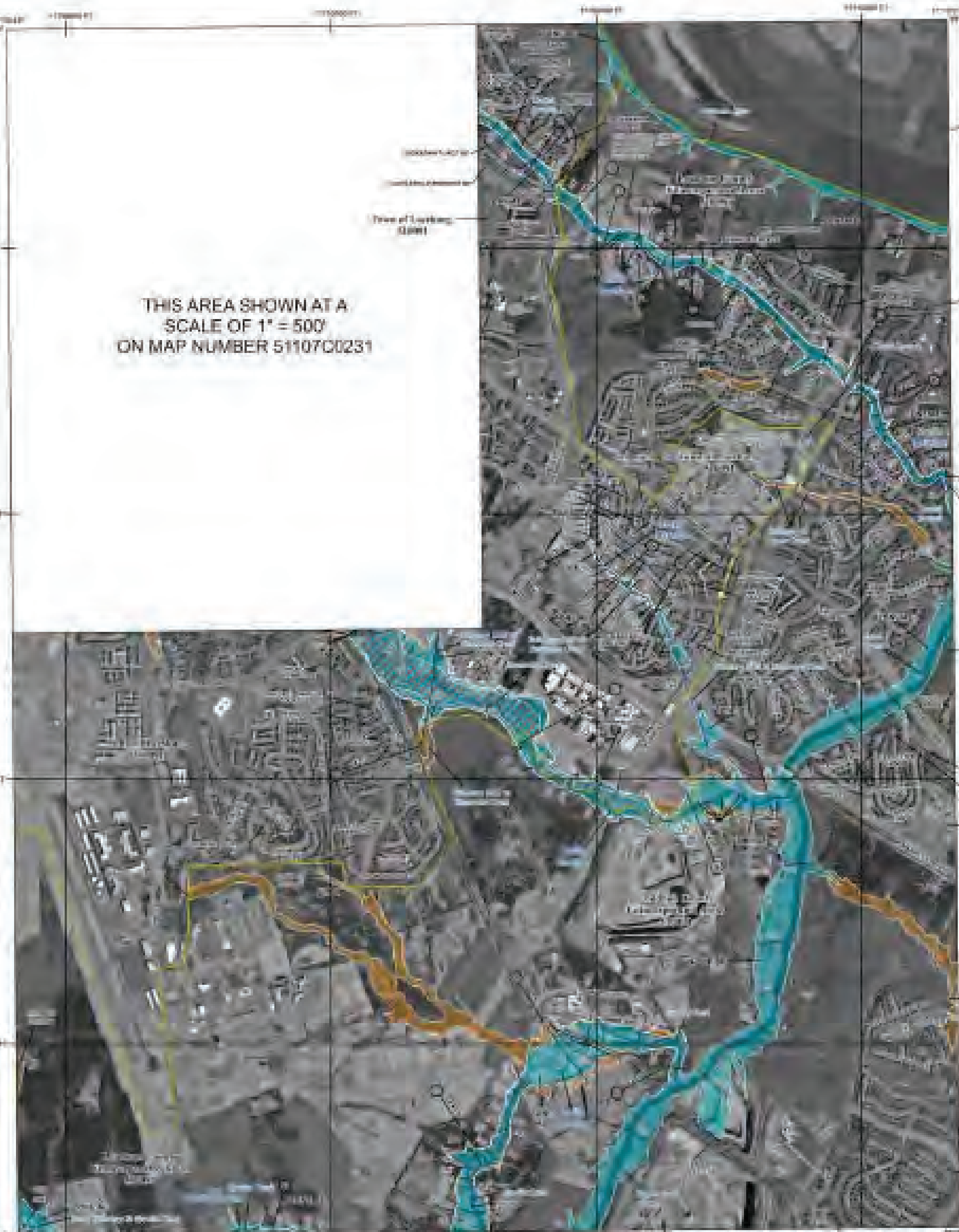
ALTERNATIVE 3 AQUATIC RESOURCES

1 inch equals 300 feet

ARCADIS

FIGURE 7.3


Alternative 2 Limit of Disturbance
Alternative 3 Limit of Disturbance
Project Area
Quarry A (2018)
Two Creeks Trail Area (2022)
Waterline (2010)
Webb Property (2022)
Baker Concrete (2020)
LOUDOUN COUNTY, VA
LOUDOUN WATER COMMUNITY STORAGE PROJECT
AQUATIC RESOURCES DELINEATIONS
1 inch equals 450 feet
ARCADIS
FIGURE
7.4



FLOOD HAZARD INFORMATION

- Without Base Flood Elevation (BFE)
- With BFE or Depth
- Regulatory Floodway
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Flood Risk due to Levee
- Areas of Minimal Flood Hazard
- Area of Undetermined Flood Hazard
- Channel, Culvert, or Storm Sewer
- Accredited or Provisionally Accredited Levee, Dike, or Floodwall
- Non-accredited Levee, Dike, or Floodwall
- Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

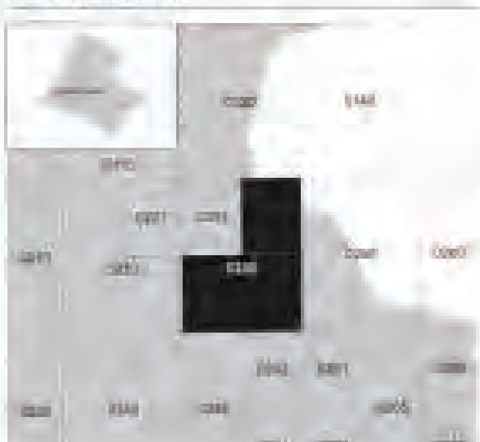
SCALE

1 inch = 1,000 feet 1:12,000

0 1,000 2,000 4,000 Feet

0 250 500 1,000 Meters

PANEL LOCATOR



FEMA

National Flood Insurance Program

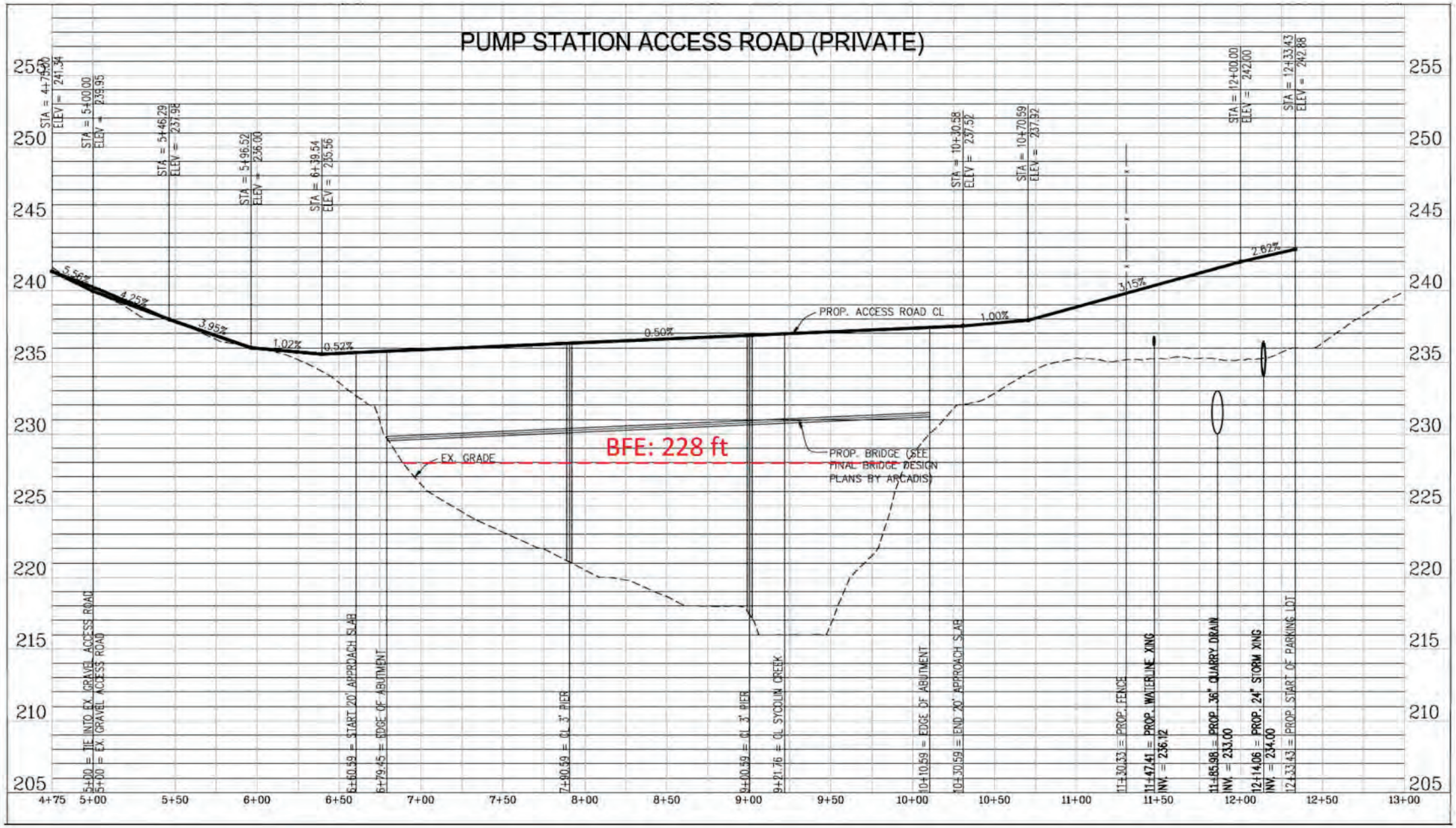
LOUDOUN COUNTY, VIRGINIA

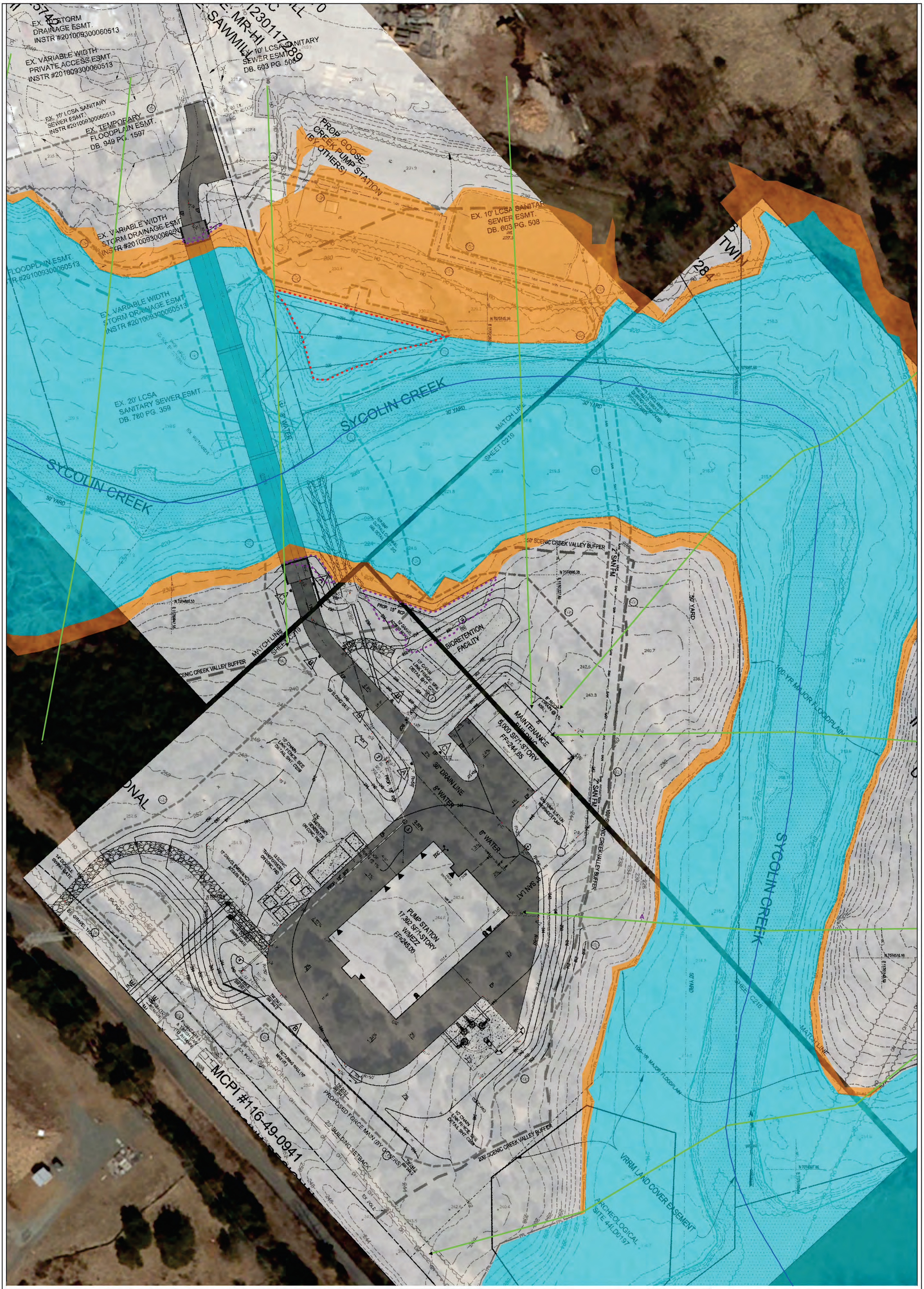
PANEL 235 OF 2982

VERSION NUMBER 2.3.3.2

MAP REVISED FEBRUARY 17, 2017

Proposed bridge over Sycolin Creek & 100-yr Base Flood Elevation





LEGEND

- FEMA Cross-Sections
- Stream Centerline

Floodplain Modifications

- Zone AE Expansion - Floodplain Easement
- Zone X 0.2 PCT Removal - Proposed Topography Modification

Proposed (Preliminary) Floodplain

- AE,
- X, 0.2 PCT ANNUAL CHANCE FLOOD HAZARD

0 40 80 120 160 Feet

N

Horizontal Datum: NAD1983 State Plane Virginia North FIPS 4501 (US Feet)
Vertical Datum: NAVD88

LOUDOUN WATER, VA

LOUDOUN WATER COMMUNITY STORAGE PROJECT

Proposed (Post-project) Floodplain

ARCADIS

FIGURE 8


N
Durham Ct
Cochran Mill Rd
Glen Ln
Builders Ln
Jackpit Ln
Belmont
Belmont Station Dr
1. March 2019 aerial imagery obtained through ArcGIS Online Streaming Service
2. Land use data obtained from Loudoun County GIS at https://geohub-loudoungis.opendata.arcgis.com/.
Project Area
Agricultural/Residential
Joint Land Management Area-3
Mineral Resource/Heavy Industry
Planned Development Housing-3
Planned Development-General Industrial
Planned Development-Industrial Park
Planned Development-Office Park
Single Family Residential-1
Single Family Residential-4
Single Family Residential-8
LOUDOUN COUNTY, VA
LOUDOUN WATER COMMUNITY STORAGE PROJECT
LAND USE MAP
1 inch equals 700 feet
ARCADIS
FIGURE
9

					DESIGNED BY: J. SEALS
					DRAWN BY: J. SEALS
					CHECKED BY: B. MARTIN
					APPROVED BY: B. MARTIN
REV. NO.	DATE	DRWN BY	CHKD BY	REMARKS	DATE: AUGUST 2022

LOUDOUN WATER

SCALE NOTE: SCALE BAR SHOWN BELOW IS ONE INCH LONG ON A FULL SIZE DRAWING. WHEN SCALING DRAWINGS, MEASURE BAR TO DETERMINE IF SCALES SHOWN WILL REMAIN ADJUSTING.

ARCADIS U.S., Inc.

urban

LOUDOUN WATER
MILESTONE RESERVOIR
AND PUMP STATION

MRPS SITE
CIVIL
PROPERTY INFORMATION MAP

FILE NAME: PROPERTY INFO

DRAWING NO.

C203

Appendix B

Floodplain Management Eight-Step Documentation

This appendix is available for review upon request; please contact FEMA-R3-EHP-PublicComment@fema.dhs.gov.

Appendix C

Agency Correspondence

This appendix is available for review upon request; please contact FEMA-R3-EHP-PublicComment@fema.dhs.gov.

Appendix D

Tribal Nation Consultation

This appendix is available for review upon request; please contact FEMA-R3-EHP-PublicComment@fema.dhs.gov.

Appendix E

Public Notice

This appendix is available for review upon request; please contact FEMA-R3-EHP-PublicComment@fema.dhs.gov.

Appendix F

Technical Reports

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