Draft Environmental Assessment
for the 2023 Pentagon Reservation Master Plan Update

U.S. Department of Defense
Washington Headquarters Services
Facilities Services Directorate
Environmental and Sustainability Branch

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Arlington, VA

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ACRONYMS

AADT	annual average daily traffic
ACP	access control point
ACS	American Community Survey
ANC	Arlington National Cemetery
AQCR	air quality control region
ART	Arlington Transit
AVB	anti-vehicle barrier
BMP	best management practice
CATEX	Categorical Exclusion
CCTV	closed-circuit television
[redacted]	[redacted]
CEJST	Climate and Economic Justice Screening Tool
CEQ	Council on Environmental Quality
CFL	compact fluorescent lamp
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
COR8	Pentagon Corridor 8
CRAC	computer room air conditioner
CVIF	Commercial Vehicle Inspection Facility
CZMA	Coastal Zone Management Act
D.C.	District of Columbia
DASH	Driving Alexandria Safely Home
dB	decibel
dBA	A-weighted decibel
DCA	Ronald Reagan National Airport
DCR	Virginia Department of Conservation and Recreation
DES	Arlington County Department of Environmental Services
DoD	Department of Defense
DoDI	Department of Defense Instruction
EA	Environmental Assessment
EAD	Engineering & Architecture Division
eGRID	Emissions & Generation Resource Integrated Database
EJ	environmental justice
EPA	Environmental Protection Agency
EO	Executive Order
ESA	Endangered Species Act
ESB	Environmental and Sustainability Branch
ESM	Exterior Standards Manual
EUI	Energy Usage Intensity
EV	electric vehicle
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Maps
FOB2	Federal Office Building Two
FONSI	Finding of No Significant Impact

(Continued)

FPCON	Force Protection Condition
FR	Federal Register
FRCS	Facility related control system
GCR	General Conformity Rule
GHG	greenhouse gas
GIS	geographic information system
GLUP	General Land Use Plan
GREET	Greenhouse gases, Regulated Emissions and Energy use in Technology
GWP	global warming potential
HI	hazard index
HRP	Heating and Refrigeration Plant
HOV	high occupancy vehicle
HVAC	heating, ventilation, and air conditioning
IEP	Installation Energy Plan
IONMP	Installation Operational Noise Management Plan
IPaC	Information for Planning and Consultation
JSP	Joint Service Provider
kW	kilowatts
kWh	kilowatt-hours
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
MEF	Metro Entrance Facility
MMBtu	million British thermal units
MOA	Memorandum of Agreement
MOC	Modular Office Complex
MS4	Municipal Separate Storm Sewer System
mt	metric tons
NAAQS	National Ambient Air Quality Standards
NDAA	National Defense Authorization Act
NCPC	National Capital Planning Commission
NEPA	National Environmental Policy Act
NFHL	National Flood Hazard Layer
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPS	National Park Service
NRHP	National Register of Historic Places
NRMP	Natural Resources Management Program
NWI	National Wetlands Inventory
O&M	operations and maintenance
PAC	Pentagon Athletic Center
PBMO	Pentagon Building Management Office
PFPA	Pentagon Force Protection Agency
PL	public law

(Continued)

PLC2	Pentagon Library and Conference Center
PM	particulate matter
$PM_{2.5}$	fine particulate matter
PM_{10}	coarse particulate matter
POV	privately owned vehicle
PRTC	Potomac and Rappahannock Transit Company
PTC	Pentagon Transit Center
RMA	Resource Management Area
RDF	Remote Delivery Facility
RPA	Resource Protection Area
SAL	Secure Access Lane
SF	square feet
SIP	State Implementation Plan
SR	state route
TES	thermal energy storage
TMDL	Total Maximum Daily Load
TMP	Transportation Management Plan
TN	total nitrogen
TP	total phosphorus
tpy	tons per year
TSS	total suspended solids
U.S.C.	United States Code
UESC	Utility Energy Services Contract
UFC	Unified Facilities Criteria
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation
USEEIO	U.S. Environmentally-Extended Input-Output
USFWS	U.S. Fish and Wildlife Service
VACP	vehicular access control point
VA DEQ	Virginia Department of Environmental Quality
VaFWIS	Virginia Fish and Wildlife Information Service
VDGIF	Virginia Department of Game and Inland Fisheries
VDHR	Virginia Department of Historic Resources
VDOT	Virginia Department of Transportation
VESCP	Virginia Erosion and Sediment Control Program
VOC	volatile organic compound
VPDES	Virginia Pollutant Discharge Elimination System
VSMP	Virginia Stormwater Management Program
WHS	Washington Headquarters Services
WMATA	Washington Metropolitan Area Transit Authority
ZEV	zero-emissions vehicle

EXECUTIVE SUMMARY

The United States Department of Defense (DoD) Washington Headquarters Services (WHS) has prepared this Draft Environmental Assessment (EA) in compliance with the requirements of the National Environmental Policy Act of 1969 (NEPA). The Environmental and Sustainability Branch of WHS/Facilities Services Directorate is responsible for ensuring compliance with environmental regulations such as NEPA and has prepared this EA to evaluate the direct, indirect, and cumulative environmental impacts that would result from the implementation of the 2023 *Pentagon Reservation Master Plan Update* (the Proposed Action) or the No-Action Alternative.

The purpose of the Proposed Action as analyzed in this EA is to maintain the goals established in the 2016 Pentagon Reservation Master Plan Update, provide an update on current conditions, identify future projects, and analyze deficiencies in meeting new criteria established by Unified Facilities Criteria (UFC) 2-100-01 (*Installation Master Planning*).

The original objectives as outlined in the 2016 Master Plan include improving security, enhancing quality of life of employees and visitors, enhancing environmental sustainability, and balancing the various developmental pressures facing the Reservation. In addition to carrying forth these goals, the 2023 *Pentagon Reservation Master Plan Update* aims to provide an update to existing conditions at the Pentagon and Mark Center to reflect changes since 2016. This includes revising the Mark Center Transportation Management Plan, last revised in 2016, to continue to improve the overall efficiency and operations of vehicular, pedestrian, and bicycle circulation systems. Other new projects enhance safety and security, improve stormwater management practices, reduce surface parking, and increase energy resilience. In an effort to look forward to the Master Plan Update expected in 2027, the Proposed Action also identifies future projects that align with the priorities established by the 2016 Master Plan Update. Additionally, included in the Master Plan is an analysis of any deficiencies in meeting the requirements set forth by the UFC 2-100-01, which have been updated since 2016.

The Proposed Action in this EA is described in three components. The first component is Construction, Demolition, and Renovation of Short-Term projects, which are projects with a 0 to five year timeline, and include improvements to security, safety, circulation, environments and sustainability, energy infrastructure, construction of new facilities, and land-use changes. The second component is Construction, Demolition, and Renovation of Long-Term projects, which are those with a six to 20 year timeline and include improvements to energy structure, construction of new facilities, and land-use changes. The third component to be implemented is Revisions to Land-Use Categorization, where changes in land-use categorization and plans for additional land acquisition are analyzed.

This EA has been prepared in accordance with the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA (Code of Federal Regulations, Title 40, Parts 1500–1508 [2022]) and Executive Order 11514.

1. INTRODUCTION

The United States Department of Defense (DoD) Washington Headquarters Services (WHS) has prepared this Draft Environmental Assessment (EA) in compliance with the requirements of the National Environmental Policy Act of 1969 (NEPA). This EA evaluates the direct, indirect, and cumulative environmental impacts that would result from the Proposed Action which is the implementation of the 2023 *Pentagon Reservation Master Plan Update* and the No-Action Alternative.

WHS considered the Proposed Action in accordance with Draft WHS NEPA procedures and determined the appropriate level of NEPA analysis in a Record of Environmental Consideration signed on July 20, 2022. WHS, as the agency responsible for the Pentagon site and the Mark Center, is the lead agency responsible for the preparation of this EA under NEPA.

WHS prepared this EA in accordance with the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (Code of Federal Regulations [CFR], Title 40, Parts 1500–1508 [2022]) and Executive Order (EO) 11514 (35 Federal Register [FR] 4247).

1.1 Background

WHS is responsible for providing administrative services and support to various DoD operations, including those at the Pentagon site and the Mark Center. Within WHS, the Engineering & Architecture Division (EAD) of the Engineering & Construction Management group is responsible for revising and updating the master plan for the Pentagon site. In 2021, EAD contracted with HDR to update the 2016 Pentagon Reservation Master Plan Update. This EA was developed by the Environmental and Sustainability Branch (ESB) in the Standards & Compliance Division in conjunction with the master planning team and concurrently with the development of the master plan update.

The master planning team began by gathering data from stakeholders, analyzing existing conditions, and identifying future projects. The team developed a Pre-Draft Master Plan, which they reviewed internally and refined with stakeholders. A 95 percent Draft was then developed, incorporating the input received during the pre-draft work session, and was distributed for formal review to internal stakeholders. Following the internal review, the team provided the revised 95 percent Draft to external stakeholders for informational purposes.

The 2023 *Pentagon Reservation Master Plan Update* (Pentagon Master Plan) serves as a minor revision to the 2016 *Pentagon Reservation Master Plan Update* and is intended to also analyze how the plan meets the new requirements under Unified Facilities Criteria (UFC) 2-100-01 (*Installation Master Planning*). In addition to carrying forward the goals of the 2016 *Pentagon Reservation Master Plan Update*, the Pentagon Master Plan includes new projects to enhance safety and security, improve pedestrian and bicycle circulation, reduce surface parking, increase energy resilience, and improve stormwater management practices to reduce negative impacts to waterways within the Chesapeake Bay Watershed. The Pentagon Master Plan also identifies next steps for the comprehensive master plan update that will take place in 2027. The Pentagon Master Plan includes an expanded geographic scope from the 2016 *Pentagon Reservation Master Plan Update* because it discusses development plans for the Mark Center in Alexandria, Virginia, which is a property administered by WHS. The Pentagon Master Plan is provided in Appendix A.

1.2 WHS Master Planning

1.2.1 Introduction

Master plans are comprehensive documents that guide development at specific sites to achieve both short- and long-term planning goals. A master plan typically outlines specific projects to achieve such goals and also includes broad and dynamic policies to guide future development decision-making. Common priorities for master plan policies include land use, security, and climate and energy resiliency, among other categories. Master plans are intended to be regularly updated to meet new goals and to accommodate any changes to the planning area.

1.2.2 DoD Requirements and Guidance

All major military installations must have a master plan that addresses environmental planning, sustainable design and development, sustainable range planning, real property master planning, military resilience, and transportation planning (10 United States Code [U.S.C.] 2864). Department of Defense Instruction (DoDI) 4165.70 (*Real Property Management*) implements this requirement for DoD installations. In accordance with DoD Instruction 4165.70, WHS must develop master plans that cover at least a 10-year period, and all master plans must be updated every 5 years (or more often if necessary). The master plan is required to include a specific, annual listing of all construction projects, major repair and sustainment projects, and restoration and modernization projects needed within the time period covered by the plan (DoD, 2018a). Minimum requirements for the master planning process are set forth in UFC 2-100-01 (*Installation Master Planning*), which was most recently updated in 2020 (DoD, 2020a). The 2016 Master Plan Update was developed pursuant to a now-outdated 2013 version of the UFC. The 2023 Pentagon Master Plan is intended to identify ways to align the Master Plan with the 2020 UFC update.

Master planning processes are meant to apply comprehensive planning strategies through facility and infrastructure development. Among other things, master plans provide timely and correct planning information and real property support for installation missions; support informed decision-making; promote cooperative and interactive intra- and inter-service and inter-governmental relationships; incorporate climate resilience analysis; encourage sustainable development; maintain an audit trail of master planning and real property decisions; ensure efficient and compatible land use; protect an installation's long-term viability by providing capability for growth and flexible facility and land-use decisions that can accommodate changes to missions and/or users; and encourage policies and interaction with the local community (DoD, 2020a).

1.2.3 Past Pentagon Master Planning

2005 Master Plan

WHS prepared the first master plan for the Pentagon site in 1991. In response to growing security concerns following the September 11, 2001 terrorist attacks on the Pentagon and in response to other changes that occurred on or around the Reservation, WHS prepared an updated master plan in 2005. The geographic scope of the 2005 Master Plan included the main site property bounded by Interstate 395 (I-395) to the south, Boundary Channel to the east, and State Route (SR) 27 to the west. The 2005 Master Plan did not include the parking lots south of I-395 or the Mark Center. It also did not include the Navy Annex Federal Office Building Two (FOB2), a building that was demolished in 2013. The 2005 Master Plan's primary objectives were to complete a permanent secure perimeter as well as to enhance sustainability strategies and promote the long-term environmental health of the Pentagon site.

To fulfill these objectives, WHS proposed that implementation be phased in four construction sequences of five years each (WHS, 2005). Some of the objectives of the 2005 Master Plan, such as enhancing sustainability strategies and improving vehicular and pedestrian circulation, continue to apply to the 2023 Pentagon Master Plan.

2016 Master Plan Update

WHS updated the master plan in 2015 and amended this update in 2016. The 2016 Master Plan Update set forth a primary goal of maintaining, enhancing, and optimizing DoD Headquarters/Pentagon Operations. More specifically, objectives included:

- Improve DoD Headquarters/Pentagon security.
- Enhance the safety and quality of life of employees and visitors.
- Enhance the environmental sustainability of the Reservation.
- Balance the various planning factors/development pressures on the Reservation, including funding, security, safety, public access, historic preservation, being a good neighbor, and sustainability.

While the 2016 Master Plan Update incorporated many of the same features found in the 2005 Master Plan, the 2016 Master Plan Update also reflected changes to the Pentagon Reservation that had occurred since 2005. In addition, the 2016 Master Plan Update included new long-term security and screening projects, circulation system updates, projects to address facilities that needed to be replaced due to age or temporary status, and updates to address new environmental requirements. For example, the 2016 Master Plan Update attempted to achieve a more "green" and sustainable campus by integrating environmentally prudent stormwater management measures into the existing parking lots. The geographic scope for the 2016 Master Plan Update was similar to the 2005 Master Plan, but also included the Hayes Street, Fern Street, and Eads Street parking lots along Army-Navy Drive that support the Pentagon (WHS, 2016a).

Master plans are also subject to federal environmental review under NEPA. For both the 2005 Master Plan and the 2015 Master Plan Update, WHS published an EA assessing the potential environmental impacts associated with each plan. The Finding of No Significant Impact (FONSI) for the EA for the 2015 Master Plan Update was signed on October 6, 2014. Within both the 2005 and 2014 EAs, WHS determined that implementation of the of the updated master plan would not result in significant impacts to the natural or manmade environment (WHS, 2014).

Transportation Management Plan

In 2015, WHS initiated the Transportation Management Plan (TMP) for the Pentagon site in conjunction with the 2015 Master Plan Update to thoroughly analyze transportation issues at the Pentagon Reservation. The TMP has two major goals: 1) to reduce traffic congestion and improve air quality by reducing the number of single-occupancy vehicle trips in the workday commute to 28 percent or less by 2034; and 2) to facilitate employee multimodal transportation by enhancing the existing sustainable transportation infrastructure and programs. One guiding principle of the TMP is its focus on promoting the use of sustainable transportation alternatives such as transit, walking, biking, and carpooling (WHS, 2015). The 2023 Pentagon Master Plan Projects are intended to further these goals by significantly

improving the overall efficiency and operations of the vehicular, pedestrian, and bicycle circulation systems.

The first TMP for the Mark Center was prepared in October 2010 (WHS, 2023a). Concurrently with the development of the 2023 Pentagon Master Plan, WHS is revising the Mark Center TMP to establish a plan to promote more efficient employee commuting patterns by minimizing single-occupancy vehicle trips.

1.2.4 Current Master Plan Study Area

The Master Plan Study Area includes the Pentagon site in Arlington County, Virginia, and the Mark Center facility in the city of Alexandria, Virginia (Figure 1-1). The Pentagon is located across the Potomac River from and west of Washington, D.C. Arlington National Cemetery (ANC) borders the Pentagon to the west. The Mark Center is located approximately 4.3 miles southwest of the Pentagon. Both the Pentagon site and the Mark Center are situated in the National Capital Region as defined by the National Capital Planning Commission (NCPC).

The Pentagon site is situated on approximately 245 acres of land and serves as the headquarters of the DoD. It is bounded to the east by Boundary Channel Drive and the Boundary Channel Lagoon, to the south by I-395, and to the west by SR 27, Washington Boulevard (Figure 1-2). The Pentagon site includes the Pentagon building and associated features and complexes such as the 9/11 Pentagon Memorial, the North and South Villages, and the Pentagon Transit Center. The Pentagon site also includes the Hayes Street, Fern Street, and Eads Street parking lots north of Army-Navy Drive.

The Mark Center is situated on approximately 16 acres of land and serves primarily as additional office space. It is located at the intersection of Seminary Road and North Beauregard Street at I-395 (Figure 1-3). The Mark Center includes two office towers (Mark Center East Tower and Mark Center West Tower), two parking structures, and a public transit facility with five bus bays, a sheltered passenger area, and information kiosks.

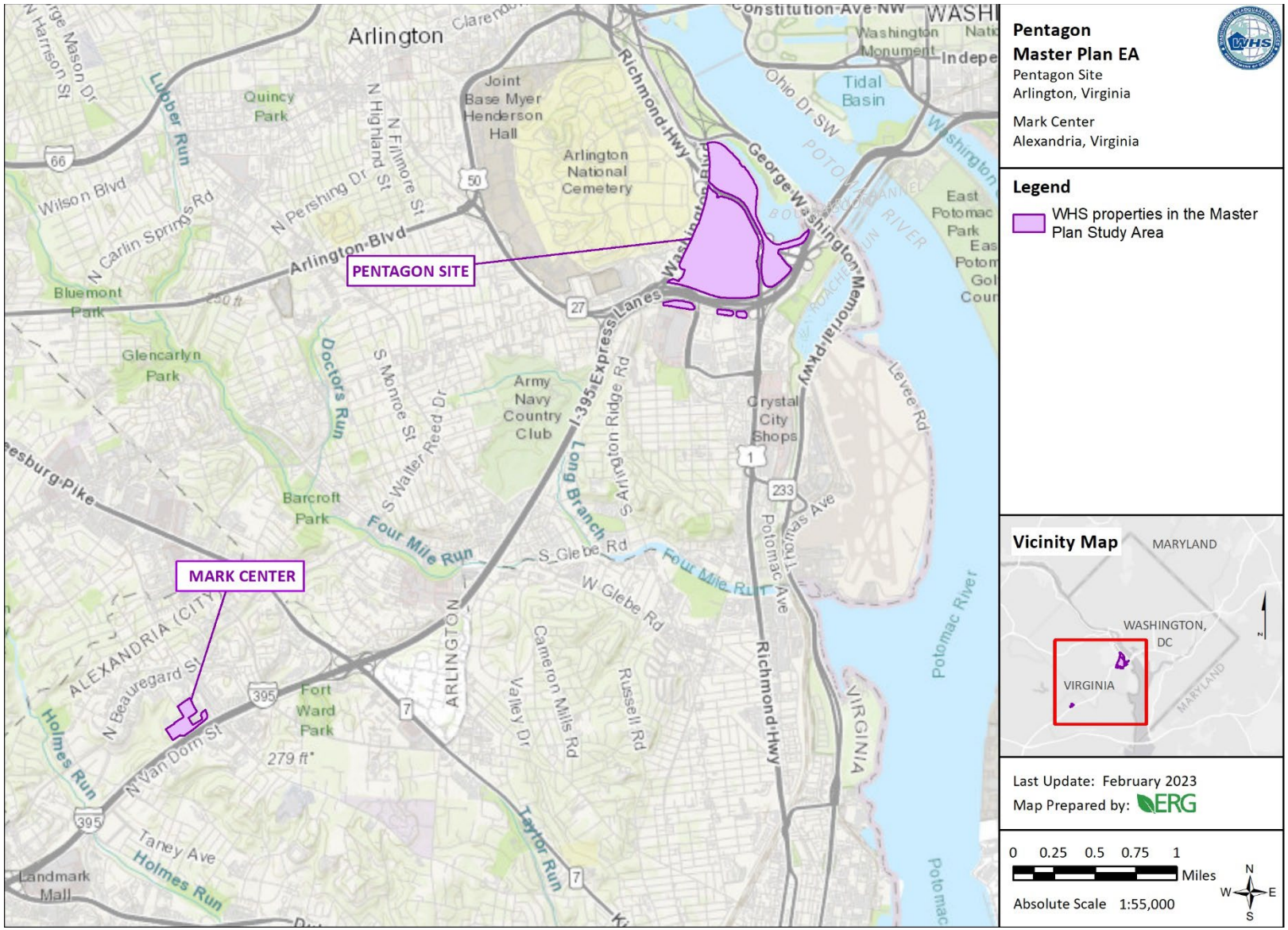


Figure 1-1. Master Plan Study Area

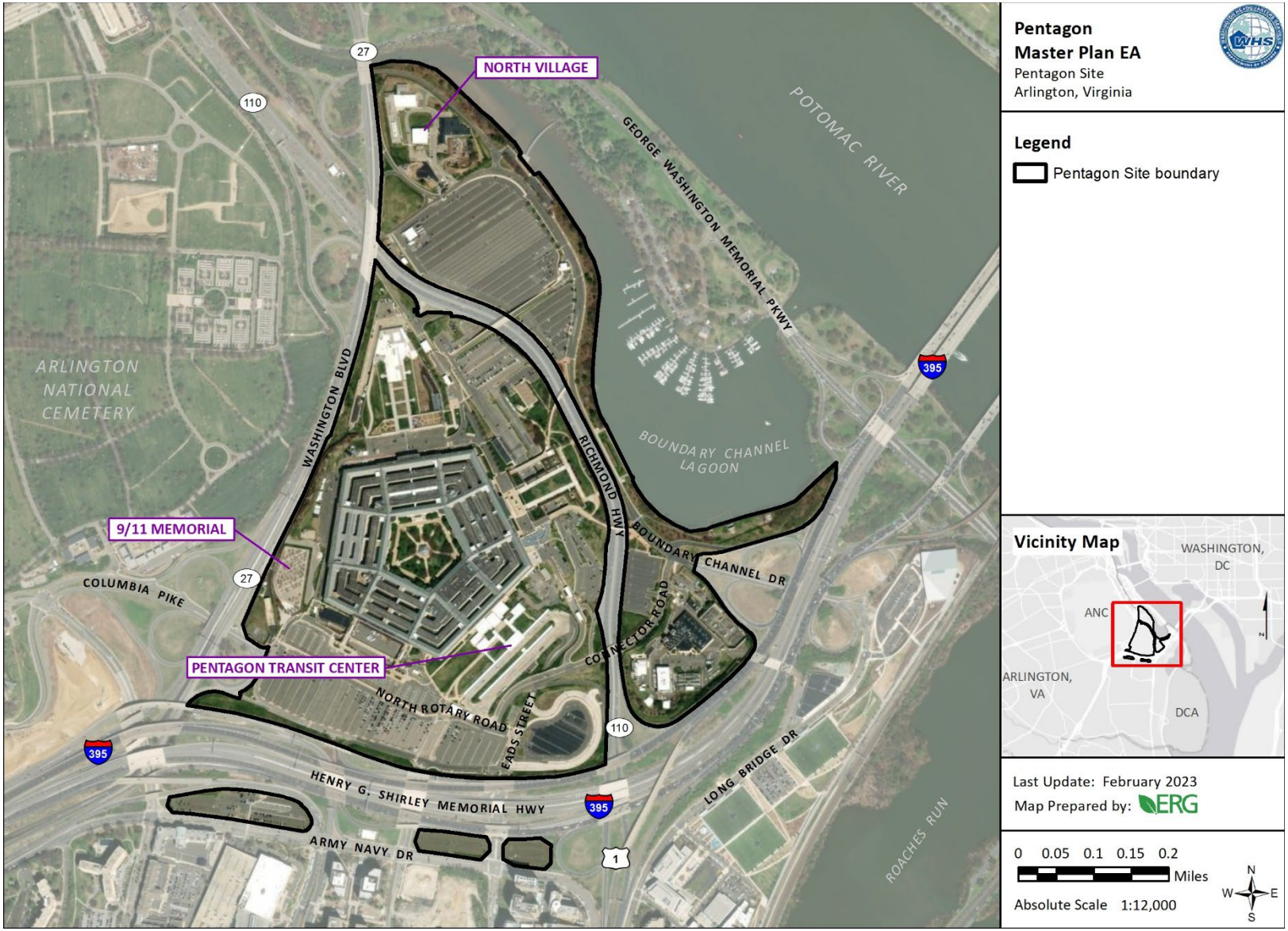


Figure 1-2. Pentagon Site

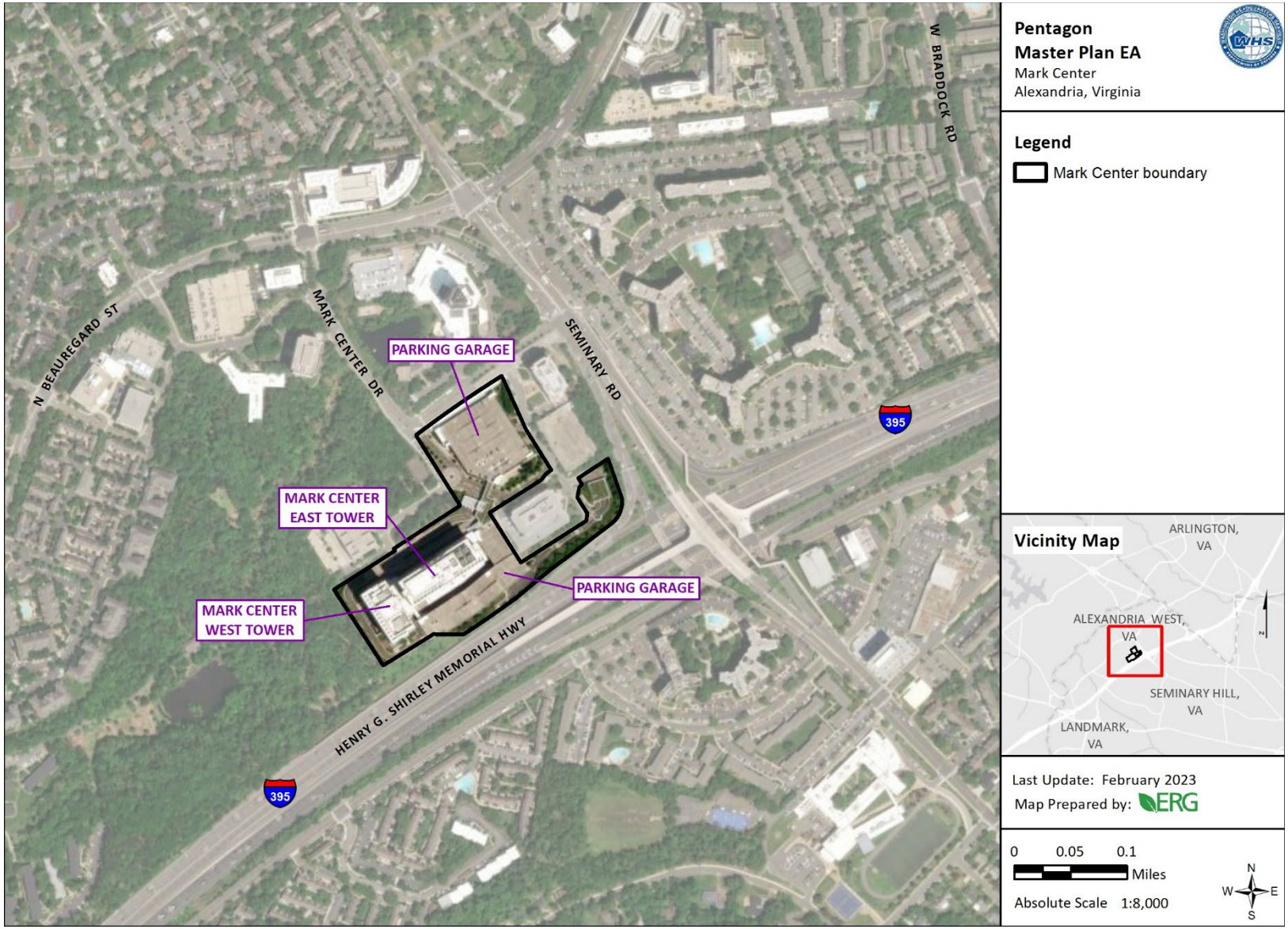


Figure 1-3. Mark Center

1.3 Purpose and Need

This EA analyzes the Proposed Action, which is implementation of the Pentagon Master Plan (the 2023 *Pentagon Reservation Master Plan Update*). The purpose of the Proposed Action is to maintain the vision of the 2016 Master Plan Update, carry the 2016 Update forward, and bridge the gap between the 2016 Master Plan Update and the next full master planning effort anticipated in 2027. The purpose will be accomplished by:

- Providing an update to the existing conditions at the Pentagon site and Mark Center, reflecting changes since 2016.
- Identifying future projects that would uphold the 2016 Update goals of improving security, enhancing the safety and quality of life of employees and visitors, enhancing environmental sustainability, and balancing the Reservation's planning factors and development pressures.
- Identifying deficiencies in meeting the UFC 2-100-01 criteria, which have been updated since the 2016 Master Plan Update, and summarizing the steps that will need to be taken for the future full master planning effort to meet the UFC requirements.

The need for the Proposed Action is driven by: 1) changes to the projects previously identified in the 2016 Master Plan Update, 2) DoD master planning requirements that require updates to master plans every 5 years (DoD, 2018a), and 3) changes to DoD master planning requirements under UFC 2-100-01. The projects in the Pentagon Master Plan will address the specific needs to reduce the Pentagon's environmental impacts and to advance sustainability, security, and resilience.

1.4 Incorporation of Completed NEPA Documents

WHS previously considered certain projects in accordance with Draft WHS NEPA Procedures and determined the appropriate level of NEPA analysis for these projects in Records of Environmental Consideration. The Records of Environmental Consideration concluded that existing NEPA documentation and decisions (i.e., EAs and the associated FONSIs) provided NEPA compliance for these projects, as they were sufficiently analyzed in the *Pentagon Reservation Master Plan Update EA* (2014) or other project-specific NEPA documentation. Projects identified in the Pentagon Master Plan for which NEPA documentation has previously been completed include:

- *EA for the Pentagon Sentry Program* (2011):
  - Commercial Vehicle Inspection Facility (CVIF) Project (previously named the Secure Access Lane Remote Screening Facility in 2011)
  - Pentagon Corridor 8 (COR8) Pedestrian Access Control Point (ACP) Project
- *Pentagon Reservation Master Plan Update EA* (2014):
  - North Village ACP Project
  - Control Tower and Fire Day Station Project
  - Pentagon South Pedestrian Safety Project
  - COR8 Pedestrian ACP Project
  - North Rotary Road Security Fence and Bollards Project
  - South Secure Parking Project
  - Tree Box Filters Project

  - North Parking Bioretention Project
  - Old East Loading Dock Project
  - Corridor 5 Parking Project

- [redacted]
  - Remote Delivery Facility Roof Project

- *Utility Energy Services Contract (UESC)—Energy Efficiency Conservation Measures on the Pentagon Campus Categorical Exclusion* (2021):
  - Lighting Improvements Project
  - Domestic Water Improvements Project
  - Chilled Water Plant Improvements Project
  - Building Envelope Weatherization Project
  - Irrigation Improvements Project
  - Refrigeration Improvements Project

Planning decisions have been made for the projects listed above, and WHS has proceeded with their implementation. Though these projects have completed NEPA documentation and are constructed or underway, they are included in this EA because they form part of the Proposed Action to implement the Pentagon Master Plan, which identifies them as short-term projects. Their potential impacts are considered in Section 4 (Environmental Consequences) in combination with all other projects included in the Pentagon Master Plan.

The following projects, or components of the following projects, were analyzed in the *Pentagon Reservation Master Plan Update EA* (2014) and carried forward to the 2023 Pentagon Master Plan, but do not have Records of Environmental Consideration and represent future projects to be implemented. These projects will receive an updated analysis in this EA:

- Metro Entrance Pedestrian ACP
- West End Safety and Security
- Center Courtyard Stage
- North Parking Lot Improvements

2. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVE

WHS has developed the Proposed Action presented in Section 2.1 (Proposed Action: Master Plan Revision (Preferred Alternative)) to meet the purpose and need described in Section 1.3 (Purpose and Need). As required by NEPA regulations (40 CFR 1502.14(c)), a No-Action Alternative is also included in this EA and presented in Section 2.2 (No-Action Alternative). WHS has selected the Proposed Action as the preferred alternative.

2.1 Proposed Action: 2023 *Pentagon Reservation Master Plan Update* (Preferred Alternative)

The Proposed Action consists of the implementation of the 2023 *Pentagon Reservation Master Plan Update*. The Pentagon Master Plan predominantly carries forward the existing goals of the 2016 Master Plan Update and does not re-examine the vision of the previous master plan. At the time of the next master planning process (anticipated in 2027), the vision, strategy, and goals of the Master Plan may be reevaluated. Though the Pentagon Master Plan is only intended to bridge the gap between this revision and the next master planning exercise, it still considers projects that would be implemented in both the short term (0 to 5 years) and long term (6 to 20 years) in response to projected DoD mission needs. The Pentagon Master Plan guides and coordinates improvements; projects; and plans for land use, security, safety, circulation, environment and sustainability, and energy at the Pentagon site and Mark Center.

The Pentagon Master Plan carries forward the 2016 Master Plan Update and includes the following components:

- *Construction, Renovation, and Demolition—Short-Term Projects*: Includes development intended for implementation over the next 0 to 5 years, including improvements to security, safety, circulation, environment and sustainability, and energy infrastructure, as well as construction of new facilities and land use changes. Includes projects for which the NEPA process has already completed and projects that are underway.
- *Construction, Renovation, and Demolition—Long-Term Projects*: Includes development intended for implementation over the next 6 to 20 years, including improvements to energy infrastructure, construction of new facilities, and land use changes. Projects in this category are conceptual and will require additional NEPA analysis in the future when scopes are more well defined.
- *Revisions to Land Use Categorization*: Includes changes to land use categorization and plans for additional land acquisition for the Pentagon site.

Construction, renovation, and demolition projects that would occur under the Proposed Action and/or the No-Action Alternative are provided in Table 2-1 and shown in Figure 2-1.

The Pentagon Master Plan accommodates an employee population of approximately 26,560 personnel and is forecasted to remain stable through 2025. There are approximately 8,011 parking spaces specified in the Pentagon Master Plan at the Pentagon site (a reduction from 8,494 accounted for in the 2016 Master Plan Update) and 3,747 spaces at the Mark Center. The existing parking ratio at the Pentagon site is 1:4 for employee parking.

Table 2-1. Master Plan Projects

	Project	Proposed Action (Master Plan Update)		No-Action Alternative
		Short-Term	Long-Term	
Security and Safety				
1	Upgrade E-Ring Windows Security	X		
2	Pentagon First-Floor Windows	X		
3	Pentagon Pedestrian Doors	X		
4	Mug Handle Pentagon Force Protection Agency Officer Booth and Barrier	X		
5	Secure Manhole and Hand Hole Covers	X		
6	West End Safety and Security	X		
7	North Rotary Road Security Fence and Bollards	X		X
8	North Rotary and Fern Vehicle ACP Fence	X		
9	Corridor 2 and 3 Bridge Security Upgrades	X		
10	Commercial Vehicle Inspection Facility	X		X
11	Replace Pentagon Force Protection Agency Officer Booths	X		
12	Pentagon Perimeter Vehicle Barriers	X		
13	North Village ACP	X		X
14	Hayes Parking Lot Improvements	X		
15	Eads and Fern Streets Parking Lot Improvements	X		
New Facility and Land Use Change				
1	North Village and Pentagon Support Operations Center Green/Support Space [a]		X	
2	Center Courtyard Stage and Stairs	X		
3	Control Tower and Fire Day Station	X		X
4	Army-Navy Drive OffSite Parking Lots Feasibility Study [a]		X	
	[redacted]		[redacted]	
Circulation				
1	Pentagon South Pedestrian Safety Project	X		
2	Southeast Parking	X		X
3	North Parking Lot Improvements	X		
4	Connector Road Bridge Upgrades	X		

Table 2-1. Master Plan Projects

	Project	Proposed Action (Master Plan Update)		No-Action Alternative
		Short-Term	Long-Term	
5	Connector Road and Boundary Channel Drive Intersection Improvements	X		
6	Areawide Resurfacing and Rehabilitation	X		
7	Areawide Sidewalk Improvements	X		
8	Metro Entrance Pedestrian ACP	X		X
9	Pentagon Corridor 8 Pedestrian ACP	X		X
10	Remote Delivery Facility Roof Project	X		X
Environment and Sustainability				
1	South Secure Parking	X		X
2	Tree Box Filters	X		X
3	North Parking Bioretention	X		X
4	Old East Loading Dock	X		X
5	Corridor 5 Parking	X		X
Energy				
1	Microgrid		X	
2	Chiller Plant Upgrades		X	
3	Thermal Energy Storage	X		
4	Pilot Electric Vehicle Charging Stations	X		X
5	Pentagon-Wide Zero-Emissions Vehicle Fleet Infrastructure		X	
6	Project Recommissioning/Heating, Ventilation, and Air Conditioning Efficiency Upgrade	X		
7	North Parking Garage Solar [b]	X		
8	Facility Related Control System Modernization [b]	X		
9	Light-Emitting Diode Lighting Upgrades [b]	X		
10	Electric Vehicle Charging Stations and Infrastructure [b]	X		
11	Optimize Data Center Performance [b]	X		
12	Variable Speed Primary Hot Water Pumping [b]	X		
13	Lighting Improvements [c]	X		X
14	Domestic Water Improvements [c]	X		X

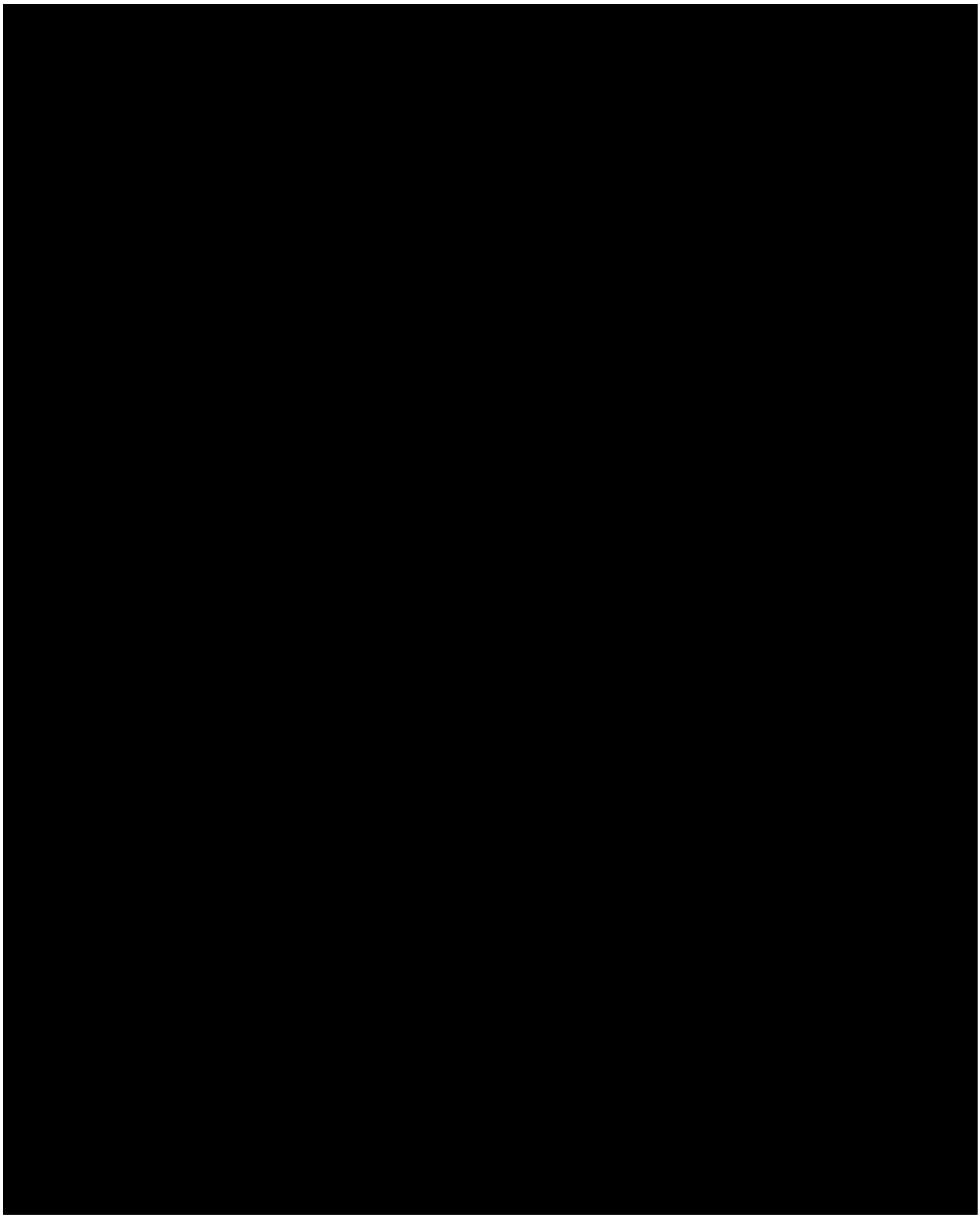
Table 2-1. Master Plan Projects

	Project	Proposed Action (Master Plan Update)		No-Action Alternative
		Short-Term	Long-Term	
15	Chilled Water Plant Improvements [c]	X		X
16	Building Envelope Weatherization [c]	X		X
17	Irrigation Improvements [c]	X		X
18	Refrigeration Improvements [c]	X		X

a — Represents a land use change

b — Represents a Mark Center project

c — Represents a UESC project



2.1.1 Construction, Renovation, and Demolition—Short-Term Projects

Short-term construction, renovation, and demolition projects in the Pentagon Master Plan include improvements or modifications to security, safety, new facilities (some with land use changes), circulation, environment and sustainability, and energy. Below is a summary of each project WHS would execute under the Master Plan over the next 5 years. Refer to Section 3 of the Pentagon Master Plan for additional details regarding the proposed scope of each project.

[redacted]

New Facility and Land Use Change Projects (Short-Term)

New facility and land use change projects are intended to respond to the need to modernize Pentagon support facilities. Refer to Section 3.5 (New Facility and Land Use Change Projects) in the Pentagon Master Plan for additional information. Short-term new facility projects include:

- The **Center Courtyard Stage and Stairs Project** would replace the existing temporary courtyard stage with a new facility more sufficient for ceremonial and other events. The project would correct deficiencies with the egress stairs behind the stage related to deterioration and safety

concerns; it also includes technology upgrades. This project has advanced to a 10 percent design concept.

- The **Control Tower and Fire Day Station Project** would replace the existing temporary helipad control tower and fire station with a new facility. The new facility would include a one-story fire truck garage with space for fire trucks and equipment, a one-story support space with accommodations for staff and a dispatch office, and a four-story control tower with space and equipment for personnel to oversee helicopter operations. The ground floor would house the fire station and control tower support space. The helipad will remain in its existing location and is currently being rebuilt to improve its structural integrity and meet safety criteria. The new control tower and fire station must meet certain emergency and security criteria, as well as functional space requirements. The control tower is currently under construction. This project would also include stormwater BMPs, including incorporation of bioretention areas, vegetated areas, and native landscaping.

Circulation Projects (Short-Term)

Circulation projects include significant improvements to the complex circulation systems at the Pentagon site to improve safety, security, and efficiency; create a strong pedestrian network; and improve sustainability features. Circulation projects would also increase green space and landscape islands and install new locker and shower facilities for bicyclists and pedestrians to promote alternative means of transportation. Refer to Section 3.6 (Circulation Projects) in the Pentagon Master Plan for additional information. Short-term circulation projects include:

- The **Pentagon South Pedestrian Safety Project** would reconfigure the South Parking Lot to increase and define sidewalks and crosswalks, install raised crosswalks with advanced pedestrian warning systems, implement signalized intersections and crosswalks, realign roadways and sidewalks to improve traffic flow, and reconfigure parking lanes on the west side of the lot to provide more efficient circulation. It would also connect pedestrian and bicycle circulation systems to Columbia Pike, install wayfinding signage, incorporate signed on-street bike routes, and replace existing lighting with LED fixtures.

  Refer to Section 3.6.1 of the Pentagon Master Plan, specifically page 3-30, which lists components of this project as items 1, 2, 4, 5, 6, 7, and 9.

- The **North Parking Lot Improvements Project** would install a new sidewalk along Boundary Channel Drive, retain the existing tree canopy and add regularly spaced trees along the roadway, install a new Boundary Channel Drive ACP, implement a tree-lined pedestrian path through the parking lot, add LED fixtures, and maintain the facility's ability to host special events. A portion of the LED lamping work has been implemented. This project would include stormwater BMPs, such as the incorporation of bioretention areas, vegetated swales, curbless parking lots, native landscaping, and tree box filters.

- The **Southeast Parking Project** would realign the Connector Road, North Rotary Road, and Eads Street intersection to create a signalized, four-leg intersection; convert Fern Street from a one-way to two-way road; install a traffic signal at North Rotary Road and Eads Street/Connector Road; and upgrade sidewalks in the South Parking lot. This project would also replace existing lighting with LED fixtures. This project would include stormwater BMPs, such as a bioretention basin between the Bus Loop Road and Connector Road, stormwater planters, and native landscaping.

Refer to Section 3.6.1 of the Pentagon Master Plan, specifically page 3-30, which lists components of this project as items 3, 8, and 9.

- The **Connector Road Bridge Upgrades Project** would upgrade and widen the sidewalks on the bridges over Route 110 and North Rotary Road to meet Americans with Disabilities Act (ADA) requirements.
- The **Connector Road and Boundary Channel Drive Intersection Improvements Project** would reconfigure the un-signalized intersection of Boundary Channel Drive and Connector Road to address safety and mobility issues. WHS is coordinating with the Virginia Department of Transportation (VDOT) on this project.
- The **Areawide Resurfacing and Rehabilitation Project** would periodically resurface and upgrade roadway and parking lot pavements at the Pentagon site by milling, patching, sealing, resurfacing, and restriping existing deteriorated pavements.
- The **Areawide Sidewalk Improvements Project** would replace deteriorated curbs, gutters, sidewalks, and driveways and add new ADA-compliant sidewalks.
- The **Metro Entrance Pedestrian ACP Project** would redevelop the employee screening facility and ACP at the Pentagon entrance adjacent to the Pentagon Metro station. The project would provide space for PFPA officers to work; integrate outdoor and indoor spaces; and improve safety, security, and operational efficiency. This project would include stormwater BMPs, such as incorporation of bioretention areas and vegetated swales.
- The **COR8 Pedestrian ACP Project** would construct a new, Leadership in Energy and Environmental Design (LEED)-certified building to house the Corridor 8 pedestrian ACP. A new single-story building, approximately 3,000 SF in size, would be constructed next to the Pentagon Library and Conference Center (PLC2) entrance and on an expanded Corridor 8 concrete walkway. The facility would house visitor areas with associated security equipment, a police officer's room, an interview room, and utility rooms. The pedestrian ACP would be connected to the North Secure parking lot by new walkways and an accessible ramp. The existing pedestrian bridge and structured ramp would also undergo structural repairs to fix issues with the retaining wall, concrete beams, and structural steel. The signs, lighting, bicycle racks, and communication and electrical utilities for the pedestrian ACP would be replaced, and a snow melt system would be embedded in the concrete outside the entrances. Project demolition would include removing the existing facility, approximately 7,500 SF of existing concrete and curbs, portions of the security fence, the gate, and utility and irrigation equipment. The project would also remove the retaining wall and the existing timber and gravel stairs and accessible ramp to the North Secure parking lot. Twenty ornamental trees would also be removed. Currently, 11,000 SF of the site is impervious (prevents precipitation from infiltrating the ground), and the project would increase the impervious area by approximately 8,300 SF. A 1,680-SF micro-bioretention facility would be constructed between the accessible ramp and stairs to the pedestrian ACP to treat site runoff. This project is currently under construction.
- The **Remote Delivery Facility Roof Project** would repair and convert the Remote Delivery Facility (RDF) roof helipad system into a helipad facility to sustain safe operation of the military helicopter fleet. The project would include structural changes and adjustments to the exterior site and its environmental, air traffic control, electrical, drainage, backfill, waterproofing, and irrigation systems.

Environment and Sustainability Projects (Short-Term)

Environment and sustainability projects include stormwater management and sustainable building strategies that would enable WHS to meet targets established by regulations, federal mandates, and other environmental drivers. The projects include implementing water quality improvement measures to meet Chesapeake Bay Total Maximum Daily Load (TMDL) pollutant load reduction requirements associated with the Pentagon site's municipal separate storm sewer system (MS4) permit. The Pentagon Master Plan also increases green space on the Pentagon site by 7.5 percent. Refer to Section 3.7 (Environment and Sustainability Projects) in the Pentagon Master Plan for additional information. Short-term environment and sustainability projects include:

- The **South Secure Parking Project** would help address stormwater management for the South Parking Lot Improvements and redesign the South Secure parking area to include bioretention areas along the pedestrian walkways and tree box filters near the Corridor 2 and 3 entrances. This project would result in the net gain of approximately 11 parking spaces.
- The **Tree Box Filters Project** would help address stormwater management for the North Parking Lot Improvements. This project includes the installation of tree box filters within the North Parking Area and in the Hayes, Fern, and Eads lots.
- The **North Parking Bioretention Project** would help address stormwater management for the North Parking Lot Improvements by installing approximately 14 bioretention areas across the North Parking Lot.
- The **Old East Loading Dock Project** would demolish the existing K-9 kennel building, and its supporting utilities and existing containment area; implement a bioretention area; and replace damaged storm sewer structures.
- The **Corridor 5 Parking Project** would demolish the existing helipad near the Corridor 5 parking area, expand the parking lot, regrade the parking lot, and install emergency call boxes and LED lighting. This project would result in the addition of approximately 24 parking spaces. This project would include stormwater BMPs, such as installation of three bioretention areas and incorporation of vegetated swales, curbless parking lots, native landscaping, and tree box filters.

Energy Projects (Short-Term)

Energy projects at the Pentagon site considered in the Pentagon Master Plan include those found in the Pentagon Installation Energy Plan, which are being implemented under a variety of funding and delivery programs, including the Energy Resilience and Conservation Investment Program. Energy projects at the Pentagon site considered in the Pentagon Master Plan also include UESC projects that were identified in the Phase 1 Feasibility Study prepared by Dominion Energy and Energy Systems Group to improve facilities and energy resilience on the Pentagon site (Dominion Energy Virginia and Energy Systems Group, 2021). Refer to Section 3.8 (Energy Projects) in the Pentagon Master Plan for additional information. Short-term energy projects at the Pentagon site include:

- The **Chilled Water Plant Improvements Project** is a UESC project that would address the need for modern chiller equipment. This project is expected to be complete by June 2024 and would result in savings of approximately $735,000 annually.
- The **Thermal Energy Storage (TES) Project** would be implemented to utilize off-peak electricity savings and achieve efficiencies through overnight operations. This project would install a

stratified chilled water TES tank adjacent to the HRP. The TES tank would use minimal pumping energy to provide chilled water to the HRP during certain times of the year as compared to operating chillers, which require much more energy (Dominion Energy Virginia and Energy Systems Group, 2021). This project would achieve utility bill savings, reduce peak electricity use, and allow existing backup generators to run for longer durations.

- The **Pilot Electric Vehicle (EV) Charging Stations Project** would help meet the Pentagon's plans to implement zero emissions infrastructure for its vehicle fleet in accordance with the Federal Sustainability Plan and EO 14057 (*Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability*). As a short-term pilot project, WHS would construct 10 EV dual port stations in the North Secure parking lot with the ability to charge 20 vehicles, as well as 3 solar charging stations. The long-term component of this project is discussed further in Section 2.1.2 (Construction, Renovation, and Demolition – Long-Term Projects).
- The Project **Recommissioning/HVAC Efficiency Upgrades Project** would identify mechanical failures or other inefficiencies in heating, ventilation, and air conditioning (HVAC) systems within the Pentagon building and correct them to optimize equipment performance.
- The **Lighting Improvements Project** is a UESC project that would replace existing interior and exterior linear fluorescent, compact fluorescent lamp (CFL), high-intensity discharge, high pressure sodium, and metal halide fixtures with new LED fixtures and UFC-compliant luminaire conversion kits and equip each new exterior LED roadway and parking lot fixture to automatically turn off when sufficient daylight is available. This project would include lighting improvements for multiple buildings on the Pentagon site. This project would result in savings of approximately $2,232,768 annually (Dominion Energy Virginia and Energy Systems Group, 2021).
- The **Domestic Water Improvements Project** is a UESC project that would modify water closets, urinals, bathroom faucets and aerators, and showerheads as an energy conservation measure to reduce domestic water consumption on the Pentagon site. This project would result in savings of approximately $1,445,364 annually (Dominion Energy Virginia and Energy Systems Group, 2021).
- The **Building Envelope Weatherization Project** is a UESC project that would repair, replace, or install weatherization materials (e.g., weather stripping, door sweeps) on exterior and interior entry doors and garage doors throughout the Pentagon site, replacing 15 exterior entry doors and 7 exterior high-speed garage doors. This project would result in savings of approximately $22,755 annually (Dominion Energy Virginia and Energy Systems Group, 2021).
- The **Irrigation Improvements Project** is a UESC project that would retrofit the existing irrigation systems with centrally controlled, weather smart irrigation software and moisture sensors that would automate irrigation based on climate, plant, and soil conditions; install master valves and flow meters to measure water use; and replace or retrofit spray heads. This project would result in savings of approximately $24,673 annually (Dominion Energy Virginia and Energy Systems Group, 2021).
- The **Refrigeration Improvements Project** is a UESC project that would correct operating deficiencies for 49 walk-in coolers and freezers in the Pentagon building's commercial kitchens. This project would reset temperatures, install weatherization materials, replace lighting, and install more energy-efficient equipment. This project would result in savings of approximately $13,007 annually (Dominion Energy Virginia and Energy Systems Group, 2021).

Energy projects at the Mark Center considered in the Pentagon Master Plan are found in the Final Washington Headquarters Services Installation Energy Plan – Mark Center Campus (WHS, 2022a). Short-term energy projects at the Mark Center include:

- The **North Parking Garage Solar Project** would install a canopy system with photovoltaic panels on the top level of the Mark Center's North Parking Garage and would include carport structures, racks, inverters, electrical integration infrastructure, and engineering analysis to ensure structural integrity and electrical coordination. The system would have a nominal capacity of 1,850 kilowatts (kW), generate approximately 2,181,600 kilowatt-hours (kWh) per year for use in the garage and main building, and enable the Mark Center to continue critical mission operations during extended outages. This project would result in savings of approximately $161,000 annually (WHS, 2022a).
- The **Facility Related Control System (FRCS) Modernization Project** would integrate existing building automation system software; supervisory controls and data acquisition software; and elevator, escalator, and fire safety system networks at the Mark Center. It would also replace outdated Delta controllers, install fiber optic cables, install a Human Machine Interface, and allow control sequences to be programmed to improve energy efficiency of existing systems and equipment. This project would result in savings of approximately 1 million kWh in electricity, 8,100 million British thermal units (MMBtu) in natural gas, and $130,000 in utility costs annually (WHS, 2022a).
- The **LED Lighting Upgrades Project** would replace approximately 14,000 fluorescent, halogen, and CFL lighting fixtures and 6,000 outdated LED fixtures with current industry standard LED fixtures to bring the Mark Center up to date with current lighting technologies. This project would result in savings of approximately 2 million kWh and $315,000 annually (WHS, 2022a).
- The **Electric Vehicle Charging Stations and Infrastructure Project** would include a pilot project to install 10 new dual-port charging stations and electrical infrastructure in the Mark Center's North Parking Garage, which would allow for the installation fleet managers to acquire additional zero-emissions vehicles (ZEVs) without worrying about refueling capabilities (WHS, 2022a).
- The **Optimize Data Center Performance Project** would implement modifications to optimize the current data center to meet industry best practices without major renovations. These modifications include installing blanket panels, sealing cutouts, running existing computer room air conditioner (CRAC) fans at lower speeds, and reducing the number of CRAC units in operation to increase efficiency and reduce cooling energy use. This project would result in savings of approximately 591,000 kWh and $51,700 annually (WHS, 2022a).
- The **Variable Speed Primary Hot Water Pumping Project** would convert the existing central plant boiler's constant-speed primary pumps to variable speed and program pump speed to run proportionally to boiler loads. This project would prolong motor life by reducing the pump speed during periods of low loading, thus saving approximately 40,000 kWh and $3,000 annually (WHS, 2022a).

2.1.2 Construction, Renovation, and Demolition—Long-Term Projects

Four long term construction, renovation, and demolition projects are included in the Pentagon Master Plan, including new facilities (some with land use changes) and energy projects. Below is a summary of each project WHS would execute under the Pentagon Master Plan over the next 6 to 20 years. Refer to

Section 3 of the Pentagon Master Plan for additional details regarding the proposed scope of each project. The studies and concepts for long-term projects are not sufficiently progressed to inform a meaningful environmental review and may require additional NEPA analysis (e.g., as a Categorical Exclusion [CATEX], as a supplement to this EA, or in an EA for the next Pentagon Master Plan) in the future when scopes are more well defined.

New Facilities and Land Use Change Projects (Long-Term)

Like the short-term projects in this category, these long-term projects are intended to modernize and consolidate Pentagon support facilities. Projects identified as long-term would be implemented over the next 6 to 20 years and are included in the Pentagon Master Plan as concepts for future land use and development. Long-term new facilities and land use change projects include:

- The **North Village and PSOC Green/Support Space Project** would reconsider potential uses for the eastern portion of the North Village, which is currently occupied by green space, landscape operations, and the Modular Office Complex (MOC). In the long term, functions assigned to the MOC would be relocated and the MOC would ultimately be demolished. The Pentagon Master Plan proposes that the green space area along the eastern edge of the North Village be expanded to cover the area vacated by the MOC demolition. This green space would function as a hybrid Green Space/Support land use, provide space for outdoor training and recreation, include landscape storage, and reduce impervious areas.
- [redacted]

The Master Plan also includes the following long-term feasibility study. However, this is not part of the Proposed Action evaluated in this EA because it is only a study, and future potential uses of the affected site cannot be appropriately defined (and their impacts cannot be evaluated) until after the study is completed:

- The **Army-Navy Drive OffSite Parking Lots Feasibility Study** would reconsider potential uses for the three parking lots located south of I-395: the Hayes Street, Fern Street, and Eads Street lots. These parking lots are identified under the Mixed Use/Support land use category. WHS proposes the parking lots be considered for land use types that provide a more positive impact than surface parking, such as commercial uses, support uses for the Pentagon, green space, and pedestrian and transit enhancements. However, development of these lots would be subject to many constraints; a feasibility analysis is needed before specific projects are identified. The Pentagon Master Plan proposes an effort to determine the base feasibility of development. If development is feasible, WHS proposes another focused effort to develop a vision for the parking lots and determine the final mix of uses and form of development.

Refer to Section 3.5 (New Facility and Land Use Changes Projects) in the Pentagon Master Plan for additional information.

Energy Projects (Long-Term)

Three long-term energy projects are considered in the Pentagon Master Plan and are found in the Pentagon Installation Energy Plan:

- The **Chiller Plant Upgrades Project** would retrofit or replace additional chillers at the HRP that were not replaced during the Chilled Water Plant Improvements Project.
- The **Pentagon-Wide ZEV Fleet Infrastructure Project** would allow WHS to meet their goals for a ZEV fleet. As mentioned in Section 2.1.1 (Construction, Renovation, and Demolition—Short-Term Projects), the Pentagon is implementing zero-emissions infrastructure for its vehicle fleet and would proceed with the Pilot EV Charging Stations Project as a short-term project. In the long term, WHS would implement the necessary infrastructure to realize a Pentagon-wide ZEV fleet, including upgraded Level 3 direct current fast charging stations at the pilot locations (in the North Secure Parking area) and four additional locations (two in the North Parking area and two in the South Parking area).

Refer to Section 3.8 (Energy Projects) in the Pentagon Master Plan for additional information.

2.1.3 Revision to Land Use Categorization

The Pentagon Master Plan generally retains the existing land use pattern at the Pentagon site with a few changes, including the addition of two new land use categories, changes in the acreage of certain land uses, and a slight modification in the naming convention of one land use category. The revisions will result in a total of eight types of land uses within the Pentagon site: Administration, Industrial/Utility, Support, Mixed Use/Support, Green/Open Space, Green Space/Support, Public Transportation, and Parking/Vehicular Access. The Pentagon Master Plan proposes land use category changes that would reduce impervious surfaces, reduce land dedicated to parking, increase green space, improve stormwater management, and provide opportunities for new support spaces. Refer to Section 3.3 (Land Use) in the Pentagon Master Plan and Section 3.1 (Land Use) in this EA for additional information.

The two new land use categories proposed by the Pentagon Master Plan are Mixed Use/Support and Green Space/Support. The new Mixed Use/Support land use category reflects the potential combination of uses for the Amy-Navy Drive parking lots, including the potential for private mixed use commercial development, support uses, public transportation, and green/open space. Under the Pentagon Master Plan, the eastern area of the North Village will transition from the Support land use designation to the new Green Space/Support designation. The new Green Space/Support land use category results from the potential hybrid use of green space in the North Village area, which would retain the general appearance of green space while being programmed to potentially contain minor facilities for support uses, such as outdoor training, recreation, and landscape and nursery storage.

The land use categorizations in the Pentagon Master Plan also reflect land acquisition activities that have occurred since the 2016 Master Plan Update. In the 2016 Master Plan Update, the Pentagon site boundary included the northern traffic cloverleaf at the intersection of Route 244 and SR 27. This 1.7-acre cloverleaf was owned by WHS at the time of the 2016 Master Plan Update, but the land has since been transferred to the Secretary of the Army for construction of a 9/11 Pentagon Memorial Fund Visitor Education Center. The current Pentagon Master Plan reflects this change in ownership and removes the cloverleaf from the Pentagon site boundary.

In the future, WHS also plans to acquire a parcel of land along Boundary Channel Drive from VDOT. However, this land would not be transferred until ongoing VDOT improvements along Boundary Channel Drive are completed. WHS and VDOT signed a Memorandum of Agreement associated with this transfer in 2022.

2.2 No-Action Alternative

The No-Action Alternative would not implement the Proposed Action. Under the No-Action Alternative, WHS would not meet DoD requirements for updating the Master Plan every 5 years and would continue to implement the 2016 Master Plan Update without any revisions or updates until the next major master planning cycle concludes. The No-Action Alternative would maintain the present course of action at the Pentagon site and Mark Center by continuing ongoing repair and maintenance activities. Changes can also occur in response to Congressional actions or revisions to building and safety codes; under the No-Action Alternative, WHS would presumably maintain and repair facilities in response to these requirements. The No-Action Alternative would not make revisions to the land use categorizations or include plans for land acquisition at the Pentagon site.

Typically, the No-Action Alternative would include no net growth or change in employee numbers or facilities at the Pentagon site or the Mark Center, with facilities being rehabilitated as necessary to maintain their functions. However, WHS has already begun a number of projects that will be implemented under both the Proposed Action and the No-Action Alternative. WHS would proceed as planned in accordance with the programmed projects of the 2016 Master Plan and other projects, which include the construction of buildings that are already in various stages of planning, design, and construction. These ongoing projects are:

- North Village Access Control Point
- Control Tower and Fire Day Station Project
- Southeast Parking Project
- Metro Entrance Pedestrian ACP Project
- Pentagon COR8 Pedestrian ACP Project
- Remote Delivery Facility Roof Project
- South Secure Parking Project
- North Rotary Road Security Fence and Bollards Project
- Tree Box Filters Project
- North Parking Bioretention Project
- Old East Loading Dock Project
- Corridor 5 Parking Project
- Lighting Improvements Project
- Domestic Water Improvements Project
- Chilled Water Plant Improvements Project
- Building Envelope Weatherization Project
- Irrigation Improvements Project
- Refrigeration Improvements Project
- Commercial Vehicle Inspection Facility Project
- Pilot EV Charging Stations

2.3 Alternatives Considered but Not Carried Forward

WHS considered other alternatives that were ultimately not carried forward in the Pentagon Master Plan and this EA. The alternatives included here were developed as part of the planning process based on discussions with WHS's master planning team. The following projects and/or concepts were considered but were eliminated due to the reasons specified below:

- WHS considered incorporating full EV and fleet electrification goals into the Pentagon Master Plan, but these efforts are still in the early planning stages. WHS recently finalized policies related to EO 14057 and is working toward implementing pilot projects instead, which are included in the Pentagon Master Plan and this EA.

- [redacted]

- WHS considered installing the TES tank at a location other than the HRP (in the southwest corner of the South Village where existing tanks currently exist), but this was determined infeasible due to space limitations and conflicts with existing structures and utilities in the vicinity.

3. AFFECTED ENVIRONMENT

During the internal scoping process, WHS identified several resource areas that would potentially be affected by the Proposed Action or the No-Action Alternative. This section discusses the affected resource areas and the resources present in the study area, including the baseline conditions of the area.

WHS identified one resource area (Geology Topography and Soils) that would only be minimally affected by the Proposed Action or the No-Action Alternative. This resource area is therefore not discussed further within this section.

3.1 Land Use

3.1.1 Pentagon

The Pentagon site Master Plan Area is approximately 245 acres. The Pentagon site includes the Pentagon and its associated structures, such as the 9/11 Pentagon Memorial, the North and South Villages, the Pentagon Transit Center (PTC), the Pentagon Heliport, and the RDF. The Pentagon site encompasses six land use types (Figure 3-1). Designated land uses for the Pentagon site include the following:

- *Administration*: This land use category serves administrative government purposes. The Pentagon building is the only administration land use on the Reservation.
- *Industrial/Utility*: This land use category provides utility services. This category includes the HRP in the southeastern edge of the site, an area next to the Pentagon Lagoon, and a building systems/utility facility adjacent to the River Terrace in the North Parking Lot.
- *Support*: This land use category includes auxiliary functions that support the Pentagon mission. This category includes the North Village, the area below the River Terrace, the Commercial Vehicle Inspection Facility (formerly designated as the SAL), and the RDF truck delivery entrance located on the western edge of the Pentagon site.
- *Green/Open Space*: This land use category includes areas with minimal constructed buildup and often contains green space such as grass and/or trees. The Pentagon site has 85 acres of green space. Green/Open Space land use areas on the Pentagon site include the Pentagon Center Courtyard, 9/11 Pentagon Memorial, River Terrace, David O. Cooke Terrace (RDF Roof), and green space along Boundary Channel Drive around the Pentagon Lagoon.
- *Public Transportation*: This land use category includes the PTC and is located southeast of the Pentagon building next to the Metro Entrance Facility (MEF) by Corridors 1 and 10. The PTC includes the Washington Metropolitan Area Transit Authority (WMATA) Metro system area and the public bus service area for Metrobus and several regional bus services. The Pentagon Metro Station, located below grade, provides access to the Blue and Yellow lines. The rideshare/slug lane and taxi drop-off areas are also part of this land use category.
- *Parking/Vehicular Access*: This land use category is the largest land use on the Pentagon site and includes two primary parking facilities: the North Parking Lot and the South Parking Lot. Other parking areas within the Pentagon site include the Pentagon Connector Parking Lot (located north of the HRP) and three parking lots south of I-395: Hayes Street Parking, Denison

Parking, and the Eads Lot. Each lot is permit-controlled. No structured or below-ground parking is available.

The Pentagon site is surrounded by commercial and residential areas to the south, a highway to the north and west, and a waterway to the east. The commercial and high occupancy residential areas, many of which are high-rise apartments, are directly south of the site in an area called Pentagon City. Washington Boulevard borders the west side of the Pentagon site, with ANC on the other side of the highway. The Potomac River is to the east, with Washington, D.C. on the other side of the river.

Land in the vicinity of the Pentagon site is controlled by other land use plans, such as the Comprehensive Plan for the National Capital, the Arlington County General Land Use Plan (GLUP), and the Columbia Pike Initiative, which are described below.

The Comprehensive Plan for the National Capital

The Comprehensive Plan for the National Capital is the overarching planning document for the District of Columbia. It has two components: the Federal Elements and the District Elements. The Federal Elements outline the NCPC's planning goals and policies for development on federal lands within the National Capital Region, which includes the Pentagon site and the Mark Center. Several policies of the Federal Elements apply directly to the Pentagon site and this Master Plan Update. Appendix B lists the policies of the Federal Elements that apply directly to the Pentagon site and this Master Plan Update (NCPC, 2021).

The Arlington County GLUP

The Arlington County GLUP is one of 11 components of the county's Comprehensive Plan. The GLUP is the lead policy for future development in Arlington County, setting out the overall character, extent, and location of various land uses (Arlington County, 2021a). The GLUP designates land within the Pentagon site into the following categories: residential, commercial and industrial, public and semi-public, office-apartment-hotel, and mixed use. The GLUP land designations for the areas immediately surrounding the Pentagon site include the following: "Public" lands to the east; "Public" and "Government and Community Facilities" lands to the north and west; and "Medium" to "High-to-Medium Residential" and "Low" to "High Office-Apartment-Hotel" lands to the south (Arlington County, 2021b).

The GLUP also includes supporting planning documents, including the *Columbia Pike Initiative—Update 2005* and the *Columbia Pike Neighborhoods Area Plan*. Planning documents related to Columbia Pike are relevant to the Master Plan, as the Pentagon site is situated at the east end of Columbia Pike and the roadway serves as a major transportation route for many commuters and visitors to the Pentagon site. Planning initiatives for the area resulted in the creation of the Columbia Pike Special Revitalization District in 1986, which was expanded in 2002, and the Columbia Pike Special Neighborhoods Revitalization District in 2013 (Arlington County, 2021a).

Columbia Pike Initiative

Founded in 1998, the *Columbia Pike Initiative* is an ongoing long-term development plan to revitalize communities along Columbia Pike. In 2012, the Arlington County Board implemented the *Columbia Pike Neighborhoods Area Plan* as a second phase of the *Columbia Pike Initiative*. The Neighborhoods Area Plan's goals include creating a pedestrian-friendly, multi-modal, and safe transportation corridor and

incorporating sustainable and "green" building design principles (Arlington County, 2012). In 2013, the County Board adopted the "Columbia Pike Special Neighborhoods Revitalization District Form Based Code" (amended in 2016), which implements the purpose and goals of the Neighborhoods Area Plan (Arlington County, 2016). Arlington County continues to create and implement supplemental plans and projects to revitalize the Columbia Pike area, such as the *Columbia Pike Multimodal Street Improvements* Project. The purpose of the Multimodal Street Improvements project is to make Columbia Pike more accessible for all users, with a particular focus on public transit, biking, and pedestrian functionality. Construction and implementation is ongoing, and recent subprojects include: upgrading and installing utility lines underground, enhancing pedestrian accessways accessibility, and installing new transit stations. While many of these projects have occurred or will occur a few miles west of the Pentagon site, construction and implementation of Segment A—the segment of Columbia Pike nearest the Pentagon site—began in 2022 (Arlington County, 2022a). Work on Segment A of Columbia Pike is one component of the Federal Highway Administration's (FHWA's) *ANC Defense Access Roads* Project. Among other actions, the ANC Defense Access Roads Project will realign Columbia Pike and modify the Columbia Pike and Washington Boulevard interchange, which is located southwest of the Pentagon site. The realignment will make room for a southward expansion of ANC. The ANC Defense Access Roads Project is slated to be complete by Summer 2025 (FHWA, 2022).

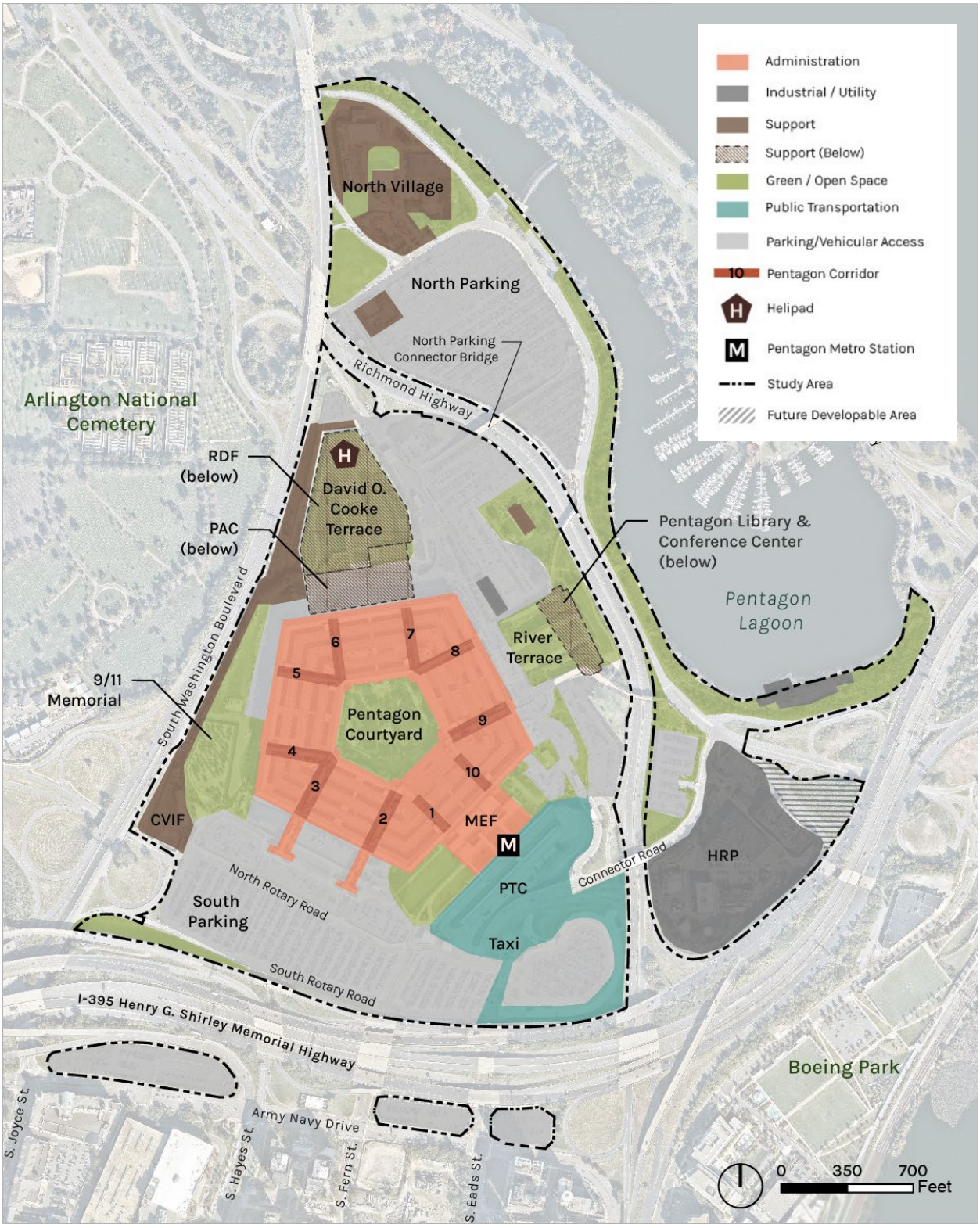


Figure 3-1. Land Use at the Pentagon (WHS, 2023b)

3.1.2 Mark Center

Located approximately 5 miles southwest of the Pentagon site in Alexandra City, Virginia, the Mark Center occupies 16 acres and serves as additional administration space for the DoD. The site supports the following four primary land uses (Figure 3-2):

- *Administration*: The Mark Center has two primary office tower buildings. The Mark Center East Tower is 17 stories, and the West Tower is 15 stories.
- *Public Transportation*: A public transit facility in the northeast section along Mark Center Avenue includes five bus bays; a large, sheltered passenger area; and information kiosks. This public transit facility is accessible via Mark Center Drive and Mark Center Avenue.
- *Parking/Vehicular Access*: The Mark Center contains three parking structures, related circulation space, service lanes, and two VACPs. One VACP is located northwest of Mark Center East Tower, next to the pedestrian entrance, and is used by government vehicles. The second VACP is located on the far east side of the Mark Center site and is used by commercial and construction vehicles.
- *Green/Open Space*: The periphery of the Mark Center site and areas between buildings and parking lots contain landscaped areas with open grass and trees.

The Mark Center falls within the National Capital Region and is subject to the policies of the Federal Elements portion of the Comprehensive Plan for the National Capital (NCPC, 2021). The Mark Center is also subject to the city of Alexandria Master Plan, which outlines the city's development goals and comprises 19 Small Area Plans covering neighborhoods throughout the city. The Mark Center is located within the Beauregard Small Area Plan and is zoned as Coordinated Development District #4, which is intended for mixed use (City of Alexandria, 2021a).

Figure 3-2. Land Use at the Mark Center (WHS, 2023b)

3.2 Hydrological Resources

3.2.1 Pentagon

Hydrological resources include surface waters, wetlands, and floodplains. The Boundary Channel, Pentagon Lagoon, Potomac River, and Roaches Run are surface waters in the vicinity of the Pentagon site. While no surface water bodies are located within the Pentagon site, the Boundary Channel and the Pentagon Lagoon are a contiguous water body located directly adjacent to the Pentagon site's northeastern boundary and feed into the Potomac River north and south of Lady Bird Johnson Park. The Boundary Channel and Pentagon Lagoon are constructed water features, and water typically flows from the north through the narrow channel and empties into the Pentagon Lagoon; however, the flow is reversed during the incoming tide (National Park Service [NPS], 2021). The Boundary Channel is a calm backwater channel. A small marina for boats is located at the northern end of the Pentagon Lagoon. Collectively, the Boundary Channel and Pentagon Lagoon encompass approximately 57 acres, are part of Washington, D.C., and are under National Park Service (NPS) jurisdiction (WHS, 2014). Roaches Run is a tidal basin measuring roughly 55 acres located approximately 0.2 miles southeast of the Pentagon site, which extends into a riverine habitat that feeds into the Potomac River (U.S. Fish and Wildlife Service [USFWS], 2020a). These water bodies are in the watershed of the Chesapeake Bay, which is located approximately 150 miles downstream from the Pentagon site.

The Pentagon site discharges to the Boundary Channel and the Pentagon Lagoon, which releases into the Potomac River. This segment of the Potomac River is identified as an impaired water body, meaning it has elevated pollutant levels that prevent it from fully supporting its designated uses under the Clean Water Act. Specifically, this segment of the river is impaired for primary contact (e.g., swimming) and secondary contact (e.g., wading) recreation and aesthetic enjoyment; protection and propagation of fish, shellfish, and wildlife; and protection of human health related to consumption of fish and shellfish. The pollutants identified as causing these impairments are *E. coli*, total suspended solids (TSS), chlorophyll *a*, dissolved oxygen, pH, and polychlorinated biphenyls (U.S. Environmental Protection Agency [U.S. EPA], 2020).

Water from the Pentagon Lagoon is pumped to the HRP for cooling and provides a portion of the supply for the irrigation systems at the Pentagon site (Dominion Energy Virginia and Energy Systems Group, 2021).

No wetlands are present within the Pentagon site. According to National Wetlands Inventory (NWI) data from the U.S. Fish and Wildlife Service (USFWS) lacustrine and riverine tidal wetlands are located along and associated with the Boundary Channel, Pentagon Lagoon, and Potomac River directly adjacent to the northeastern Pentagon site boundary (USFWS, 2020a; USFWS, 2020b). The NWI also identified two freshwater ponds located approximately 0.15 miles southeast of the Pentagon site, though review of recent aerial imagery indicates that these were filled during construction of the Long Bridge Aquatics & Fitness Center. Freshwater forested/shrub, freshwater emergent, freshwater pond, and lacustrine wetlands associated with Roaches Run are also located approximately 0.2 miles southeast of the Pentagon site (USFWS, 2020a; USFWS, 2020b).

A floodplain is the area along or adjacent to a stream or body of water that is capable of storing or conveying floodwaters. Floodplains in healthy ecosystems perform important functions, such as moderating peak flows, maintaining water quality, recharging groundwater, and preventing erosion. Floodplains also provide wildlife habitat, recreational opportunities, and aesthetic benefits. To protect these important floodplain characteristics and minimize future flood damage, EO 11988 requires agencies to reduce the risk of flood loss and minimize the impact of floods within the 100-year floodplain, defined as an area with a 1 percent or greater chance of flooding in any given year. Under EO 11988, each federal agency must determine if any of its actions would occur within a floodplain and evaluate the potential effects of actions within floodplains.

According to the Federal Emergency Management Agency's (FEMA's) National Flood Hazard Layer (NFHL) Viewer data, areas next to the Pentagon Lagoon, including Boundary Channel Drive, are located in the 100-year floodplain (FEMA, 2016; FEMA, 2021a). The northern portions of the Pentagon site, including North Village and North Parking, are within the 500-year floodplain with a 0.2 percent annual chance of flooding. FEMA is in the process of updating the flood hazard maps for Arlington County and released preliminary Flood Insurance Rate Maps (FIRMs) in 2020 and 2022. In these preliminary maps, the 500-year floodplain extends farther south along Richmond Highway and the Pentagon River Terrace; however, these floodplains are still subject to finalization (FEMA, 2022). Because extensive fill was used to raise the site during initial construction of the Pentagon, areas within the Pentagon site are not subject to serious flooding. However, storm surges caused by high tides, low barometric pressure, and wind from major storms have historically caused more extensive flooding than downstream flows. The effects of climate change may result in more severe flooding events in the future (WHS, 2023b).

Federal actions in Virginia must comply with the Coastal Zone Management Act (CZMA) (16 U.S.C. § 1451 et seq.), which is administered through the Virginia Department of Environmental Quality (VA DEQ) Coastal Zone Management Program. The CZMA was enacted in 1972 "to preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone" (16 U.S.C. § 1452). Virginia encompasses more than 5,000 miles of shorelines, and all of Arlington County is in Virginia's coastal zone (VA DEQ, 2022a; VA DEQ, 2022b). While federal properties such as the Pentagon site are not part of the coastal zone, any foreseeable effects on the coastal zone outside of federal property must be reviewed for consistency with the Virginia Coastal Management Program and undergo a consistency determination as required by the CZMA and the Federal Consistency Regulations (15 CFR § 930).

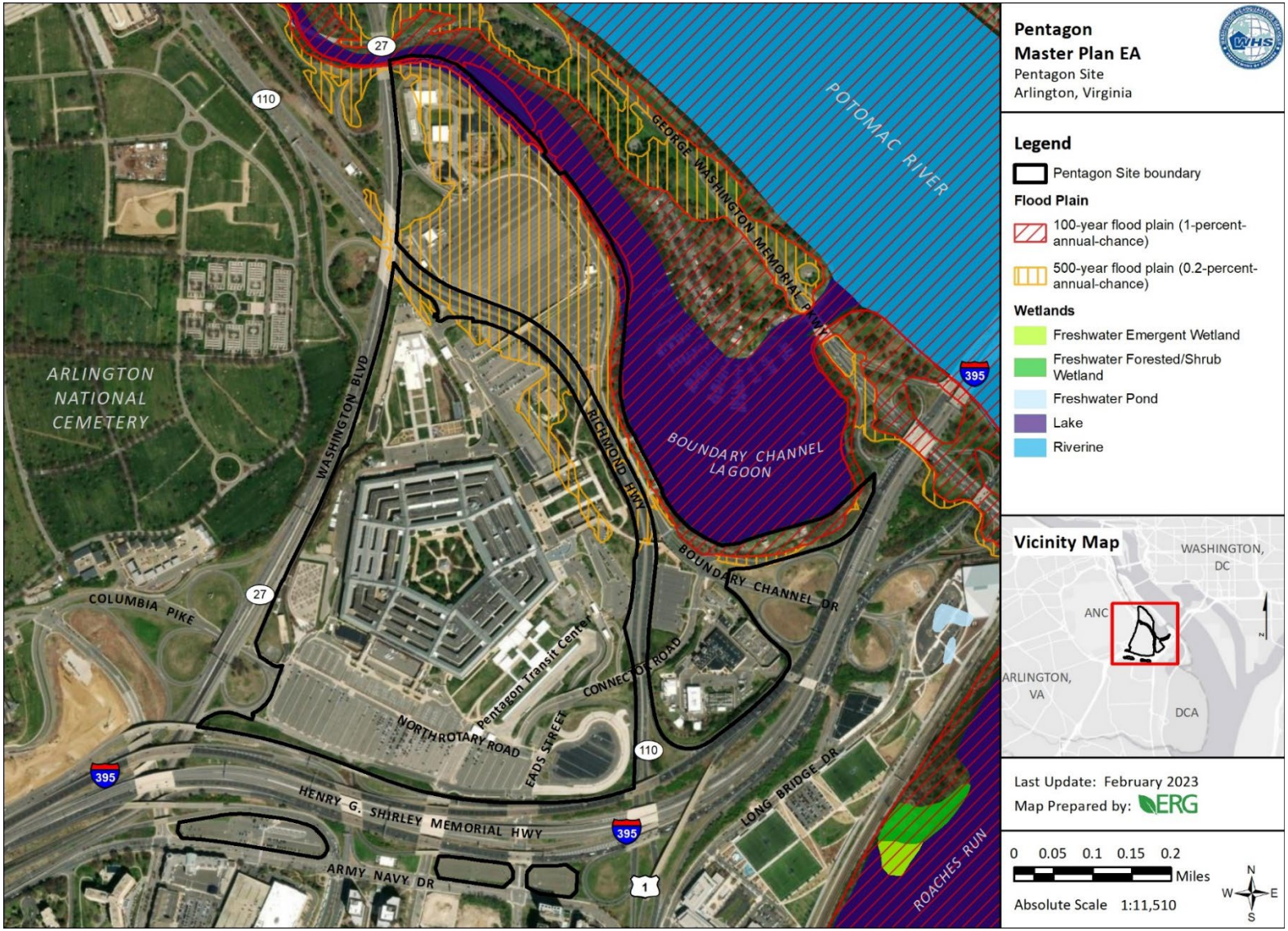


Figure 3-3. Water Resources in the Vicinity of the Pentagon Site

3.2.2 Mark Center

No surface water bodies or wetlands are located within the Mark Center site (USFWS, 2020a). However, according to the NWI Wetlands Mapper, a 0.24-acre freshwater pond, 1.01-acre freshwater pond, and 1.14-acre freshwater pond (known as the Winkler Botanical Preserve Pond) are located approximately 190 feet north, 340 feet north, and 650 feet southwest of the Mark Center site, respectively. In addition, a stream is located approximately 320 feet west of the Mark Center site, flowing between the ponds in a southwestern direction through the Winkler Botanical Preserve to Holmes Run (USFWS, 2020a). A freshwater forested/shrub wetland is also located approximately 0.1 miles northwest of the Mark Center boundary.

The FEMA NFHL Viewer data indicate that there are no areas within the Mark Center site in either the 100-year or 500-year floodplains (FEMA, 2021b). The nearest floodplain is a 100-year floodplain located approximately 0.4 miles northeast of the Mark Center. There are also 100-year and 500-year floodplains associated with Holmes Run, which are located approximately 0.45 miles southwest of the Mark Center at the closest point (FEMA, 2021b). Therefore, flooding at the Mark Center is infrequent and unlikely.

All of the city of Alexandria is in Virginia's coastal zone (VA DEQ, 2022b). While federal properties such as the Mark Center are not part of the coastal zone, any foreseeable effects on the coastal zone outside of federal property must still be reviewed for consistency with the state coastal management program (i.e., the Virginia Coastal Zone Management Program) as required by the CZMA and the Federal Consistency Regulations (15 CFR § 930). See Section 3.2.1 above for additional information on the CZMA.

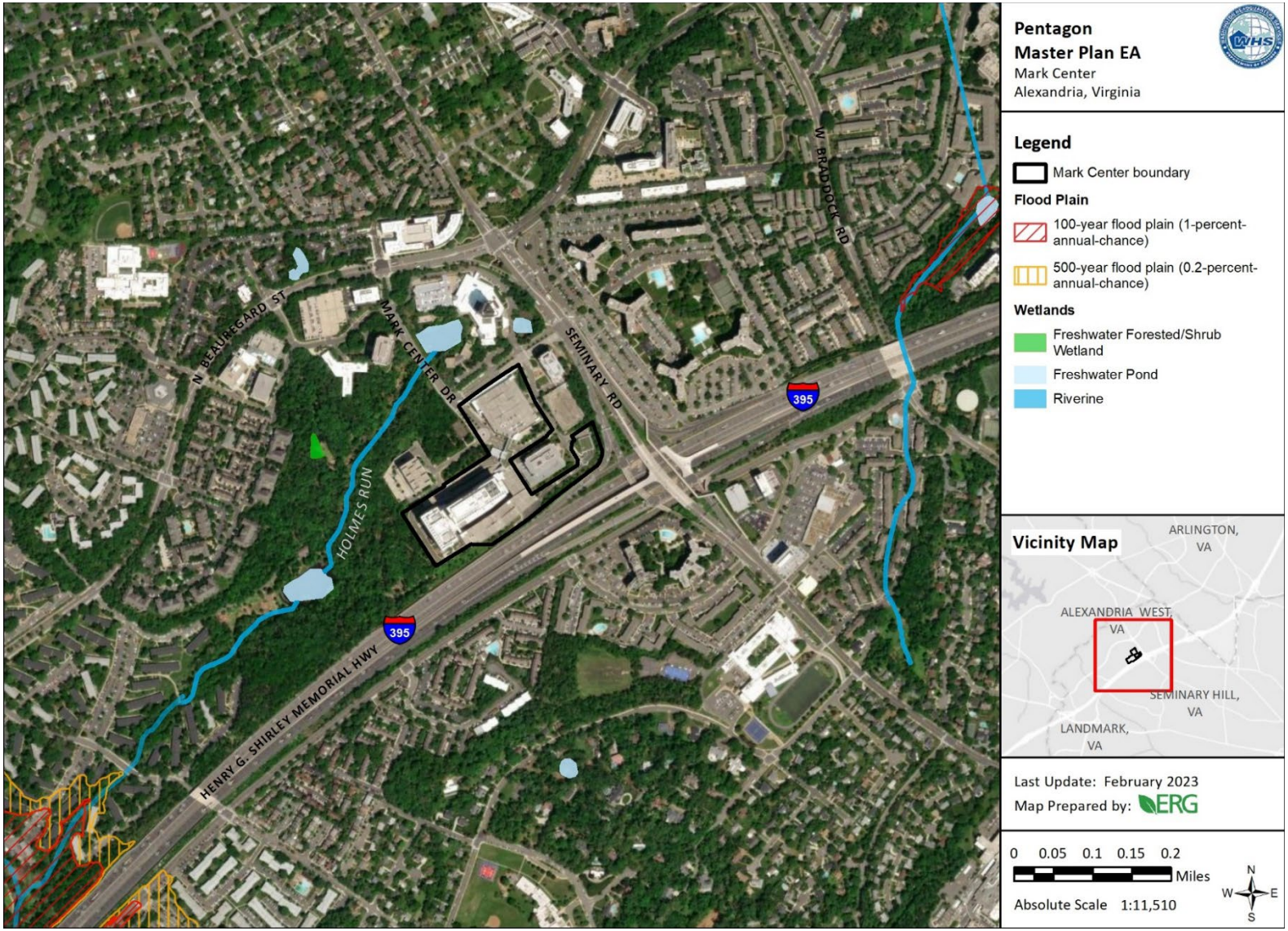


Figure 3-4. Water Resources in the Vicinity of the Mark Center

3.3 Stormwater Management

3.3.1 Pentagon

The Pentagon site is a highly urban and developed property, and the majority of the site has impervious surfaces that prevent precipitation from infiltrating into the ground and contributing to stormwater runoff. WHS owns and operates the Pentagon's MS4, which collects stormwater runoff from the Pentagon site and discharges the runoff into the Boundary Channel and Pentagon Lagoon via five outfalls. The Pentagon site's MS4 has interconnections with Arlington County, ANC, and VDOT's MS4s.

The WHS MS4 is covered under the General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Small MS4s (General Permit Number: VAR04013) which is administered by VA DEQ (VA DEQ, 2018). The General VPDES MS4 Permit requires a portion of total nitrogen (TN), total phosphorus (TP), and TSS load reductions by June 30, 2023, and full reductions by June 30, 2028, to meet Chesapeake Bay TMDL requirements. In accordance with the General VPDES MS4 Permit, WHS developed the WHS Chesapeake Bay TMDL Action Plan, which outlines how WHS will meet its required TN, TP, and TSS load reductions by June 30, 2023 (WHS, 2022b). There are multiple stormwater BMPs installed at the Pentagon site that collect and treat runoff before it is discharged. As of 2023, there are 14 bioretention facilities, 2 dry swales, 14 Filterra tree box filters, 6 hydrodynamic separators, a green roof, and a riparian buffer installed on the Pentagon site. Figure 3-5 shows stormwater BMPs at the Pentagon site.

In addition to Virginia's state laws, the Federal Energy Independence and Security Act requires any development or redevelopment project involving construction of a Federal facility that exceeds 5,000 SF of new impervious surfaces shall use site planning, design, construction, and maintenance strategies to maintain or restore, to the maximum extent technically feasible, the property's predevelopment hydrology (U.S. EPA, 2009).

The General VPDES MS4 Permit requires construction site stormwater runoff controls to be approved by a Virginia Erosion and Sediment Control Program (VESCP) authority and installed during construction activities. Either Arlington County Department of Environmental Services (DES) or VA DEQ can serve as the approving VESCP authority. If they disturb greater than 2,500 SF and less than 1 acre of land, construction projects at the Pentagon site may be required to obtain a Land Disturbing Activity permit from Arlington County DES. If they disturb 1 acre of land or more, the projects may require coverage under the General VPDES Permit for Discharges of Stormwater from Construction Activities (General Permit Number: VAR10) from VA DEQ (VA DEQ, 2019). All construction projects must comply with the Virginia Erosion and Sediment Control Law (VA. Code Ann. § 62.1-44.15:51-66) and Virginia Erosion and Sediment Control Regulations (9VAC25-840 et seq.). This law requires any land-disturbing activity exceeding 2,500 SF within the Chesapeake Bay Watershed to have an Erosion and Sediment Control Plan in accordance with VESCP standards and specifications.

The General VPDES MS4 Permit also requires that post-construction (i.e., permanent) stormwater management be approved by a Virginia Stormwater Management Program (VSMP) authority and installed on applicable project sites. Either Arlington County DES or VA DEQ can serve as the approving VSMP authority depending on the amount of land disturbance associated with a project. The size of a project's land disturbance also determines whether the project's permanent stormwater management must comply with Section 438 of the Energy Independence and Security Act of 2007 and UFC 3-210-10 Low Impact Development (DoD, 2020b). All projects at the Pentagon site must comply with the Virginia

Stormwater Management Act (VA. Code Ann. § 62.1-44.15:24-50) and Virginia Stormwater Management Program Regulations (9VAC25-870 et seq.).

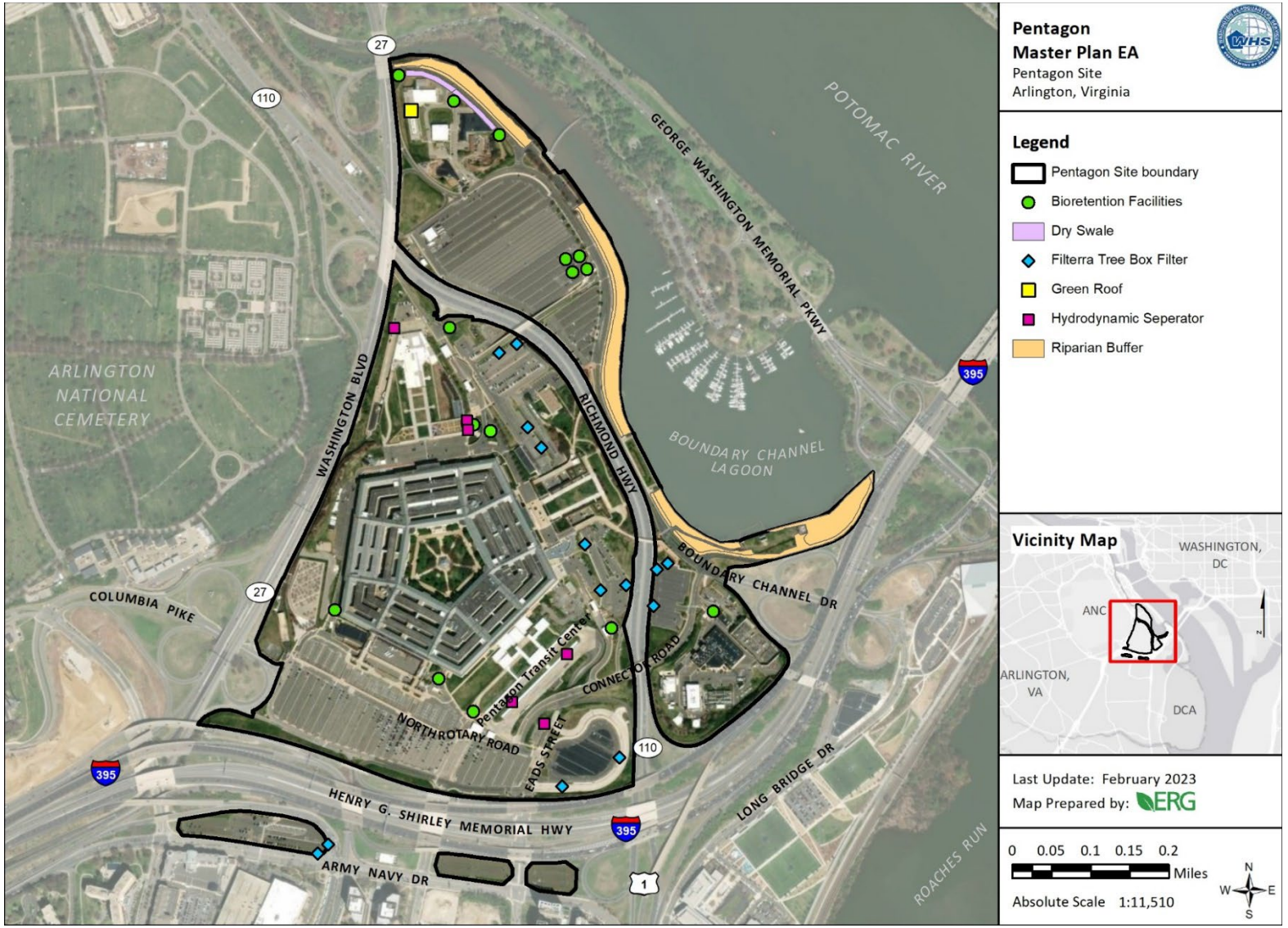


Figure 3-5. Pentagon Stormwater BMPs

3.3.2 Mark Center

The Mark Center is a highly urban and developed site, and the majority of the site includes impervious surfaces (preventing precipitation from infiltrating the ground), which contribute to stormwater runoff. WHS owns and operates the storm sewer infrastructure at the Mark Center. Stormwater from the Mark Center drains to the Winkler Botanical Preserve Pond, located offsite to the west. The pond was designed to meet stormwater management requirements for the surrounding area, including the Mark Center (U.S. Army Corps of Engineers [USACE], 2010). Stormwater BMPs at the Mark Center include two green roofs (one on the Visitor Control Center and another on the remote inspection facility) and one dry swale. The Mark Center does not have an MS4 permit.

Currently, the cooling tower blowdown water discharge is directed to the storm sewer (WHS, 2022a). WHS currently has a construction project underway to reroute the blowdown water from the stormwater system to the sanitary sewer.

3.4 Biological Resources

3.4.1 Pentagon

Because most of the Pentagon site is covered by impervious surfaces, vegetation and tree cover within the Pentagon site are minimal except along Boundary Channel Drive and the Pentagon Lagoon. The Pentagon site has approximately 79 acres of green space or open space, but these areas typically lack sufficient vegetation and/or sustainable plants (WHS, 2023b). There are currently several landscaped green spaces throughout the Pentagon site, including the David O. Cooke Terrace, the River Terrace, the Center Courtyard, and the 9/11 Pentagon Memorial.

Green/Open space land cover at the Pentagon site consists of approximately 68 acres of turf and vegetation. Most of the vegetation is ornamental, and mostly consists of grass, groundcovers, and trees planted during the initial construction of the Pentagon and subsequent building projects. However, large, vegetated areas and native habitat exist directly outside of the Pentagon site boundary. For example, Lady Bird Johnson Park, which is under NPS jurisdiction, is located northeast of the Pentagon site across the Boundary Channel. Roaches Run Waterfowl Sanctuary, also under NPS jurisdiction, is located southeast of the Pentagon site across I-395.

Landscaping standards throughout the Pentagon site vary depending on the zone as described in the Pentagon Exterior Standards Manual (ESM) (WHS, 2016b), but typically emphasize expansion and/or maintenance of green spaces, including tree-lined roadways, and emphasize or require the use of native vegetation that can withstand harsh growing conditions. Landscaping goals at the Pentagon site also promote construction practices that minimize adverse effects on natural habitat, pollution prevention, water and energy efficiency, and enhancement of quality of life by designing a pedestrian-friendly environment with natural amenities. Vegetation management incorporates effective and sustainable vegetation planning and supports compliance requirements that aim to restore ecological processes by increasing tree canopy and native vegetation. Turf grass is used for the majority of landscaping.

The WHS ESB's Natural Resources Management Program (NRMP) encourages the implementation of a standard operating procedure for horticultural operations to improve wildlife habitat and prevent impacts associated with chemical use on migratory birds, pollinators, and other wildlife species. Additionally, the NRMP encourages the restoration of native plant species that provide habitat and support for critical pollinators, such as the monarch butterfly (*Danaus plexippus*) and the rusty patched

bumble bee (*Bombus affinis*). The NRMP recommendations to restore native plant species extend to turf grass management, and the NRMP encourages that for any new lawn areas, locally adapted plant species should be fully established.

In 2007, WHS initiated a riparian buffer restoration project along approximately 9 to 10 acres of the Boundary Channel and Pentagon Lagoon shoreline within the Pentagon site boundaries. During this restoration effort, WHS eliminated many invasive and non-native species and replanted the buffer with native vegetation to restore local hydrological features. Design efforts resulted in an extensive, three-zone riparian buffer restoration project to restore the riparian area to a pre-development state from 2017 to 2020. The forest zone directly abuts the Boundary Channel and Pentagon Lagoon and consists of native canopy and understory trees (e.g., tulip poplar [*Liriodendron tulipifera*], white oak [*Quercus alba*], scarlet oak [*Quercus coccinea*]), small shrubs, and woody groundcover. The transition zone and the grass/herbaceous zone consist of native species to mimic meadows, thickets, and old field-type ecological succession (e.g., common blackberry [*Rubus allegheniensis*], Carolina rose [*Rosa carolina*]). Reestablishment of the hardwood tidal swamp along the immediate shoreline in the forest zone and establishment of grasslands in the transition and grass/herbaceous zones assists in the restoration of wildlife habitat and compliance with the Chesapeake Bay Preservation Act.

The Pentagon site's riparian area serves as habitat for a variety of beneficial wildlife species, including songbirds, raptors, bats, beavers, foxes, turtles, butterflies, and bees. The riparian restoration effort is expected to improve terrestrial habitat on the site, as well as the aquatic habitat conditions of the Boundary Channel, by reducing stormwater pollutant runoff, capturing nutrients and chemicals before they enter the water, and increasing shade along the shoreline to moderate water temperatures. Mowing and trimming vegetation in the riparian buffer is limited and typically only occurs along an approximately 4- to 6-foot-wide area along the sidewalks, in which vegetation is mowed and trimmed to prevent overgrowth from blocking the sidewalks. The conditions of the riparian area are regularly observed during monthly riparian inspection reports. Recent observations have found native plants blooming and providing habitat for pollinators, though these plants are being continuously threatened by heavy pressure from invasive plant species (e.g., porcelain-berry [*Ampelopsis brevipedunculata*], tree-of-heaven [*Ailanthus altissima*], English ivy [*Hedera helix*]) and less-desirable native species (e.g., poison ivy [*Toxicodendron radicans*]).

Most of this installed riparian buffer is also located within the area of land designated as a Resource Protection Area (RPA) by the Chesapeake Bay Preservation Ordinance of Arlington County (Arlington County Code Chapter 61). RPAs include streams, rivers, and water bodies, as well as the environmentally sensitive lands (e.g., wetlands) within 100 feet of these water resources (Arlington County Code § 61-5.B). RPAs reduce stormwater pollutant runoff, filter pollutants from runoff, provide an area for flooding to occur, minimize erosion, stabilize shores, offer wildlife habitat, provide noise reduction, and improve air quality (Arlington County, 2022b). As protected areas, most activities in RPAs require review and approval by Arlington County. The remainder of the Pentagon site outside of the RPA is designated as a Resource Management Area (RMA) by the Chesapeake Bay Preservation Ordinance (Arlington County Code Chapter 61). RMAs include lands contiguous to the entire inland boundary of RPAs and lands that, if improperly used, could significantly degrade or diminish the functional value of the RPA (Arlington County Code Chapter 61).

To ensure optimal ecosystem function within the RPA, the WHS NRMP encourages the following strategies in accordance with DoDI 4715.03 (*Natural Resources Conservation Program*): restore native vegetation and remove non-native and invasive vegetation; stabilize the bank; maintain integrity of the

RPA vegetation; gather scientific data on species populations and habitat health; enhance natural scenery to support tenant and military fitness, well-being, and recreation; and increase public awareness of ways to help conserve and manage natural resources (DoD, 2018b).

Since 2014, some projects identified in the last Master Plan have begun construction (i.e., North Village ACP, Control Tower and Fire Day Station, Pentagon COR8 Pedestrian ACP) and have resulted in the removal of trees on the interior of the Pentagon site. However, tree removal has been minimal, most trees removed were non-native and ornamental and were replaced with native vegetation, and the overall number of trees on the interior of the Pentagon site has decreased only by a minor amount. Additionally, WHS has made efforts to increase the overall number of trees on the Pentagon site by planting young, native trees in the riparian area. Specifically, from 2017 to 2020, WHS increased the extent of the riparian forest from approximately 2.54 acres to 3.40 acres. In 2020, Arlington County also planted approximately 425 trees and 50 shrubs in the riparian area.

WHS used the Virginia Department of Conservation and Recreation's (DCR's) Virginia Natural Heritage Database Search to identify vascular and non-vascular plants in Arlington determined to be critically imperiled, imperiled, vulnerable, endangered, threatened, candidate, and/or species of concern. The Natural Heritage Database Search indicates that in Arlington, one vascular plant (Torrey's Mountain-mint [*Pycnanthemum torreyi*]) is listed with a state and global conservation status as critically imperiled, a federal legal status as a species of concern, and a state legal status as proposed threatened (DCR, 2022a).

A review of the USFWS Information for Planning and Consultation (IPaC) database indicates that 1 Endangered Species Act (ESA)-listed endangered species (northern long-eared bat [*Myotis septentrionalis*]), 1 ESA candidate species (monarch butterfly [*Danus plexippus*]), and up to 20 migratory bird species have the potential to occur at the Pentagon site (USFWS, 2023a). According to the Virginia Department of Wildlife Resources (formerly the Virginia Department of Game and Inland Fisheries [VDGIF]) Virginia Fish and Wildlife Information Service (VaFWIS) database, 580 animal species are known or likely to occur within a 2-mile radius of the Pentagon site. Atlantic sturgeon (*Acipenser oxyrhynchus*) is also listed as endangered, is protected by the ESA, and is known or likely to occur within a 2-mile radius of the Pentagon site (USFWS, 2022; VDGIF, 2022a). The VaFWIS report includes four state-listed endangered species (Atlantic sturgeon, little brown bat [*Myotis lucifugus*], tri-colored bat [*Perimyotis subflavus*], and brook floater [*Alasmidonta varicosa*]) and five state-listed threatened species (northern long-eared bat, wood turtle [*Glyptemys insculpta*], loggerhead shrike [*Lanius ludovicianus*], Appalachian grizzled skipper [*Pyrgus wyandot*], and migrant loggerhead shrike [*Lanius ludovicianus migrans*]) (VDGIF, 2022a).

To supplement the screening-level IPaC and VaFWIS database review tools, ESB held informal discussions with USFWS and VDGIF in 2019 to further assess the potential occurrence of listed species and help determine whether actions at the Pentagon site could reasonably be expected to affect federal- and state-listed species. The outcomes of these informal meetings for particular species are described as follows:

- **Federal- and state-listed threatened and endangered bats.** USFWS stated that the Pentagon site does not contain enough forest habitat to support northern long-eared bat (foraging or home range), as females require 200 acres of either continuous or dissected forest within their home range (C. Keller, personal communication, June 26, 2019). VDGIF concurred with USFWS, stating that there would be little to no potential for state-listed threatened or endangered bats

to be present at the Pentagon site, and any slight potential for occurrence is limited to summertime (R. Reynolds, personal communication, August 27, 2019).

- **Federal- and state-listed endangered fish.** VDGIF noted that adult Atlantic sturgeon are expected in the main stem of the Chesapeake Bay but would not be expected in tributaries like the Boundary Channel since the species spawns in hard habitats like riprap and needs a hard, clean substrate. However, it is possible that juvenile Atlantic sturgeon could move through the area as temporary residents, and VDGIF would be concerned about in-stream work in the Boundary Channel (B. Greenlee and A. Ewing, personal communication, August 30, 2019).
- **State-listed threatened birds.** VDGIF stated that it would not expect state-listed bird species at the Pentagon site (J. Cooper, personal communication, March 25, 2020).
- **State-listed threatened reptiles.** VDGIF stated that the state-listed threatened wood turtle would not be expected to be present at the Pentagon site (J. Kleopfer, personal communication, August 28, 2019).
- **State-listed threatened and endangered invertebrates.** VDGIF noted that the state-listed endangered brook floater has been found in the Potomac River, but much farther up the river near Leesburg. However, the river in the Pentagon area is not under Virginia jurisdiction and the D.C. government does not usually do surveys in the stretch of the river near the Pentagon site (B. Watson, personal communication, August 28, 2019). VDGIF recommended discussions with the Virginia DCR Natural Heritage Program regarding the potential presence of Appalachian grizzled skipper at the Pentagon site because VDGIF does not have jurisdiction over that species (A. Ewing, personal communication, August 30, 2019). To date, ESB has not held informal discussions with the Virginia DCR Natural Heritage Program regarding the potential occurrence of Appalachian grizzled skipper at the Pentagon site.

Since 2012, WHS has conducted various wildlife surveys to characterize the species and habitats present on the Pentagon site. Based on the surveys, there is little potential for listed species to be present at the Pentagon site. Additionally, impervious surfaces cut off any greenways that might allow terrestrial wildlife to migrate between the vegetated areas on the site, which limits the potential number and types of species to be present on site. The western portion of the Boundary Channel has the greatest potential for bird and wildlife habitat at the Pentagon site due to the herbaceous vegetation present along its banks. At low tide, mud flats are exposed along the northern portion of the Boundary Channel and Pentagon Lagoon, which provides foraging areas for shore and wading birds. Additionally, bald eagles (*Haliaeetus leucocephalus*) may be seen hunting along the Potomac River or Boundary Channel. Summaries of recent surveys are provided below.

- In the spring of 2012, a survey was conducted to assess habitat and the possible presence of state and federally protected bird species (REMSA, Inc., 2012). The survey recorded 41 bird species present on the site and observed several bird nests constructed in previous years, particularly near the margins of the Boundary Channel, indicating that the Pentagon site has some patches of suitable breeding habitat for residential birds. However, the survey found that no suitable habitat was present for listed avian species, and the chance of listed species being present was negligible.
- In 2012, spring and summer fish surveys in the Boundary Channel collected a total of 28 species representing 12 families (McInnch, 2012).

- In the fall and spring of 2018, bird surveys detected 261 individuals representing 41 bird species (Luther, Clark, and Coddington, 2018a). The fall survey detected 1,569 individual birds (mostly from large flocks of invasive species) representing 37 species, with 11 of these species not detected in the spring survey (Luther, Clark, and Coddington, 2018b).
- In the summer of 2018, a fish survey of the Boundary Channel collected a total of 26 species representing 12 families (McInnich, 2018). No state- or federal-listed threatened or endangered species were collected.
- In 2018, a macroinvertebrate survey of the Boundary Channel detected 11 species (WHS, 2018). No state or federally listed macroinvertebrate species were detected. Because certain species of macroinvertebrates can be sensitive to pollution, the variety of species detected indicated that the water was moderately clean.

Pest management at the Pentagon site is guided by DoDI 4150.07 (DoD Pest Management Program). At the Pentagon site, some insects and small rodents may be considered pests (e.g., ants, cockroaches, rats, mice). The WHS NRMP encourages the use of integrated pest management to mitigate pest damage with the least possible risk to environmental and human health. The NRMP has recommended halting the use of anticoagulant rodenticides for rodent population control on the Pentagon site and proposed implementation of alternative strategies for pest management to prevent lethal and otherwise harmful effects on non-target species (DoD, 2019).

3.4.2 Mark Center

The Mark Center consists mostly of buildings and paved impervious surfaces with limited ornamental vegetation. However, large vegetated areas and native habitat exist directly outside of the Mark Center site. The Winkler Botanical Preserve, located directly adjacent to the western boundary of the Mark Center, is a private preserve open to the public that consists of 44 acres of green space, including woods and native plants (Mark Center Services, LLC, 2021).

An RPA along Holmes Run has been designated by Article XIII (Environmental Management) of the Zoning Ordinance of the city of Alexandria, Virginia. A small portion of the RPA intersects the southwestern boundary of the Mark Center site. RPAs in Alexandria include sensitive lands that have water quality value, such as streams, rivers, and other water bodies; wetlands; and other environmentally sensitive lands within 100 feet of these water resources (Alexandria Zoning Ordinance Article XIII). As protected areas, most activities in RPAs require review and approval by the city of Alexandria (Alexandria Zoning Ordinance Article XIII). The remainder of the Mark Center land not within an RPA is designated as an RMA.

A review of DCR's Virginia Natural Heritage Database Search indicates that in the city of Alexandria, no vascular or non-vascular plants occur that are determined to be critically imperiled, imperiled, vulnerable, endangered, threatened, candidate, and/or species of concern (DCR, 2022b).

A review of the USFWS IPaC database indicates that 1 ESA-listed endangered species (northern long-eared bat), 1 ESA candidate species (monarch butterfly), and up to 20 migratory bird species have the potential to occur at the Mark Center (USFWS, 2023b). According to the VDGIF VaFWIS database, 746 animal species are known or likely to occur within a 2-mile radius of the Mark Center. The VaFWIS report includes four state-listed endangered species (Atlantic sturgeon, little brown bat, tri-colored bat, and brook floater) and eight state-listed threatened species (northern long-eared bat, yellow lance [*Elliptio lanceolata*], wood turtle, peregrine falcon [*Falco peregrinus*], loggerhead shrike, Henslow's

sparrow [*Centronyx henslowii*], Appalachian grizzled skipper, and migrant loggerhead shrike) (VDGIF, 2022b).

In informal discussions between VDGIF and ESB, VDGIF confirmed that there would be little to no potential for listed bat, bird, or turtle species to be present at the Mark Center (R. Reynolds, personal communication, August 27, 2019; J. Cooper, personal communication, March 25, 2020; J. Kleopfer, personal communication, August 28, 2019). VDGIF also noted that Atlantic sturgeon would not be expected in tributaries like Holmes Run, which is located west of the Mark Center, but VDGIF would be concerned about in-stream work (B. Greenlee and A. Ewing, personal communication, August 30, 2019). VDGIF would also be concerned about in-stream work in regards to brook floater and yellow lance, as there is some uncertainty about their potential presence (B. Watson, personal communication, August 28, 2019). To date, ESB has not held informal discussions with the Virginia DCR Natural Heritage Program regarding the potential occurrence of Appalachian grizzled skipper at the Mark Center.

3.5 Cultural and Historic Resources

3.5.1 Pentagon

Several buildings and structures at the Pentagon site have been evaluated to determine their cultural and historical significance, as well as their eligibility for listing on the National Register of Historic Places (NRHP). The Pentagon Office Building Complex was listed on the NRHP in 1989 (DHR ID 000-0072); it was also designated as a National Historic Landmark in 1992 and is included on the Virginia Landmark Register. The Pentagon Office Building Complex is considered historically significant because of the unique architecture and its significance as a feat of engineering, as well as its association with famous events and people that have influenced America's role in the post-World War II era. In addition, the Pentagon serves as the international symbol of America's emergence as a military "superpower."

The Pentagon Office Building Complex, as described in the original NRHP listing, consists of the following five elements:

- The five outer façades of the Pentagon building.
- The 5-acre central courtyard.
- The Mall Terrace entrance.
- The River Terrace entrance.
- The distinctive five-sided shape of the building.

NRHP Nomination Form Update

WHS is in the process of updating the NRHP listing for the Pentagon Office Building Complex to document the Pentagon Renovation program, the events of 9/11, the Phoenix Project to rebuild the west façade, and the National 9/11 Pentagon Memorial; to clarify and adjust the historic district boundary; to identify the complex as a historic district; and to clarify the identification of character-defining features. WHS anticipates that this update will be finalized in 2023 and will expand the boundary and list of contributing resources to include the PLC2 and the National 9/11 Pentagon Memorial (WHS, 2022c).

The Pentagon Historic District has retained historical significance due to its continued contributions in sustaining the United States' role as a global superpower; the careful preservation of original exterior veneers and character-defining Stripped Classical features; and the continued innovative engineering in maintaining the Pentagon complex's relevancy and security during the Pentagon Renovation Program (2001–2011) and Phoenix Project (2001–2002). Its importance in social history is evident in the original context and retained due to the continued adoration, fear, and protests the Pentagon has provoked since its construction. Since its 1989 NRHP listing, the Pentagon Historic District has gained additional exceptional significance on the national level under NRHP Criteria A and B in the areas of Military, Politics/Government, and Social History, and NRHP Criteria A and C in the areas of Engineering, Landscape Architecture, and Commemoration in direct association with the al-Qaeda terrorist attack on September 11, 2001 (9/11) and its aftereffects. Additionally, despite being a commemorative property and achieving significance within the last 50 years, the National 9/11 Pentagon Memorial possesses exceptional significance through its design, age, tradition, or symbolic value (Criterion Consideration F) and exceptional importance due to its association with 9/11 (Criterion Consideration G).

The proposed updated Pentagon Historic District boundary encompasses 48.4 acres and contains 4 historic resources previously listed in the NRHP as contributing to the district. In the 1989 NRHP listing, the Pentagon Office Building was counted as two contributing "elements," its façades being one and its pentagonal plan being the other; it would now be counted as one contributing building per current NPS standards. The Courtyard, Mall Terrace, and River Terrace were previously listed in the 1989 listing as three contributing "elements" and would now be counted as three contributing sites. The pentagonal Food Stand at the center of the Courtyard was not addressed in the 1989 listing and would be added as a non-contributing building, as it is a 2006 replacement of two previous food stands. The PLC2, which is located under a portion of the River Terrace in the former location of the Pentagon Athletic Center (PAC), would be included as a newly contributing building because it also was not addressed in the 1989 listing, though the majority of it was within the historic property boundary. The National 9/11 Pentagon Memorial with a strip of land representing the flight path would be included as one new contributing site (WHS, 2022c). Table 3-1 and the following narrative provide details regarding these resources within the Pentagon Historic District, as proposed by WHS (WHS, 2022c).

Table 3-1. Resources Within the Pentagon Historic District (Including WHS-Proposed Updates)

Virginia Department of Historic Resources No.	Name	Location	Construction Date	Resource Type	NRHP Status
000-0072-0001	Pentagon Office Building	Between Washington Blvd (SR 27), Richmond Highway (SR 110), and Shirley Highway (I-395)	1941–1943	Building	Contributing
000-0072-0002	Pentagon Courtyard	Center of Pentagon	1941–1943	Site	Contributing
000-0072-0003	Food Stand	Center of Pentagon	1941–1943; replaced 2006	Building	Non-contributing
000-0072-0004	Mall Terrace	North Side—Elevated Parking Lot	1941–1943	Site	Contributing

Table 3-1. Resources Within the Pentagon Historic District (Including WHS-Proposed Updates)

000-0072-0005	River Terrace	East Side—Tiered Terrace to Lagoon	1941–1943	Site	Contributing
000-0072-0006	Pentagon Athletic Center (historic); PLC2 (current)	Below middle of River Terrace between historic SR 110 and current SR 110 road alignments	1941–1943	Building	Contributing
0000-0072-0007	National 9/11 Pentagon Memorial	West Side—1 North Rotary Road	2006–2008	Site	Contributing

Source: (WHS, 2022c)

The Pentagon Office Building (Virginia Department of Historic Resources [VDHR] No. 000-0072-0001): The 6.5 million-SF Pentagon Office Building covers approximately 29 acres around a 5-acre, 5-sided Courtyard (000-0072-0002). It contains 5 trapezoidal-plan segments; 5 concentric, pentagonal rings wrapping around the 5 segments; 10 corridors connecting the concentric rings with 2 corridors in each segment; 5 full upper stories; and a partial basement and mezzanine. The Pentagon Office Building retains integrity of location, design, setting, materials, workmanship, feeling, and association (WHS, 2022c).

***Courtyard (VDHR No. 000-0072-0002)*:** The Pentagon Courtyard at the center of the Pentagon Office Building (000-0072-0001) is five acres of open green space containing six paths that converge at a pentagonal patio and a more substantial, pentagonal Food Stand (000-0072-0003). Entrances to the Courtyard are located within pentagonal towers at the vertex of its five corners. A wide concrete vehicular roadway, pentagonal in plan, runs around the perimeter. Five smaller poured concrete sidewalks extend from each corner entrance. The sixth, wider pathway connects the front door of the Food Stand to a poured concrete and brick stage on the rear elevation of the Mall Entrance to the north. The Courtyard retains substantial integrity of location, design, setting, materials, workmanship, feeling, and association, and therefore, contributes to the Pentagon Historic District (WHS, 2022c).

***Food Stand (VDHR No. 000-0072-0003)*:** Located at the center of the Pentagon Office Building (000-0072-0001) and Courtyard (000-0072-0002), the Courtyard Food Stand originally consisted of a hot dog stand with what appears to be a circus tent for a shelter in the middle of a circular, poured concrete patio. It was allegedly referred to as Café Ground Zero because Soviets marked it as a target during the Cold War (1947–1992). Constructed in 2006, the current Food Stand is a slightly larger pentagonal building that now houses an Au Bon Pain. While maintaining a Food Stand at this location is character defining to the Pentagon Historic District, the current Food Stand, due to its age and unexceptional design, is not character defining and does not contribute to the Pentagon Historic District (WHS, 2022c).

***Mall Terrace (VDHR No. 000-0072-0004)*:** Attached to the north side of the Pentagon's Mall Entrance, the Mall Terrace originally consisted of a small, 600-by-125-foot elevated parking terrace level to the first floor and rested atop a basement-level area that held building maintenance support facilities. It now overlooks the David O. Cooke Terrace (dedicated in 2002) to the north, which is on top of the RDF and the relocated PAC. Despite the addition of the RDF, the PAC, and Cooke Terrace, the Mall Terrace retains enough integrity of location, design, setting, materials, workmanship, feeling, and association to contribute to the Pentagon Historic District. A small portion of the PAC is located within the lower-level interior under the historic parking lot and is therefore part of the district (WHS, 2022c).

***River Terrace (VDHR No. 000-0072-0005)*:** Attached to the east side of the Pentagon River Entrance, the River Terrace overlooks the Pentagon Lagoon, the Potomac River, and the monuments in Washington, D.C. It extends 900 feet from the east façade to the ceremonial landing dock on the lagoon. The River Terrace consists of four parts. Part 1 of the River Terrace at the west end is largely unchanged with an elevated, three-row asphalt parking lot. Originally a reinforced concrete structure on a slab of concrete, it was completely rebuilt within the interior but retains original exterior materials. Part 2 of the River Terrace contains the green roof of part of the Health Clinic at the west end, three bridges, and the green roof of the PLC2 at the east end. Part 3 of the River Terrace includes monumental limestone stairs and alcoves, which are within the east elevation of PLC2. Part 4 of the River Terrace contains the Ceremonial Dock. The River Terrace retains substantial integrity of location, design, setting, materials, workmanship, feeling, and association, and therefore, contributes to the Pentagon Historic District (WHS, 2022c).

***Pentagon Library and Conference Center (VDHR No. 000-0072-0006)*:** PLC2 is located under the River Terrace (000-0072-0005) between the old and new SR 110 alignment in a space previously occupied by the PAC before it was relocated in 2002. The 120,000-SF space includes the Army library, a conference center, and a logistical area. The conference center holds 14 conference rooms; a 250-person-capacity, multi-purpose room with a stage; and a cafeteria capable of facilitating catering for conferences. PLC2's exterior retains integrity of location, design, setting, materials, workmanship, feeling, and association, and therefore, contributes to the Pentagon Historic District (WHS, 2022c).

***National 9/11 Pentagon Memorial (VDHR No. 0000-0072-0007)*:** The National 9/11 Pentagon Memorial is located south and east of the Air Force Memorial, SR 27, and a parallel multi-use recreational trail; north of the South Parking lot; and west and northwest of the Pentagon South Parking Entrance. Formerly the Pentagon Heliport Entrance (1955–2001), this 2-acre site was selected because it is situated approximately 150 feet from the point of impact where 5 hijackers crashed American Airlines Flight 77 into the building's west façade on September 11, 2001. The central focus of the memorial is the arrangement of 184 Memorial Units, each consisting of a 14-foot-long, wing-like cantilevered bench situated over a pool of flowing water. The Memorial Units are shaded by 85 paperbark maple trees. Other key design elements of the memorial include the Zero Age Line, a granite band in the pavement embedded with lettering that says, "SEPTEMBER 11, 2001 9.37 A.M."; 84 additional, parallel Age Lines that also follow the flight path; the Age Wall, which increases 1 inch in height each time it intersects an Age Line; the Birth Year Bench, which encompasses the gravel area containing the Memorial Units; the Locator Stone, listing the names and birth years of all 184 victims; the Children's Bench, a narrow, trapezoidal nook surrounded on three sides by a low wall; and planters and other landscaping. The National 9/11 Pentagon Memorial retains exceptional integrity of location, design, setting, materials, workmanship, feeling, and association, and therefore, contributes to the Pentagon Historic District (WHS, 2022c).

Table 3-2 identifies the character-defining features of the six contributing resources within the Pentagon Historic District, as proposed by WHS (WHS, 2022c).

Table 3-2. Character-Defining Features of Contributing Resources Within the Pentagon Historic District (Including WHS-Proposed Updates)

Contributing Resource	Character-Defining Features
Pentagon Office Building	• Flexibility of interior spaces • Stripped Classical features • Clear pentagonal plan • Connecting corridors • Stone veneer • Rooflines • Unobstructed viewsheds from Floors 2 through 4 • Utilitarian simplicity and concrete finish of the elevations surrounding the Courtyard • Southeast Façade (PTC Entrance): Function as a transit center; viewshed of adjacent long transit loop and major transportation infrastructure; remaining original materials and fenestration pattern • Southwest Façade (South Parking Entrance): Function as the South Parking hub; viewshed of the South Parking Lot and Shirley Highway; remaining original materials and fenestration pattern • West Façade (Phoenix/Memorial Entrance): Entire elevation, particularly its symbolic lighter limestone and charred block; viewshed of the National 9/11 Pentagon Memorial • North Façade (Mall Entrance): Materials; fenestration; open viewshed of the lower-level terraces • East Façade (River Entrance): Materials; fenestration; open viewshed of the terrace, particularly the parade ground, lagoon, and Washington, D.C.
Courtyard	• Pentagonal driveway • Layout of the six paths • Pentagonal patio at the center • Structure-free greenspace, including the outer pentagonal garden bed and the six grassy wedges • Maintaining a Food Stand at the center of the Courtyard (not necessarily the current Food Stand)
Mall Terrace	• Open viewshed • Continuous use as an exclusive, elevated, structure-free parking lot
River Terrace	• Unobstructed viewshed to the Monumental Core of Washington, D.C. • Elevated secure parking adjacent to the River Entrance portico • Limestone finish and the rusticated stone finish of the elevations of the Health Clinic and PLC2 • Green lawn of the parade ground • Hedgerows and four green roofs extending from the four corners of the parade ground • Flanking concrete bridges • Ceremonial stairs and limestone walls leading to the lower level • Lagoon dock

Table 3-2. Character-Defining Features of Contributing Resources Within the Pentagon Historic District (Including WHS-Proposed Updates)

Contributing Resource	Character-Defining Features
PLC2	• Green roofs on the terrace • Formal façade on the east side • Irregularly coursed stone veneer on the other three elevations
National 9/11 Pentagon Memorial	• Entire memorial (except flagpole)

Historic Resources in Surrounding Area

Other historic resources located in the vicinity of the Pentagon site include the ANC, Fort Myer Historic District, Columbia Pike, Lyndon Baines Johnson Memorial Grove, and George Washington Memorial Parkway.

Archaeological Resources

In 2022, WHS conducted an archaeological inventory study for the Pentagon site and the Mark Center and determined that neither site has the potential for intact archaeological resources. At the Pentagon site, the goal of the study was to determine if any intact ground surfaces existed under construction fill that may contain archaeological resources. The archaeological inventory study included a geographic information system (GIS) cut/fill analysis to compare topography from 1900 with a 2014 data set, as well as a geoarchaeological test boring of deep sediments at five selected areas to test the hypotheses from the GIS modeling. The archaeological inventory study was completed in January 2022. Confirming the results from the GIS cut/fill analysis, the geoarchaeological boring identified deep deposits of disturbed fill overlaying natural subsoils. The study concluded that the Pentagon site has no buried intact archaeological resources. Construction of the Pentagon building required massive cutting, filling, and grading of the surrounding area which would have buried or disturbed existing resources (Thunderbird Archaeology, 2022). The archaeological inventory study was sent to VDHR on January 26, 2022, and VDHR concurred with this finding on March 16, 2022.

Regulatory Compliance

WHS complies with the National Historic Preservation Act (NHPA) Section 106 consultation process by consulting with the VDHR pursuant to 36 CFR § 800 for individual undertakings or projects as they are evaluated for implementation. WHS also complies with NHPA Section 110, which requires Federal agencies to establish their own historic preservation programs for the identification, evaluation, and protection of historic properties. As stated in the previous sections, WHS has completed an archaeological inventory study for the Pentagon site and the Mark Center and is in the process of making a comprehensive update to the NRHP eligibility documentation for the entire Pentagon site. Based on this updated inventory of historic properties, WHS plans to develop an Integrated Cultural Resources Management Plan for the Pentagon site and Mark Center to guide implementation of the cultural resources management program.

WHS also developed the Pentagon ESM to define guidelines for the design of exterior buildings and site elements on the Pentagon site (WHS, 2016b). Although the ESM does not mandate any particular designs nor serve as a maintenance manual, its purpose is to serve as a cohesive guide that recommends appropriate aesthetic designs for all development within the Pentagon site. The ESM assigns a hierarchy of the zones outlined in the 2015 Master Plan to establish which zone should receive the highest level of preservation care. The ESM includes overall design guidelines, as well as zone-specific design guidelines to establish clear design expectations. Projects that take place at the Pentagon site should comply with the guidelines in the ESM unless otherwise stated. Projects that take place at the Pentagon site are also subject to advisory review by the NCPC and the Commission of Fine Arts. Projects must also be in conformance with the Secretary of the Interior's Standards for Rehabilitation.

3.5.2 Mark Center

Historic Resources

The buildings at the Mark Center were designed with an institutional office style and were constructed in 2000 and 2002, so they are not currently eligible for consideration for the NRHP. The closest historic property to the site is the Fort Ward Historic Site (VDHR site number 100-0113), located on the south side of I-395, approximately 0.6 miles to the west.

Archaeological Resources

In 1994, prior to construction of the Mark Center, a Phase I archaeological survey and site assessment was performed at the site and surrounding area (International Archaeological Consultants, 1994). The assessment included shovel tests throughout the site, and no archaeological sites were identified. The Phase I study identified two sites (44AX0162 and 44AX0163) west of the Mark Center site; however, Phase II and III studies determined that neither site should be recommended for listing on the NRHP. In 2008, Cultural Resources, Inc. conducted Phase I, II, and III archaeological investigations at the undeveloped portions of the Mark Center. The Phase I testing resulted in the identification of two isolated finds and one new archaeological site (44AX0205), which was subject to Phase II and III investigations (Thunderbird Archaeology, 2022). Within Site 44AX0205, Cultural Resources, Inc. found over 3,900 lithics, or stone artifacts, that may have been used for tool production, foraging, plant processing, and/or hide processing and the site was determined to be a short-term Terminal Late Archaic occupation site for only a few individuals (Thunderbird Archaeology, 2022). The site was then completely developed during construction of the Mark Center.

The 2022 archaeological inventory study for the Pentagon site and the Mark Center concluded that the investigations completed in 2008 completely covered the inventory for the Mark Center; therefore, no further archaeological work was needed (Thunderbird Archaeology, 2022). As described above in Section 3.5.1, the archaeological inventory study was submitted to VDHR and received concurrence with this finding on March 16, 2022.

Regulatory Compliance

Refer to Section 3.5.1 for information regarding NHPA that also applies to the Mark Center. The Mark Center is not subject to NCPC or Commission of Fine Arts reviews.

3.6 Air Quality

3.6.1 Pentagon

The Clean Air Act designated EPA the authority to set National Ambient Air Quality Standards (NAAQS) for air pollutants considered to be harmful to public health and the environment (40 CFR Part 50).[1] The air pollutants regulated under the NAAQS, commonly referred to as "criteria pollutants," include ozone, particulate matter (PM), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead. PM is further divided into coarse and fine particulate matter: coarse particulate matter (PM_{10}) consists of particles that are between 2.5 and 10 micrometers in diameter, and fine particulate matter ($PM_{2.5}$) consists of particles that are 2.5 micrometers in diameter and smaller.

To monitor the criteria pollutants, EPA divides the United States into more than 100 air quality control regions (AQCRs) where concentrations of the criteria pollutants are continuously measured and reported. An AQCR in which levels of a criteria air pollutant meet the health-based NAAQS is defined as an "attainment" area for the pollutant, while an area that does not meet the NAAQS is designated a "nonattainment" area for the pollutant. Attainment areas that were previously nonattainment areas are called "maintenance" areas. The Pentagon site is in Arlington County, which is currently designated as a moderate nonattainment area for 8-hour ozone (2015 standard), a maintenance area for CO, and an attainment area for all other criteria pollutants (U.S. EPA, 2022a). Arlington County is also part of the Northern Virginia Emissions Control Area, which is a Volatile Organic Compound (VOC) and Nitrogen Oxides (NO_X) Emissions Control Area (VA. Admin. Code § 5-20-206).

States with nonattainment AQCRs are responsible for developing State Implementation Plans (SIPs), which specify the manner in which NAAQS will be achieved and maintained. Federal actions taking place in nonattainment or maintenance areas must conform to the region's SIP, as described by the General Conformity Rule (GCR) in 40 CFR Part 93. However, if the action's total direct and indirect emissions of the nonattainment or maintenance criteria pollutants (and their precursors) would be less than the *de minimis* emissions rates specified at 40 CFR § 93.153, a conformity determination is not required. Due to Arlington County's past and current nonattainment status, the corresponding *de minimis* emission rates are 100 tons per year (tpy) for NO_X and CO and 50 tpy for VOCs (NO_X and VOCs are ozone precursors).

VA DEQ issues state operating permits and new source review permits for stationary emissions sources. Permitted stationary sources at the Pentagon site are under Registration No. 70030. Other emissions sources at the site include small emergency generators (exempted from permitting requirements), mobile sources (e.g., personal vehicles, buses, construction vehicles, aircrafts using the Pentagon Heliport), construction equipment (e.g., compressors, generators), and grounds maintenance equipment. Vehicles on the surrounding roadways, including I-395, Columbia Pike, Washington Boulevard (SR 27), and Route 110 also generate air emissions in the area.

The Pentagon site's emissions are well below the permitted limits. Table 3-3 presents the existing permitted emissions limits for emissions generating equipment at the Pentagon site along with the actual emissions for report year 2021.

[1] See https://www.epa.gov/criteria-air-pollutants/naaqs-table for a table of the current NAAQS.

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3.6.2 Mark Center

Alexandria, Virginia, has the same attainment status as described above for Arlington County (moderate nonattainment area for 8-hour ozone, maintenance area for CO) and, therefore, has the same *de minimis* emission rates (100 tpy for NO_X and CO, 50 tpy for VOCs) for purposes of GCR conformity determination. Alexandria, like Arlington County, is part of the Northern Virginia Emissions Control Area.

Permitted stationary sources at the Mark Center are under Registration No. 73748. Other emissions sources at the Mark Center include mobile sources (e.g., personal vehicles, buses), construction equipment (e.g., compressors, generators), and grounds maintenance equipment. Vehicles on the surrounding roadways, including I-395 and Seminary Road, also generate air emissions in the area. Consumption of electrical power from the Dominion Energy Virginia grid results in indirect emissions from the same types of sources described above for the Pentagon site.

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3.7 Climate

A variety of federal laws, regulations, policies, and guidance form the framework for WHS's efforts to reduce its impacts to climate and ensuring resiliency to climate risks. The following establish the current federal goals and requirements for climate change:

- The *Energy Independence and Security Act of 2007* (74 FR 4907) requires federal agencies to reduce their facilities' energy intensity and includes provisions related to energy efficiency, water conservation, sustainable buildings, and renewable energy.
- The FY 20 *National Defense Authorization Act* (NDAA) (86 FR 61670) directs the DoD to incorporate military installation resilience into master planning to assess vulnerabilities to installations and surrounding communities, identify missions that would be affected by those vulnerabilities, and propose projects to address those vulnerabilities. The FY 20 NDAA also calls on DoD to develop a climate vulnerability and risk assessment tool to inform mitigation planning and infrastructure development. Subsequently, the DoD updated UFC 2-100-01, *Installation Master Planning*, to incorporate weather-event protection measures, weather and climate data collection and analysis, alternative scenario planning, and a requirement to prepare an Installation Climate Resilience Plan as a functional annex to an installation master plan (DoD, 2020a).
- EO 14008, *Tackling the Climate Crisis at Home and Abroad* (86 FR 7619), places the climate crisis at the forefront of foreign policy and national security planning and calls for quick action to build resilience against the impacts of climate change; bolster adaptation; and increase resilience across all operations, programs, assets, and mission responsibilities. This EO directs agencies to develop climate action plans that describe the agency's climate vulnerabilities and its plan to use the power of procurement to increase the energy and water efficiency of United States Government installations, buildings, and facilities and ensure they are climate ready.
- EO 14057, *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability* (86 FR 70935), directs the Federal Government to lead by example to achieve a carbon pollution-free electricity sector by 2035 and net-zero emissions economywide by no later than 2050. The EO is the most ambitious Federal climate initiative in history. In addition to the goals above, it includes targets for net-zero building emissions, scope 1 and 2 greenhouse gas (GHG) emissions[2]

[2] Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are the result of activities from assets not

reductions, potable water use reductions, climate-resilient infrastructure, and a climate- and sustainability-focused workforce.

- The Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding requires agencies to adhere to the Guiding Principles for Sustainable Federal Buildings. The Guiding Principles are strategies for both new construction/major renovations and existing buildings that focus on integrating sustainable design principles, such as optimizing energy performance, protecting and conserving water, enhancing indoor environmental quality, reducing the environmental impact of materials, and assessing climate change risks (DoD et al., 2006).
- The Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews (86 FR 10252) states that agencies can use GHG emissions as an indicator to assess the potential effects of a proposed action on climate change (CEQ, 2016).
- *National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change* (88 FR 1196) is interim guidance from CEQ to help agencies analyze GHG and climate change effects of their proposed actions under NEPA.

3.7.1 Pentagon

The Pentagon site is located in a low-lying area near the Pentagon Lagoon and the Boundary Channel of the Potomac River. Its geographic location, defined as Humid Subtropical by the National Oceanic and Atmospheric Administration's (NOAA's) Köppen-Geiger Climate Subdivisions, exposes it to both the cold winter and warm summer air masses from the continental interior and the moderate and moist air masses from the Atlantic Ocean (NOAA, 2022). The region's climate is characterized by moderately cold and occasionally snowy winters and warm, humid summers (Runkle et al., 2022).

The Pentagon site faces a number of growing climate risks including, but not limited to, intense storms, sea level rise, extreme heat, and drought. Intense storm events are common in the mid-Atlantic region and can involve periods of flooding, high winds, snow, and ice, which can disrupt power and communications systems at the Pentagon site and render surrounding roadways impassable. Sea level is gradually rising in the mid-Atlantic coastal area and land is subsiding in the National Capital Region. The Boundary Channel and Pentagon Lagoon, which border the Pentagon site, are fed by the Potomac River and rise and fall with the tide. They are thus affected by sea level rise, which intensifies the storm surge and flooding caused by coastal storms. Extreme heat events reduce the efficiency of electric transmission/distribution systems, increase loads on the grid due to higher demands for air conditioning, cause thermal buckling and derailment along rail lines, contribute to regional brownouts and blackouts, and adversely affect human health. Drought impact is measured by its potential and actual economic effect—for example, its impact to municipal water supplies.

Arlington County recently updated its Community Energy Plan in 2019, setting a goal of carbon neutrality by 2050 (Arlington County Department of Environmental Services, 2019). A 2016 GHG inventory found that Arlington County's building sector makes up the single largest source of emissions

owned or controlled by the reporting organization, but that the organization indirectly affects in its value chain (U.S. EPA, 2023).

in the county at 52 percent of total community emissions, with commercial buildings being the largest component at 32 percent of total community emissions alone (Njoku et al., 2018).

The DoD has taken action to incorporate Federal climate guidance into its planning processes as encompassed by the DoD Climate Adaptation Plan and DoD Climate Risk Analysis, both released in 2021. At an installation level, WHS has also made efforts to address climate resilience. In 2017, WHS developed a draft Climate Adaptation and Resilience Plan for the Pentagon site, though never finalized. In 2022, WHS has restablished those efforts with the goal of preparing an Installation Climate Resilience Plan for the Pentagon and Mark Center sites, with anticipated completion in 2023.

WHS has also made efforts to reduce energy consumption, and by association, reduce GHG emissions related to the facilities on the Pentagon site. GHG emission sources at the Pentagon site include mobile sources such as fleet vehicles and helicopters and stationary fossil fuel-burning equipment, including boilers, generators, and the Incinerator Plant.

3.7.2 Mark Center

Though further inland than the Pentagon site, the Mark Center shares the same climate risks, but has fewer risks related to sea level rise and flooding. GHG emission sources at the Mark Center site include mobile sources such as fleet vehicles and stationary fossil fuel-burning equipment, including boilers and generators.

In 2019, the city of Alexandria published its Environmental Action Plan 2040, which sets goals that exceed regulatory minimums and puts the city on a path toward carbon neutrality by 2050. According to a 2015 GHG inventory, the city's building sector makes up the largest source of emissions at 57 percent, with 36 percent attributed to commercial buildings (City of Alexandria, 2019).

As a relatively new building, completed in 2011, the Mark Center features high-performing, sustainable design and energy efficiency. WHS completed a 2022 Installation Energy Plan for the Mark Center site, which outlines the current and planned efforts to reduce energy consumption and, in turn, GHG emissions. The Installation Climate Resilience Plan currently under development also includes the Mark Center site. The building also earned a LEED Gold certification for its operations and maintenance (O&M) performance in 2019. Efforts to renew and maintain this certification for 2024 are currently underway. Refer to Sections 3.9 (Energy) and 3.11 (Sustainability) for additional information.

3.8 Transportation

3.8.1 Pentagon

Roadways

The Pentagon site is situated between several major highways (Figure 3-6). Major roadways surrounding and providing access to the Pentagon site include the following:

- *I-395* is a 13.39-mile highway running from Springfield, Virginia, to Washington, D.C. It is the largest roadway providing access to Washington D.C. In addition to two high occupancy vehicle (HOV) lanes and several feeder lanes between ramps, I-395 contains four to five lanes in either direction. I-395 runs along the south edge of the Pentagon site. This roadway provides direct access to the Pentagon's South Parking Lot.

- *Richmond Highway* (SR 110) is a 2.41-mile freeway stretching from Crystal City to Rosslyn. It contains four to six lanes. Richmond Highway was formerly named Jefferson Davis Highway until October 2019. Richmond Highway bisects the Pentagon site and is situated to the northeast of the Pentagon building and to the southeast of Pentagon Lagoon. This highway provides direct access to both the Pentagon site's North Parking Lot and South Parking Lot.
- *Washington Boulevard* (SR 27) is a 2.54-mile freeway running primarily along the southern border of ANC. Washington Boulevard has three lanes in both directions and marks the west and northwest boundary of the Pentagon site. Washington Boulevard provides access to the South Parking Lot, the RDF at interchange with Columbia Pike, and the North Parking lot via an exit ramp. This roadway provides direct access to both the North Parking Lot and South Parking Lot.
- *Columbia Pike* (SR 244) is an 8.25-mile highway that begins in Annandale, Virginia, and ends at the Pentagon site. It has four total lanes. Columbia Pike provides access to Washington Boulevard and ends at the South Parking Lot.
- *The George Washington Memorial Parkway* (G.W. Parkway) is a 25-mile parkway that runs along the Virginia side of the Potomac River. It begins in Mount Vernon and ends in McLean. The G.W. Parkway does not provide direct access to the Pentagon site but is located immediately east of the Master Plan Area.

Minor roads around the Pentagon site include the following:

- *Army Navy Drive* is south of the Pentagon site, runs parallel to I-395, and has six total lanes. Army Navy Drive provides access to three parking lots along Eads Street, Fern Street, and Hayes Street that serve the Pentagon. Army Navy Drive does not provide direct vehicular access to the Pentagon site.
- *South Eads Street* runs south of the Pentagon site and intersects with Army Navy Drive. South Eads Street provides direct access to the South Parking Lot via South Rotary Road. During peak traffic periods, South Eads Street serves HOVs and buses only.
- *South Fern Street* runs south of the Pentagon site and intersects with Army Navy Drive. South Fern Street provides direct access to the South Parking Lot via South Rotary Road.
- *South Hayes Street* runs south of the Pentagon site and intersects with Army Navy Drive. South Hayes Street does not provide direct access to the Pentagon site but does provide access to Washington Boulevard and I-395.
- *South Joyce Street* is southwest of the Pentagon site and intersects with Army Navy Drive. South Joyce Street does not provide direct access to the Pentagon site.
- *Boundary Channel Drive* runs east of the Pentagon site and Richmond Highway, provides access to the North Parking Lot, and loops around Pentagon Village. Boundary Channel Drive is also accessible via I-395 and Washington Boulevard.

Within the Pentagon site, four smaller roads dictate circulation for parking. North Rotary Road and South Rotary Road together circle the South Parking Lot. Accessible via I-395 and Richmond Highway, Connector Road connects the South Parking Lot with Boundary Channel Drive.

Figure 3-6. Regional Roadways around the Pentagon Site (WHS, 2023b)

Traffic

Tens of thousands of drivers use the roads around the Pentagon site every year. Each year, the VDOT collects traffic data from sensors in or near streets and other sources and estimates the annual average daily traffic (AADT) volume of major roadways throughout the state. Table 3-5 summarizes the AADT counts for selected roads surrounding the Pentagon site in 2021 (VDOT, 2021a). The data represent two-way (except for ramp segments which are one-way), 24-hour volumes.

Table 3-5. AADT Counts for Selected Roadways Surrounding the Pentagon Site

Route	Segment	2021 AADT Volume
I-395 [a]	Washington Boulevard to Richmond Highway	47,000
I-395 (ramp volume)	Northbound off to Washington Boulevard	19,000
	Southbound off to Boundary Channel Drive	1,800
	Southbound off to Richmond Highway	20,000
	Southbound off to Pentagon Rotary Road	18,000
	Southbound off to George Washington Parkway	14,000
Richmond Highway [a]	Washington Boulevard to U.S. 1	51,000
Richmond Highway (ramp volume)	Northbound off to I-395 North	8,600
	Southbound off to Army-Navy Drive	10,000
Washington Boulevard [a]	Columbia Pike to Richmond Highway	29,000
Washington Boulevard (ramp volume)	Eastbound off to Army Navy Drive	27,000
	Eastbound off to I-395 North	17,000
	Westbound off to I-395 South	21,000
South Fern Street	Army Navy Drive to entrance to Pentagon Parking Lot	5,300
South Hayes Street	18th Street to I-395	9,500
South Joyce Street	Army Navy Drive to Columbia Pike	11,000
Army Navy Drive	South Hayes Street to 12th Street	6,700

Source: (VDOT, 2021a).

a — Provides direct access to Pentagon site.

With tens of thousands of employees and visitors, Pentagon traffic and circulation face many challenges. Problems include inadequate signage as well as pedestrian, vehicular, and bus conflicts (WHS, 2023b). To address ongoing challenges, WHS initiated the TMP in 2015 to analyze the transportation issues at the Pentagon site (WHS, 2015). A more detailed analysis of transportation issues at the Pentagon site can be found in the TMP. However, since the beginning of the COVID-19 pandemic, commuting patterns have been in flux as some employees began teleworking. The long-term changes in parking, traffic, and teleworking patterns are still unclear.

Parking

The NCPC recommends that parking ratios not exceed one parking space to every four employees within transit-rich corridors, such as the Pentagon area (NCPC, 2021). Under current conditions, the Pentagon site holds approximately 8,011 parking spaces, creating an estimated parking ratio of 1:4 parking spaces to employees (WHS, 2023b).

The Pentagon site has two primary parking lots: the North Parking Lot and the South Parking Lot. The North Parking Lot and the South Parking Lot provide access to cars, trucks, buses, and pedestrians. The Pentagon Connector Parking Lot, immediately east of Richmond Highway, also serves the Pentagon site. In total, the Pentagon site has five Parking Zones. Parking Zone 1 is the North Parking Lot. Zone 2 includes several lots on the western side and 2 small areas on the northern and eastern sides of the Pentagon building. Parking Zone 3 is located near the HRP. Parking Zone 4 is the South Parking Lot. Finally, Parking Zone 5 includes 3 parking lots along Army Navy Drive(WHS, 2023b).

Three parking lots along the north side of Army Navy Drive provide pedestrian access to the Pentagon site. The first, Hayes Street Parking, is situated between Joyce Street and Hayes Street; the second, Denison Parking, is between Fern Street and Eads Street; and the third, Eads lot, is at the northeast corner of the intersection between Eads Street and Army Navy Drive.

Parking at the Pentagon site is allowed by permit only. Visitors on official business may make parking arrangements through their primary sponsor point of contact (WHS, 2021b). There are no onsite public visitor parking spaces. Metered parking is available for the public in Pentagon City to the south of the Pentagon site and in Crystal City, located east of Pentagon City. Public visitors may also park in commercial lots, such as the Pentagon City Parking Garage, within walking distance from the Pentagon site or may take public transportation to the site. In the South Parking Lot, there are five parking spaces for 9/11 Pentagon Memorial visitors with disabilities (WHS, 2021b). Refer to Section 2.5 (Circulation) of the Pentagon Master Plan for information on existing conditions of the Pentagon site parking lots.

Public Transit

Public transportation also provides access to the Pentagon site. As a major intermodal transfer point for the Metro and bus systems, the PTC is located on the southeastern side of the Pentagon site and provides access to WMATA's Blue and Yellow Lines and several regional bus systems, such as Alexandria Transit Company's Driving Alexandria Safely Home (DASH), Arlington Transit (ART), Fairfax Connector, Loudoun County Transit, Martz Trailways, Potomac and Rappahannock Transit Company (PRTC) Omniride, and WMATA Metrobus. The PTC is also a major stop for DoD shuttles. Tour buses are not allowed in the PTC, so visitors are dropped off or picked up at the Hayes Street parking lot. From there, visitors use the pedestrian tunnel just north of the parking lot to get to the Pentagon and 9/11 Pentagon Memorial. Informal rideshare is also located in this area but is not well labeled. Located in front of Corridors 1 and 10, the MEF is the Pentagon entrance to the Metro and is the most used entrance of the Pentagon site.

To reduce traffic and improve commuting efficiency, Pentagon employees can engage in both formal and informal rideshare programs. The Pentagon permits a limited number of formal rideshare parking permits for eligible employees. There are 613 spots designated for rideshare (i.e., carpool) vehicles (WHS, 2023b). Slugging is an informal rideshare program where drivers pick up riders waiting for a ride from designated locations ("slug" lanes). Slug lanes are primarily located in the South Parking Lot. However, a pilot slug station also opened at the Hayes Street parking lot in Fall 2022 (WHS, 2022d).

During the morning commute, drivers will drop off riders in various locations around the Pentagon site. Some riders do not work at the Pentagon but slug to the site to access the PTC and/or the Metro. Many employees and other drivers participate in slugging to ensure enough passengers to be able to use the HOV or Express lanes.

Pedestrian and Bicycle Circulation

The main pedestrian access on the Pentagon site runs between the 9/11 Pentagon Memorial and the MEF along the southern part of the Pentagon site. This route follows the sidewalk along North Rotary Road and turns north toward the building at the North Rotary and Fern Street screening area. The MEF is the main pedestrian entrance from the south. Many pedestrians enter the building from the Corridor 3 bridge directly opposite the South Parking lot area. Employees and visitors walking from Hayes Street Parking, Denison Parking, or Eads lot south of the site can access the Pentagon site and South Parking Lot by walking on the sidewalks of the underpass crossing below I-395. From the north area, pedestrians coming from the North Parking lot can cross over Route 110 using the North Parking Connector Bridge and enter the building at the PAC or use one of the two River Terrace pedestrian bridges and enter the building through Corridor 8.

Many employees and visitors bike to the Pentagon site. Bike Arlington, an education program by Arlington County Commuter Services, maps out the rideability of roads and paths throughout Arlington County (Bike Arlington, 2022). Accessible for bikers and pedestrians, the Mount Vernon Trail runs along the west side of the Potomac River and has approximately 1 million annual users (NPS and U.S. Department of Transportation [USDOT], 2020). Although Mount Vernon Trail does not directly connect to the Pentagon site, many bicyclists use a series of connector paths to access the Pentagon site from Mount Vernon Trail. Arlington County has plans to connect the trail to both the Pentagon and Long Bridge Park (NPS and USDOT, 2020). Within the Pentagon site, non-employee bikers can only bike on the periphery of the Pentagon site, while Pentagon employees with Pentagon/DoD badges can access more biking areas after passing through an ACP.

Air Traffic

Air traffic at the Pentagon Heliport is limited to rotary-wing aircrafts. No fixed wing vehicles are permitted, and all helicopters are transient since the Pentagon does not have any based aircraft. The majority of helicopters traveling to the Pentagon Heliport are from Davison Army Airfield, but flights also come from Joint Base Andrews, Joint Base Anacostia-Bolling, and Marine Corps Base Quantico (the farthest from the Pentagon site).

The helipad is located on the David O. Cooke Terrace deck on the north side of the Pentagon above the RDF. Flight operations at the helipad are supported by a small air traffic control tower and fire station. The control tower for the helipad is currently located west of the RDF, approximately 700 feet southwest of the helipad. The control tower is a structure on the backside of the current emergency fire truck vehicle shed and does not have an optimum view of the helipad. As part of the Proposed Action, a permanent control tower and fire day station are currently under construction, and the helipad is being reconstructed (WHS, 2023b).

3.8.2 Mark Center

Roadways

The Mark Center is situated at the I-395 and Seminary Road interchange. Major roadways surrounding the Mark Center include the following:

- *I-395,* which borders the Pentagon site, also runs along the southeast side of the Mark Center. Although it does not provide direct access to the Mark Center, drivers can take a ramp from I-395 to Seminary Road to access the Mark Center.
- *Seminary Road* (SR 420) is the main roadway providing direct access to the Mark Center and borders the northeast side of the property.
- *North Beauregard Street* runs less than a quarter-mile north of the Mark Center site. North Beauregard Street provides direct access to Mark Center Drive.

Minor access roads that dictate circulation within the Mark Center include the following:

- *Mark Center Drive* begins just north of North Beauregard Street and loops around the largest parking structure on the Mark Center site. It connects with North Highview Lane, a small road providing access to non-Mark Center nearby amenities, including the Hilton Alexandria, and car rentals.
- *Mark Center Avenue* is located immediately north of the Mark Center. Drivers can access Mark Center Avenue from Seminary Road and Mark Center Drive.

Traffic

Tens of thousands of drivers use the roads around the Mark Center every year. Table 3-6 summarizes the AADT counts for major roads surrounding the Mark Center (VDOT, 2021b). The data represent two-way (expect for ramp segments, which are one-way), 24-hour volumes.

Table 3-6. AADT Counts for Selected Roadways Surrounding the Mark Center

Route	Segment	2021 AADT Volume
I-395	SR 236 Duke St to Seminary Road	79,000
I-395 (ramp volume)	Northbound off to Seminary Road	11,000
	Southbound off to Seminary Road	10,000
Seminary Road	Beauregard Street to I-395	41,000
North Beauregard Street	West city limit Alexandria to Braddock Road	12,000

Source: (VDOT, 2021b).

The first TMP for the Mark Center was created in 2010 and is currently being revised. The 2023 Draft Mark Center TMP [internal working version] describes baseline traffic conditions at the Mark Center, and while it does not currently include specific projects to address ongoing traffic and circulation issues, it does include several recommendations for WHS to continue and expand monitoring efforts. The 2023 Draft Mark Center TMP proposes 2 main goals for the Mark Center: 1) achieve 40 percent or more non-single occupancy vehicle person-trips to the Mark Center to minimize traffic impacts to the neighboring community and 2) facilitate mobility to the site by providing a viable transportation program to help employees choose appropriate commuting methods to and from the Mark Center (WHS, 2023a).

Parking

The NCPC recommends that parking ratios not exceed a one parking space to every two employees within Suburban Areas Beyond Metrorail, such as the Mark Center (NCPC, 2021). The Mark Center

contains 3,747 parking spaces (WHS, 2023a). Assuming there are 6,400 onsite employees (WHS, 2023a), the parking ratio at the Mark Center is approximately 1:1.67, meaning the Mark Center currently does not meet the NCPC's parking ratio recommendation.

There are two parking garages on the Mark Center site: the North Parking Garage and the South Parking Garage. The North Parking Garage is located immediately south of the bus bay and north of the East Tower. The South Parking Garage is located adjacent to the Mark Center East and West Towers. Visitor parking is located in the North Garage and has a separate entrance and exit from the garage's general parking. Visitors must receive approval from the PFPA and register at least one day in advance of visiting. Public parking is available at two Colonial parking garages immediately adjacent to the property along Mark Center Drive.

Public Transit

The Mark Center Transit Center is located at the northeast section of the Project Area, just south of Mark Center Avenue. This public transit facility has five bus bays, a sheltered passenger area, and information kiosks. The public transit services providing access to the Mark Center include: DASH, Fairfax Connector, PRTC Omniride, and WMATA MetroBus. The Mark Center Express Shuttle halted service as a result of the COVID-19 pandemic and has not since resumed service (WHS, 2023a).

The Mark Center provides access to Metro via bus or shuttle ride to the Van Dorn Street, King Street, Pentagon City, and Pentagon Metro Stations on the Blue and Yellow Lines (WHS, 2023b). Metrobus lines 7M and 25B directly service the Mark Center Transit Center. The Mark Center-Pentagon Line (7M) is a direct bus route running to and from the Pentagon site and Mark Center. DASH bus 35 also provides direct transportation between the Mark Center and the Pentagon Metro (Dashbus, 2022). Mark Center employees can also engage in slugging. At the Mark Center, slug lanes are located near the bus terminal.

Pedestrian and Bicycle Circulation

Pedestrian circulation within the Mark Center site is dictated by sidewalks along Mark Center Drive and Mark Center Avenue. The Winkler Botanical Preserve borders the Mark Center to the west, blocking pedestrian access from that side. The first pedestrian crosswalk on Seminary Road is just north of the northern-most corner of the Mark Center. There are no pedestrian bridges crossing I-395 providing direct access to the Mark Center, thus restricting pedestrian access from the south. However, there is a bike- and pedestrian-friendly trail on the east side of Seminary Road and that crosses I-395. This trail provides access to the Mark Center via the Mark Center Avenue and Seminary Road cross section. Although Seminary Road does not have a designated bike lane in the segment next to the Mark Center, bicyclists may also use the trail that crosses I-395 and runs parallel to part of Seminary Road to access the Mark Center. Visitors and employees in the North Parking Garage must use the pedestrian bridge and be verified through the ACP before accessing the Mark Center towers (WHS, 2023a).

3.9 Energy

A variety of federal laws, regulations, policies, and guidance form the framework for WHS's energy policies and goals. The following establish the current federal goals and requirements for energy use at WHS:

- The *Energy Policy Act (EPAct) of 2005* addresses cleaner energy production by promoting alternative fuels and advanced vehicles production. The policy encourages avoiding the by-production of GHGs and increasing the amount of biofuels required to be mixed with gasoline sold in the United States.
- The *Energy Independence and Security Act of 2007* reinforces previous energy reduction goals and includes key provisions regarding national energy independence and security, clean renewable fuels, improved vehicle fuel economy, energy improvement in the Federal Government, and GHG capture and storage, among many other focuses.
- The *Energy Act of 2020* contains provisions related to both carbon capture and carbon removal. Additionally, the act authorizes clean energy demonstration programs that concentrate on the research and development of technologies in sectors such as advanced nuclear, long-duration energy storage; carbon capture; and geothermal. It also includes significant reauthorizations for solar and wind energy, critical minerals, and grid modernization.
- EO 13834, *Efficient Federal Operations,* calls for Federal agencies to meet certain energy and environmental performance requirements such that the country "increases efficiency, optimizes performance, eliminates use of unnecessary resources, and protects the environment." These goals encourage Federak agencies to seek to achieve annual reductions in facility energy use for existing buildings and new construction, reduce potable and non-potable water consumption, and implement waste prevention and recycling measures.
- EO 14057, *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability* (86 FR 70935), directs the Federal Government to lead by example to achieve a carbon pollution-free electricity sector by 2035 and net-zero emissions economywide by no later than 2050. The EO includes targets for net-zero building emissions, scope 1 and 2 GHG emissions reductions, potable water use reductions, climate-resilient infrastructure, and a climate- and sustainability-focused workforce.

DoD has taken action to incorporate Federal energy guidance and has adopted policies to further efficient energy management. The following establish recent DoD initiatives and policies for energy:

- DoD Instruction 4170.11, *Installation Energy Management*, is a policy that prioritizes energy and water efficiency and conservation on an installation level. It encourages facility energy management and reporting by introducting the Annual Energy Management Report and the Energy Conservation Investment Program. It also calls for DoD to establish program goals for reducing energy and water consumption and improving energy resilience.
- DoD Directive 4180.01, *Department of Defense Energy Policy*, directs DoD to "enhance military capability, improve energy security and resilience, and mitigate costs in its use and management of energy." This policy encourages DoD to improve the energy performance of its equipment, weapons systems, and installations while also exploring diversified energy resources such as renewable energy sources and alternative fuels. The directive also suggests that all energy-related analyses and risk assessments be a focus for DoD operations, training, and testing.
- The DoD Memorandum, *Installation Energy Plans*, describes the need to integrate all applicable energy initiatives and energy projects into each DoD Component's installation master plan. The Installation Energy Plans' purpose is to give the Office of the Deputy Assistant Secretary of Defense (Energy, Installations, and Environment) an overview of how each installation will achieve the established program goals of energy management, energy reduction, and energy

resilience. The revised memorandum signed on May 30, 2018, expands the Installation Energy Plan development requirement for all DoD installations and clarifies energy resilience and cybersecurity requirements.

- The *2021 Utilities Meter Policy* is the most recently enacted DoD policy on metering that supersedes the previous Utilities Meter Policy from 2013. It recognizes the need for advanced metering in order to "effectively manage energy and water use across the DoD." The core requirement is that "each Component's metering program should result in the capture of a minimum of 60 percent electricity and natural gas use with a goal of 85 percent electricity and natural gas use, using advanced meters by September 30, 2024."

Energy Goals

As outlined in both the Pentagon and Mark Center Installation Energy Plans (IEPs), WHS has adopted several goals from EOs and DoD policies to further energy resilience and efficiency, increase alternative and renewable energy, and reduce transportation-based emissions. To increase energy resilience, WHS is working toward the following Office of the Secretary of Defense policies outlined in the DoDI 4170.11 and the 2017 Energy Resilience Operations, Maintenance, and Testing Guidance issued by the Office of the Deputy Assistant Secretary of Defense:

- Install sufficient generation capacity to meet campus base loads by FY 2023.
- Install sufficient generation capacity to fully island the campus by FY 2025.

The energy efficiency goals originally based on EO 13693, which are subject to change with the pending release of the implementing instructions for EO 14057, are as follows:

- Reduce Energy Usage Intensity (EUI) 25 percent by FY 2025 (FY 2015 Baseline).
- Reduce EUI 45 percent by FY 2035 (FY 2015 Baseline).

The alternative and renewable energy goals based on EO 14057, which are subject to change with the pending release of the implementing instructions, are as follows:

- 100 percent carbon-pollution-free electricity on a net annual basis by 2030, including 50 percent 24/7 carbon pollution-free electricity.
- A net-zero emissions building portfolio by 2045, including a 50 percent emissions reduction by 2032.
- A 65 percent reduction from 2008 levels of scope 1 and 2 GHG emissions, as defined by the Federal Greenhouse Gas Accounting and Reporting Guidance, from Federal operations by 2030.

The transportation energy goals based on EO 14057, which are subject to change in accordance with the implementing instructions released in August 2022, are as follows:

- 4A: 100 percent zero-emission vehicle acquisitions by 2035.
- 4B: 100 percent zero-emission light-duty vehicle acquisitions by 2027.

3.9.1 Pentagon

In 2019, WHS developed a Pentagon IEP to meet the requirements of the *Installation Energy Plans* DoD Memorandum (WHS, 2019). The Pentagon IEP will be updated in 2023. Current energy-reduction projects that will be featured in the updated IEP include the following, which are also included in the Proposed Action:

- UESC, which includes Chiller Plant Improvements, Lighting Retrofits, Domestic Water Fixture Improvements, Irrigation Improvements, Refrigeration Improvements, and Building Envelope Improvements. All of these are included in the Proposed Action.
- Recommissioning/HVAC Efficiency Upgrades Project.
- Pilot EV Charging Stations Project.
- Lighting Improvements Project.
- TES Project.

WHS is promoting changes in the Pentagon HVAC operating schedules to help ensure that energy savings take place during space-unoccupied hours and that safe air quality is maintained when occupants are present. WHS is also conducting a Pentagon Power Islanding Study to develop plans to increase the Pentagon site's energy resilience and ensure it is capable of sustaining utility power disruptions. Proposed solutions will be consistent with DoD requirements and EO 14057. The GHG reducing technologies WHS is considering under this study include renewable energy generation, battery storage, and others.

The Pentagon site is served by a system of underground and aboveground utilities. Electricity makes up approximately 60 percent of the Pentagon site's total energy use. Electricity is used for HVAC, information technology (IT), lighting, and other plug loads. The HRP is the single largest user of electricity, drawing electricity to provide cooling for the Pentagon building with electric centrifugal chillers. The Pentagon site receives electrical power from Dominion Energy Virginia. The Pentagon participates in Dominion Energy Virginia's Demand Response program, which requires the Pentagon site to reduce power demand when a demand-response event is called. Pentagon building management staff operate the backup generator system during such events to offset grid power.

Natural gas makes up a portion of the Pentagon site's total energy use. A small percentage of natural gas is also used for cooking. The Pentagon site receives natural gas from Washington Gas Company. The Pentagon site participates in the natural gas curtailment program, which provides lower natural gas pricing but allows the utility to call curtailment events when natural gas supplies are constrained, requiring the Pentagon site to use fuel oil or pay higher prices for natural gas during curtailment events.

Fuel oil is consumed periodically, making up 5 percent of the Pentagon site's total energy use. Boiler and incinerator plant usage far outweigh usage from the generators. The Pentagon periodically replenishes fuel oil supplies in storage tanks to ensure sufficient energy for outage and testing events.

The HRP produces steam and chilled water for heating and cooling buildings at the Pentagon site. Chilled water is produced using electric chillers. Steam and chilled water are distributed from the HRP via an underground tunnel. The HRP receives condenser water from raw water intake/lift station structure at the Pentagon Lagoon. Water is discharged to the nearby Roaches Run Waterfowl Sanctuary from the HRP.

3.9.2 Mark Center

The Mark Center is subject to the same Federal and DoD applicable legislation, EOs, and policies listed above. In 2022, WHS developed the Mark Center IEP to identify economically feasible energy savings opportunities and to meet the requirements of the *Installation Energy Plans* DoD Memorandum. The Mark Center IEP includes all six of the proposed future energy-reduction projects listed in the Proposed Action, specifically: FRCS Modernization, LED Lighting Upgrades, North Parking Garage Solar Panels, Electric Vehicle Charging Stations and Infrastructure, Optimize Data Center Performance, and Variable Speed Primary Hot Water Pumping (WHS, 2022a).

The Mark Center is served by a system of underground and aboveground utilities. Electricity makes up over 75 percent of the Mark Center's total energy use. Electricity is used for HVAC, IT, lighting, and plug loads. The largest users of electricity are the centrifugal chillers that supply chilled water for space cooling and dehumidification. The Mark Center receives electricity from Dominion Energy Virginia. Power enters the Mark Center and is then distributed to various loads around the Mark Center. A series of switchgears enables the system to isolate from the primary electrical distribution system in the event of an electrical outage or other emergency. As described for the Pentagon site, the Mark Center also participates in Dominion Energy Virginia's Demand Response program. Mark Center building management staff operate the backup generator system during demand-response events to offset grid power.

Natural gas makes up a portion of the Mark Center's total energy use. A small percentage of natural gas is also used for cooking and laundry equipment. The Mark Center receives natural gas from Washington Gas Company. As described for the Pentagon site, the Mark Center participates in the natural gas curtailment program and uses fuel oil or pays higher prices for natural gas during curtailment events.

Fuel oil is consumed in small quantities, making up less than 5 percent of the Mark Center's total energy use. Boiler usage far outweighs usage from the generators. The Mark Center periodically replenishes fuel oil supplies in storage tanks to ensure sufficient energy for outage and testing events.

The Mark Center receives hot and chilled water for heating and cooling purposes from central systems. The chiller plant receives condensed water from the cooling towers located on the roof. Chilled water is then delivered to the dedicated outdoor air units, also on the roof, and the air handling units and fan-powered induction units throughout the building. The boiler plant generates hot water by utilizing, water tube hot water boilers.

The condenser water system utilizes evaporative cooling to provide water to the chiller plant to reject heat. The evaporative cooling is achieved through the use of counter-flow cooling towers located on the roof next to the chiller plant.

3.10 Other Utilities and Infrastructure

3.10.1 Pentagon

Water

The Washington Aqueduct provides potable water to the Pentagon site. USACE owns and operates the aqueduct, which withdraws water from the Potomac River in the Great Falls area and directs it to the Dalecarlia Water Treatment Plant. A 30-inch primary water main connects the treatment plant to the Pentagon site, instead of connecting through the Arlington County water system. The Pentagon site

water mains connect to the Washington Aqueduct system at locations north and west of the building, travel in a loop along the east and south of the building, then connect near the HRP and South Rotary Road with a secondary water main to the Arlington County water supply (WHS, 2019). The Pentagon site uses the potable water for food preparation, restrooms, drinking fountains, fire protection, small industrial uses, and some irrigation.

The Pentagon site also withdraws water from the Pentagon Lagoon via two small pump houses located off of Boundary Channel Drive for cooling water and irrigation uses (WHS, 2019). The lagoon water is withdrawn, chilled, pumped through the cooling system, then returned to the lagoon. It does not commingle with any potable water systems. The irrigation system at the Pentagon site supplies water to the turf grass around the Pentagon building. There are 16 irrigation zones, 3 of which are supplied by water pumped from the Pentagon Lagoon, and the other 13 are supplied by domestic water.

Sanitary Sewer System

Sanitary wastewater is collected from the buildings throughout the Pentagon site into a subgrade sanitary sewer system operated by WHS. Depending on the building location, the wastewater is either directed via gravity flow to the West Sewage Lift Station north of the RDF or the East Sewage Lift Station in the North Secure parking lot, east of the RDF. These lift stations connect the Pentagon site sanitary sewer system to the Arlington County DES lift station. The wastewater is treated at the Arlington County Water Pollution Control Plant, which discharges the treated effluent into Four Mile Run just upstream of the Potomac River. The original Pentagon wastewater treatment plant, located at the North Village, was decommissioned and then fully demolished by 2022. The sanitary sewer system is separate from the stormwater sewer system at the Pentagon site and in Arlington County.

Telecommunications Systems

The Joint Service Provider (JSP) is a field activity of the Defense Information Systems Agency and manages the telecommunications, cable, and associated electronic equipment at the Pentagon building. At least one primary communications trunk line enters the Pentagon site from the east, and another from the west.

Solid Waste

The Pentagon site accumulates non-hazardous waste from facility operations, including waste from offices, bathrooms, food service operations, and small amounts of construction debris from building maintenance. WHS encourages the use of sustainable practices throughout the site by providing recycling bins for paper, metal, plastic, and glass and working with onsite food operators to compost food waste. Federal and WHS policies promote pollution prevention at the Pentagon site and construction sites through methods such as waste reduction, waste prevention, reuse, recycling, and energy efficiency measures in support of an energy conservation program; these methods cumulatively result in the disposal of less material in landfills. Custodial contractors are required to collect and transport the recycled materials to material-specific dumpsters at the RDF for transport to the appropriate recycling facility. WHS ensures compliance by conducting annual recycling audits to meet recycling goals. Sensitive paper is incinerated at the HRP for security reasons and then sent to a compost facility.

The RDF contains the Pentagon site's accumulation and storage areas for non-hazardous solid and recyclable waste, hazardous and universal waste. Custodial contractors collect and transport recycled

materials to material-specific dumpsters at the RDF for transport to the appropriate recycling facility. The solid and hazardous waste (see below) accumulated at the RDF is produced by facility O&M at the Pentagon site, while construction-related solid and hazardous waste are independently managed by the construction contractors.

Hazardous Waste

The Pentagon site is classified as a small quantity generator of hazardous waste. Hazardous waste typically includes paints, solvents, flammable items, and mercury. Any hazardous waste produced at the Pentagon is stored at a designated hazardous waste collection site and then sent to a regulated facility for disposal.

WHS has performed environmental baseline surveys at locations within the Pentagon site to support land transactions and access easements. These surveys found no hazardous waste sites as defined in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

3.10.2 Mark Center

Potable Water

The Mark Center receives domestic water from the Virginia American Water Company. Three water lines enter the campus through the North Parking Garage. One small line serves the service restrooms for bus drivers. The other two lines join to form a larger loop around the main tower. These water lines service the Mark Center tower, visitor access control center, North Parking Garage, remote inspection facility, and campus fire hydrants. The water is used for restrooms, commercial food service, and drinking fountains, as well as the cooling tower, chilled water, and fire protection. There is no irrigation infrastructure at the Mark Center campus, and there is no non-potable water service available.

Sanitary Sewer

Wastewater from the Mark Center site is directed to a lift station adjacent to the North Parking Garage. The lift station pumps the sanitary waste to the Alexandria Sanitation Authority, now called Alexandria Renew Enterprises (WHS, 2022a).

Telecommunications

The JSP manages the telecommunications, cable, and electronic equipment management at the Mark Center.

Solid Waste

The Mark Center accumulates non-hazardous waste from facility operations, including waste from offices, bathrooms, food service operations, and small amounts of construction debris from building maintenance. Recycling bins for paper, metal, plastic, and glass are present throughout the building. The building management office implements a solid waste management policy with the goal to protect the environment and public health, conserve natural resources, minimize landfilling or incineration, and reduce toxicity (WHS, 2017). The custodial contractors collect solid waste and recyclable waste throughout the building and bring it to waste compactors at the base of the building. Recyclable materials are sent to a material recovery facility where they are sorted and recycled. Bulk waste (e.g., large cardboard, broken furniture, broken pallets, some construction and demolition waste) is collected

and sent to a recycling center. WHS performs recycling metrics and annual audits to ensure that the facility is meeting its solid waste policy goals.

Other wastes produced at the Mark Center include cooking oil from food vendors, electronic waste, and ink cartridges. These wastes are securely stored at the base of the building and periodically sent to waste-specific recycling vendors. The building's landscaping contractors compost landscape waste and subsequently use it onsite as mulch or compost.

Hazardous Waste

The Mark Center produces small amounts of universal waste, such as lamps that contain mercury and batteries. These wastes are collected in a secured storage area prior to disposal in an authorized facility (WHS, 2017).

3.11 Sustainability

The Energy Policy Act of 2005 (Public Law [PL] 109–58) and the Energy Independence Security Act of 2007 (PL 110–140) require Federal agencies to increase efficiency, optimize performance, eliminate unnecessary use of resources, and protect the environment. EO 14057 (86 FR 70935) expands upon those mandates and requires all Federal agencies to set more aggressive sustainable building, energy efficiency, GHG reduction, and waste diversion targets. Many of these Federal requirements and goals are incorporated into the *Guiding Principles for Sustainable Federal Buildings and Associated Instructions*, which federal agencies are required to adhere to for new construction or major renovations (CEQ, 2020). Per EO 14057, agencies are required to meet the Guiding Principles for all projects exceeding 25,000 SF and pursue Guiding Principles compliance for smaller projects wherever feasible (CEQ, 2022a).

DoD facilities, like the Pentagon site and Mark Center, adhere to the UFC system, which provides planning, design, construction, sustainment, restoration, and modernization criteria. UFC 1-200-02, *High Performance And Sustainable Building Requirements*, provides minimum requirements and guidance to achieve high performance and sustainable buildings and is organized to align with the Guiding Principles. Additionally, UFC 1-200-02 criteria can also be met via a third-party certification, such as LEED certification (DoD, 2022a).

3.11.1 Pentagon

In addition to meeting the Guiding Principles, WHS's current policy is to achieve LEED Silver certification for all eligible new construction or renovation projects on the Pentagon site. There are five LEED-certified, three LEED Silver, and four LEED Gold buildings on the Pentagon site, and there are four planned projects anticipated to achieve a minimum certification rating of LEED Silver underway. The Pentagon site utilizes a comprehensive integrated solid waste management approach as described in Section 3.10 (Other Utilities and Infrastructure). The Pentagon's composting program includes multiple major food vendors and dining facilities within the building. The Pentagon site currently has a landfill diversion rate of about 52 percent for FY 22. For projects at the Pentagon site that generate construction and demolition waste, WHS maintains a goal to divert at least 60 percent of that waste from landfills annually through recycling and other diversion methods.

3.11.2 Mark Center

Like the Pentagon site, the Mark Center adheres to the Guiding Principles, UFC 1-200-02 criteria, and the WHS policy of LEED Silver certification for all eligible construction or renovation projects. The Mark Center was certified LEED Gold for New Construction in 2011. Additionally, the Mark Center received LEED Gold certification for O&M in 2019. Efforts to renew the O&M certification are currently underway. The Mark Center collects and stores recycling and municipal solid waste as described in Section 3.10 (Other Utilities and Infrastructure). The Mark Center similarly achieved a landfill diversion rate of nearly 50 percent for FY 22.

3.12 Socioeconomic

3.12.1 Pentagon

This section describes the existing social and economic conditions, including population, race, employment, income, and housing in the areas immediately surrounding the Pentagon site. WHS used American Community Survey (ACS) and decennial data from the U.S. Census Bureau, as well as EPA's EJScreen 2.0[3] to assess social, economic, environmental, and demographic data for block groups in the geographic scope of analysis. See Section 3.13 (Environmental Justice) for additional demographic information regarding minority and low-income communities in the vicinity of the Project Area.

WHS used a refined buffer approach to define the geographic scope of the socioeconomic and environmental justice (EJ) analyses for the Proposed Action at the Pentagon site. To determine the geographic scope of the analysis, WHS created a 0.5-mile buffer around the Pentagon site boundaries. WHS examined the census block groups captured within this buffer and excluded block groups that have zero population within 0.5 miles of the Pentagon site (e.g., the block group encompassing Ronald Reagan National Airport [DCA] [Block Group 510139802001] has 0 residences within the buffer).[4] The immediate vicinity surrounding the Pentagon site to the west, north, and east does not contain any residential or commercial areas and therefore does not produce demographic indicators; these areas consist of either government-owned property (i.e., ANC to the west) or the Potomac River to the north and east. The resultant geographic scope of analysis for purposes of the socioeconomic and EJ analysis is called the Pentagon Socio/EJ Study Area and covers approximately 0.78 square miles, encompassing 4 block groups entirely and 8 block groups partially. Refer to Figure 3-7 in Section 3.13 (Environmental Justice) to see the boundary of the Pentagon Socio/EJ Study Area.

Population

Arlington County has a population of approximately 238,643 as of 2020 (Census Bureau, 2020). Forecast estimates by Arlington County predict that the county's population will be 261,600 in 2030; 273,900 in 2035; 287,200 in 2040; and 299,500 in 2045 (Arlington County, 2022c).

[3] See https://ejscreen.epa.gov/mapper/.

[4] Some of the excluded block groups have substantially different socioeconomics and environmental and social indicator values than those of the communities close to the Pentagon site. Exclusion of block groups that have 0 population within 0.5 miles of the Pentagon site boundaries therefore helps ensure a better characterization of the local population in the vicinity of the Pentagon site that is more likely to be affected by temporary construction activities and long-term operations under the Proposed Action.

Arlington County and a majority of census block groups in the Pentagon Socio/EJ Study Area are majority white. In 3 block groups (510131033001, 510131035012, and 510131035013), people of color make up more than half of the population, with 70 percent, 55 percent, and 52 percent of the population represented by non-white demographic groups, respectively (Census Bureau, 2020). The most common non-white racial group in the Pentagon Social/EJ Study Area varies between Black, Hispanic/Latino, and Asian (Census Bureau, 2020). Table 3-7 summarizes the racial demographics for Arlington County and census block groups within the Pentagon Socio/EJ Study Area (Census Bureau, 2020; U.S. EPA, 2022b).

Table 3-7. Racial Demographics of Arlington County and Census Blocks Groups Within the Socio/EJ Study Area

County and Block Groups [a,b]	Total Population	White	Black	Hispanic/Latino	American Indian and Alaska Native	Asian	All Other
Arlington County	238,643	139,653 (59%)	20,330 (9%)	37,362 (16%)	258 (<1%)	27,235 (11%)	13,805 (6%)
Block groups within or partially within the Pentagon Socio/EJ Study Area							
510131025001	1,577	831 (53%)	162 (10%)	286 (18%)	6 (<1%)	172 (11%)	120 (8%)
510131033001	1,167	353 (30%)	440 (38%)	188 (16%)	1 (<1%)	99 (8%)	86 (7%)
510131034021	946	Not reported					
510131034025	1,721	Not reported					
510131035011	1,108	694 (63%)	86 (8%)	123 (11%)	4 (<1%)	124 (11%)	77 (7%)
510131035012	616	275 (45%)	55 (9%)	67 (11%)	1 (<1%)	179 (29%)	39 (6%)
510131035013	1,811	875 (48%)	123 (7%)	240 (13%)	1 (<1%)	503 (28%)	69 (4%)
510131035021	3,807	Not reported					
510131035022	1,134	Not reported					
510131035031	1,861	949 (51%)	140 (8%)	147 (8%)	3 (<1%)	517 (28%)	105 (6%)
510131035032	1,225	667 (55%)	77 (6%)	152 (12%)	1 (<1%)	234 (19%)	84 (7%)
510131037001	962	723 (75%)	33 (3%)	69 (7%)	0 (<1%)	67 (7%)	70 (7%)

a — Total population and race data for Arlington County, 510131025001, 510131033001, 510131035011, 510131035012, 510131035013, 510131035031, 510131035032, and 510131037001 are from the 2020 Decennial census (Census Bureau, 2020).

b — Total population data for 510131034021, 510131034025, 510131035021, and 510131035022 are from EJScreen (U.S. EPA, 2022b) due to lack of data in the 2020 Decennial census (Census Bureau, 2020).

Data on English-speaking ability and languages spoken at home are collected in the ACS. In Arlington County, 29 percent of the population 5 years of age and over speak a language other than English in their households (either partially or entirely), and within these households, 30 percent speak English less than “very well.” Spanish is the most common language spoken at home other than English,

representing 13 percent of the county's total population 5 years of age and older, followed by other Indo-European languages at 7 percent (Census Bureau, 2021a).

Income and Employment

Median income within census block groups varied from less than $86,000 (510131035032) to over $217,000 (510131037001) in 2019 inflation-adjusted dollars. One census block group (510131035022) did not have recent data on median household income. The median household income in Arlington County in 2019 was $120,071 (Census Bureau, 2019a).

In 2022, employment in Arlington County was approximately 227,200 (Arlington County, 2022c). The most common employment sectors in Arlington County were "professional and technical services" and "government" (Arlington County, 2022c). Arlington County predicts that employment will reach 258,100 by 2030; 280,100 by 2035; 287,500 by 2040; and 290,800 by 2045 (Arlington County, 2022c). Arlington County and most block groups within or partially within the Pentagon Socio/EJ Study Area have unemployment rates below the 2021 national average of 5.5 percent (Arlington County, 2022c; U.S. EPA, 2022b; Census Bureau, 2021b). However, unemployment rate in three census block groups (510131025001; 510131033001; 510131035032) exceeds the national average (U.S. EPA, 2022b; Census Bureau, 2021b). Table 3-8 summarizes the median household income and the unemployment rate in Arlington County and in block groups within the Pentagon Socio/EJ Study Area (Census Bureau, 2019a; Arlington County, 2022c; U.S. EPA, 2022b).

Table 3-8. Median Household Income and Unemployment Rate of Arlington County and Census Blocks Groups Within the Socio/EJ Study Area

County and Block Groups	Median Household Income (2019$) [a]	Unemployment Rate (2021) [b]
Arlington County	$120,071	3%
Block groups within or partially within the Pentagon Socio/EJ Study Area		
510131025001	$130,391	9%
510131033001	$77,593	8%
510131034021	$138,984	3%
510131034025	$119,766	3%
510131035011	$91,971	0%
510131035012	$72,444	0%
510131035013	$99,257	2%
510131035021	$119,302	5%
510131035022	Not reported	3%
510131035031	$109,726	3%
510131035032	$85,781	8%
510131037001	$217,917	1%

a — Median household income (2019$) data for Arlington County and all block groups are from Census Bureau, 2019a.

b — Unemployment rate data for Arlington County are from Arlington County, 2022c, while unemployment rate data for all census block groups are from U.S. EPA, 2022b.

Housing

Because of the lack of available housing data at the census block group level, WHS analyzed housing characteristics of the census tracts that encompass the census block groups within the Socio/EJ Study Area. Median values of owner-occupied units in the Socio/EJ Study Area are generally lower than the county median value of $705,400 (Census Bureau, 2019b). Census tract 1037, which overlaps block group 510131037001 in the Pentagon Socio/EJ Study Area, is the only tract in the study area with a higher median value of owner-occupied units than Arlington County. Median rent in 4 census tracts (1034.02, 1035.02, 1035.03, and 1037) is higher than the county median of $1,970 (Census Bureau, 2019b). Table 3-9 summarizes the median value of owner-occupied units and the median rent in census tracts with at least one census block group within the Pentagon Socio/EJ Study Area (Census Bureau, 2019b).

Table 3-9. Selected Housing Characteristics of Arlington County and Census Tracts Within the Socio/EJ Study Area

County and Census Tracts	Median Value of Owner-Occupied Units (2019) [a]	Median Rent (2019) [a]
Arlington County	$705,400	$1,970
Census tracts with at least one block group within or partially within the Pentagon Socio/EJ Study Area		
1025	$616,300	$1,961
1033	$518,800	$1,679
1034.02	$467,800	$2,352
1035.01	$447,800	$1,786
1035.02	$612,500	$2,250
1035.03	$596,800	$2,189
1037	$879,300	$3,500+[b]

a — Data for Arlington County and all census tracts for both Median Value of Owner-occupied units and Median Rent are from Census Bureau, 2019b.

b — Census Bureau data reports this census tract's median rent as "3,500+."

In 2021, affordable housing comprised 11.6 percent of Arlington County's total housing units (Arlington County, 2022c). The county has a goal to raise the affordable housing percentage to 17.7 percent by 2040 (Arlington County, 2017). Neighborhoods near the Pentagon site include Pentagon City, Crystal City, and the Aurora Highlands. Located immediately south of the Pentagon site, Pentagon City and Crystal City are mixed-use districts consisting of high-density residential, retail, and commercial office complexes. Pentagon City has approximately 342 Committed Affordable Units (Arlington County, 2022d). Both the 2022 Pentagon City Development Plan and the 2010 Crystal City Sector Plan set goals to increase affordable housing within the respective neighborhoods (Arlington County, 2022d; Arlington County, 2010). The Aurora Highlands is a residential area located immediately south of Pentagon City with many single-family residences. The Aurora Highlands Neighborhood Conservation Plan was last updated in 2008 and does not include any goals related to affordable housing (Aurora Highlands Civic Association, 2008).

3.12.2 Mark Center

This section describes the existing social and economic conditions, including population, race, employment, income, and housing in the areas immediately surrounding the Mark Center. WHS used ACS and decennial data from the U.S. Census Bureau, as well as EPA's EJScreen 2.0, to assess social, economic, environmental, and demographic data for block groups in the geographic scope of analysis. See Section 3.13 (Environmental Justice) for additional demographic information regarding minority and low-income communities in the vicinity of the Project Area.

WHS used a refined buffer approach to define the geographic scope of the environmental justice analysis for the Proposed Action at the Mark Center. To determine the geographic scope of analysis, WHS created a 0.5-mile buffer around the Mark Center boundaries. WHS examined the block groups captured within this buffer and found that areas within each block group in the buffer contained residences. As such, no block groups were excluded from the Mark Center Socio/EJ Study Area. The Mark Center Socio/EJ Study Area covers approximately 1.96 square miles, encompassing 5 block groups entirely and 13 block groups partially.

Population

Alexandria City has a population of approximately 159,467 (Census Bureau, 2020). In Alexandria City and in a majority of census block groups in the Mark Center Socio/EJ Study Area, people of color make up the majority of the population. In four block groups (515102001023, 515102001061, 515102001062, and 515102003021, the population is majority white. The most common racial group varies between white, Black, and Hispanic/Latino within the census block groups near the Mark Center (Census Bureau, 2020). Table 3-10 summarizes the total population and racial demographics for Alexandria City and census block groups in the Mark Center Socio/EJ Study Area (Census Bureau, 2020; U.S. EPA, 2022c).

Table 3-10. Racial Demographics of Alexandria City and Census Blocks Groups Within the Mark Center Socio/EJ Study Area

City and Block Groups [a, b]	Total Population	White	Black	Hispanic/Latino	American Indian and Alaska Native	Asian	All Other
Alexandria City	159,467	78,519 (49%)	31,314 (20%)	29,372 (18%)	217 (<1%)	11,205 (7%)	8,840 (6%)
Block groups within or partially within the Mark Center Socio/EJ Study Area							
515102001021	951	116 (12%)	194 (20%)	428 (45%)	0 (0%)	188 (20%)	25 (3%)
515102001022	3,022	497 (16%)	525 (17%)	1,546 (51%)	3 (<1%)	335 (11%)	116 (4%)
515102001023	1,070	566 (53%)	102 (10%)	210 (20%)	2 (<1%)	105 (10%)	85 (8%)
515102001041	1,229	114 (9%)	224 (18%)	742 (60%)	4 (<1%)	84 (7%)	61 (5%)
515102001042	789	89 (11%)	188 (24%)	396 (50%)	1 (<1%)	85 (11%)	30 (4%)
515102001051	1,588	425 (27%)	694 (44%)	162 (10%)	1 (<1%)	193 (12%)	113 (7%)

Table 3-10. Racial Demographics of Alexandria City and Census Blocks Groups Within the Mark Center Socio/EJ Study Area

City and Block Groups [a, b]	Total Population	White	Black	Hispanic/Latino	American Indian and Alaska Native	Asian	All Other
515102001052	2,477	500 (20%)	1,501 (61%)	139 (6%)	2 (<1%)	239 (10%)	96 (4%)
515102001061	654	402 (61%)	74 (11%)	98 (15%)	1 (<1%)	55 (8%)	24 (4%)
515102001062	1,410	718 (51%)	259 (18%)	270 (19%)	4 (<1%)	72 (5%)	87 (6%)
515102001063	628	221 (35%)	232 (37%)	124 (20%)	0 (0%)	29 (5%)	22 (4%)
515102001072	2,117	Not reported					
515102001073	1,935	Not reported					
515102002011	1,162	575 (49%)	227 (20%)	206 (18%)	3 (<1%)	78 (7%)	73 (6%)
515102002013	1,099	530 (48%)	293 (27%)	132 (12%)	6 (1%)	84 (8%)	54 (5%)
515102003011	1,987	861 (43%)	416 (21%)	462 (23%)	1 (<1%)	134 (7%)	113 (6%)
515102003012	1,346	315 (23%)	552 (41%)	138 (10%)	3 (<1%)	228 (17%)	110 (8%)
515102003021	1,867	1,303 (70%)	106 (6%)	226 (12%)	0 (0%)	115 (6%)	117 (6%)
515102003022	1,619	207 (13%)	596 (37%)	694 (43%)	1 (<1%)	70 (4%)	51 (3%)

a — Total population and race data for Alexandria City and all census block groups besides 515102001072 and 515102001073 are from the 2020 decennial census (Census Bureau, 2020).

b — Total population data for 515102001072 and 515102001073 are from EJScreen (U.S. EPA, 2022c) due to the lack of data in the 2020 decennial census (Census Bureau, 2020).

In Alexandria City, 31 percent of the population 5 years of age and over speak a language other than English in their households (either partially of entirely), and within these households, 36.4 percent speak English less than "very well." Spanish is the most common language spoken at home other than English, representing 13 percent of the city's total population 5 years of age and older (Census Bureau, 2021a).

Employment and Income

Median income within census block groups within or partially within the Mark Center Socio/EJ Study Area varied from less than $40,000 (515102001021) to over $160,000 (515102003021). The median household income in Alexandria City was approximately $101,000 (Census Bureau, 2019a).

Alexandria City and most block groups within or partially within the Mark Center Socio/EJ Study Area had unemployment rates below the 2021 national average of 5.5 percent (Census Bureau, 2021b; U.S. EPA, 2022c). However, unemployment rates in three census block groups (515102001021; 515102001042; and 515102001061) exceeded the national average. Table 3-11 summarizes the median

household income and the unemployment rate in Alexandria City and in block groups within the Mark Center Socio/EJ Study Area (Census Bureau, 2019a; Census Bureau, 2021b; U.S. EPA, 2022c).

Table 3-11. Median Household Income and Unemployment Rate of Alexandria City and Census Blocks Groups Within the Mark Center Socio/EJ Study Area

City and Block Groups	Median Household Income (2019$) [a]	Unemployment Rate (2021) [b]
Alexandria City	100,939	3%
Block groups within or partially within the Mark Center Socio/EJ Study Area		
515102001021	39,583	11%
515102001022	64,625	4%
515102001023	135,500	0%
515102001041	70,690	1%
515102001042	50,298	6%
515102001051	65,848	0%
515102001052	57,750	1%
515102001061	70,962	19%
515102001062	50,398	0%
515102001063	100,924	1%
515102001072	103,963	1%
515102001073	91,884	5%
515102002011	100,078	1%
515102002013	97,176	3%
515102003011	117,569	3%
515102003012	55,250	1%
515102003021	162,500	4%
515102003022	97,361	5%

a — Median household income data for Alexandria City and all block groups are from Census Bureau, 2019a.

b — Unemployment rate data for Alexandria City are from Census Bureau, 2021b, while unemployment rate data for all census block groups are from U.S. EPA, 2022c.

Housing

Because of the lack of available data at the census block and census block group level, WHS analyzed housing characteristics within the census tracts that house census block groups within the Mark Center Socio/EJ Study Area. Two census tracts (2001.04; 2001.05) did not have recent data on the median value of owner-occupied units. Median values of owner-occupied units in the Mark Center Socio/EJ Study Area are generally lower than Alexandria City's median value of $572,900 (Census Bureau, 2019b). Census tract 2003.02 is the only census tract with a higher median value of owner-occupied units than Alexandria City. Median rent in 5 census tracts (2001.04, 2001.07, 2002.01, 2003.01, and 2003.02) is higher than Alexandria City's median rent of $1,747 (Census Bureau, 2019b). Table 3-12 summarizes the median value of owner-occupied units and the median rent in census tracts with at least one block group within the Mark Center Socio/EJ Study Area (Census Bureau, 2019b).

Table 3-12. Selected Housing Characteristics of Alexandria City and Census Tracts Within the Mark Center Socio/EJ Study Area

County and Census Tracts	Median Value of Owner-Occupied Units (2019) [a]	Median Rent (2019) [a]
Alexandria City	$572,900	$1,747
Census tracts with at least one block group within or partially within the Mark Center Socio/EJ Study Area		
2001.02	$556,700	$1,724
2001.04	Not reported	$1,798
2001.05	Not reported	$1,334
2001.06	$532,500	$1,523
2001.07	$273,500	$1,851
2002.01	$399,300	$1,840
2003.01	$371,100	$1,804
2003.02	$602,000	$2,101

a — Data for Alexandria City and all census tracts groups for both median value of owner-occupied units and median rent are from Census Bureau, 2019b.

In 2021, there were 6,977 affordable housing units in Alexandria City (City of Alexandria, 2021b). Primarily due to growth in housing costs, growth in wages, and the strong demand for housing in the region, market-affordable units in the city declined by 62 percent between 2000 and 2021 (City of Alexandria, 2021b). In 2020, the Alexandria City Council endorsed "The Future of Housing in Greater Washington: A Regional Initiative to Create Housing Opportunities, Improve Transportation, and Support Economic Growth" from the Metropolitan Washington Council of Governments Board, a nonprofit organization that connects area leaders to address regional issues in Washington, D.C., suburban Maryland, and northern Virginia. One target of the Future of Housing report is that at least 75 percent of new housing be affordable to low- and middle-income households (Metropolitan Washington Council of Governments Board, 2019). Within the Beauregard region alone, Alexandria City aims to provide 800 additional units as committed affordable and workforce rental housing (City of Alexandria, 2021a). Neighborhoods and subareas near the Mark Center include Seminary Overlook to the south, Southern Towers to the west, and Adams to the north. Seminary Overlook is a residential area. Southern Towers and Adams neighborhoods consist of offices, retail, and hotels. All three neighborhoods are within the Beauregard Small Area Plan jurisdiction (City of Alexandria, 2021a).

3.13 Environmental Justice

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 7629), directs Federal agencies to make EJ part of their 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…" It specifically requires that Federal agencies consider effects—including human health, economic, and social impacts—on minority and low-income communities when performing NEPA analyses.

Several recently issued EOs have established a renewed focus on EJ: EO 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis* (86 FR 7037); EO 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government* (86 FR 7009); and EO 14008, *Tackling the Climate Crisis at Home and Abroad* (86 FR 7619). EO 13990,

Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis (86 FR 7037) directs all executive departments and agencies to review and address Federal regulations and actions from January 20, 2017, to January 20, 2021, that conflict with the national objectives described in EO 13990. EO 13990 specifically includes the following as national objectives: holding polluters accountable who disproportionally harm communities of color and low-income communities and prioritizing EJ and creating well-paying union jobs necessary to deliver on goals.

EO 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government* (86 FR 7009), directs Federal agencies to evaluate the extent to which underserved communities face systemic barriers in accessing opportunities and benefits available pursuant to the agency's policies and programs. Additionally, EO 13985 requires Federal agencies to develop a plan for addressing these barriers. The *Department of Defense Equity Action Plan* was developed pursuant to EO 13985 and describes actions to cultivate equity (DoD, 2022b).

EO 14008, *Tackling the Climate Crisis at Home and Abroad* (86 FR 7619), directs agencies to "make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts to disadvantaged communities, as well as the accompanying economic challenges of such impacts." The *Department of Defense Climate Adaptation Plan* meets the requirements of Section 211 of the EO and acknowledges that EJ must be considered when evaluating climate change impacts (DoD, 2021). The plan also requires that DoD training, testing, and acquisition actions do not disproportionately impact low income and/or minority populations per EOs 13985 and 13990; DoD programs, activities, and policies address disproportionately high and adverse human health, environmental, climate-related, and cumulative impacts to disadvantaged populations; and climate-related EJ and social vulnerability analyses be included in financial and management information systems as appropriate (DoD, 2021). Per EO 14008, DoD plans to update their Environmental Justice Strategy to coordinate and address EJ risks and opportunities in further detail (DoD, 2021). Until then, the *Department of Defense Strategy on Environmental Justice* from 1995 remains in effect.

The *Department of Defense Strategy on Environmental Justice* (1995) was developed to identify major programs and areas of emphasis that would best meet the intent of EO 12898, minimize adverse effects to the human and environmental health of minority and low-income populations, and accomplish the defense mission. In the strategy, specific DoD agency actions are identified to help integrate EJ into policies, programs, and activities. These actions include using NEPA as the primary means for implementing EO 12898 and using EAs, Environmental Impact Statements, and/or Records of Decision to evaluate the effects that proposed actions may have on minority and low-income populations. The strategy also sets forth the principles that focus on institutional change and ensure a healthy and safe environment exists around DoD activities located near minority and low-income populations (DoD, 1995).

3.13.1 Pentagon

WHS used the same refined buffer approach and resulting Socio/EJ Study Area used in the Pentagon socioeconomics analysis (see Section 3.12.1 [Socioeconomic]) to define the geographic scope of the EJ analysis for the Proposed Action at the Pentagon site. WHS used EPA's EJScreen 2.0[5] as the primary

[5] See https://ejscreen.epa.gov/mapper/.

screening tool to assess social, economic, environmental, and demographic data for block groups in the Socio/EJ Study Area.

Additionally, WHS used the CEQ Climate and Economic Justice Screening Tool (CEJST) 1.0[6] to help identify disadvantaged communities in the vicinity of the Pentagon site based on whether the census tracts containing or directly adjacent to the Pentagon site experience burdens related to climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development.

The population in the Pentagon Socio/EJ Study Area is estimated to be approximately 13,759 (U.S. EPA, 2022b). Minority (people of color) populations exist throughout the Pentagon Socio/EJ Study Area. The Pentagon Socio/EJ Study Area itself is in the 62nd percentile (relative to the state of Virginia as a whole) for minority percent of population (U.S. EPA, 2022b). Most block groups in the Pentagon Socio/EJ Study Area are above the 50th percentile for minority populations, with 4 block groups directly adjacent to the Pentagon in or above the 70th percentile (510131025001, 510131033001, 510131035021, and 510131035032). The highest of these is block group 510131033001, which is in the 85th percentile and is located south of Columbia Pike to the west of SR 27 and I-395 interchange partially within the Pentagon Socio/EJ Study Area (U.S. EPA, 2022b). While some low-income communities exist within the Pentagon Socio/EJ Study Area, the majority of the block groups are below the 40th percentile for low-income populations, and the Pentagon Socio/EJ Study Area itself is in the 35th percentile (U.S. EPA, 2022b; U.S. EPA, 2022d). However, 3 block groups located partially within the Pentagon Socio/EJ Study Area (510131033001, 510131035022, and 510131035032) are above the 50th percentile for low-income populations, 2 of which (510131033001 and 510131035022) have high values in or above the 75th percentile, though these are located on the outskirts of the Pentagon Socio/EJ Study Area (U.S. EPA, 2022b). Notably, block group 510131033001 has particularly high percentiles for both demographics; this block group is in the 75th percentile for low-income populations and the 85th percentile for minority populations. Minority and low-income population figures are provided in Figure 3-7 and Figure 3-8. For more minority and low-income population data, see Appendix C (Environmental Justice Supporting Data).

Many communities in the Pentagon Socio/EJ Study Area also experience extremely high burdens for certain environmental indicators, with the Pentagon Socio/EJ Study Area above the 90th percentile for $PM_{2.5}$, ozone, diesel PM, air toxics cancer risk, air toxics respiratory hazard index (HI), traffic proximity, hazardous waste proximity, and wastewater discharge (U.S. EPA, 2022b). High percentiles for $PM_{2.5}$, ozone, diesel PM, air toxics cancer risk, air toxics respiratory HI, and traffic proximity can be attributed to the Pentagon Socio/EJ Study Area's proximity to I-395 and other major roadways. See Section 3.6 (Air Quality) for more information about air quality and air quality issues around the Pentagon. Additionally, several hazardous waste features (generators, transporters, treaters, storers, and disposers of hazardous waste) are located within the Pentagon Socio/EJ Study Area, and there are several wastewater dischargers in the region.

A review of CEJST indicated that the census tract containing the Pentagon site (Tract 51013980100) and the census tracts directly adjacent to the Pentagon site (Tracts 51013980100, 51013103501, 51013103502, 51013103503, and 51013103402) are not disadvantaged. However, some metrics in the

[6] See https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5.

CEJST application are reported as not available, so this finding may be incomplete (CEQ, 2022b; CEQ, 2022c; CEQ, 2022d; CEQ, 2022e; CEQ, 2022f; CEQ, 2022g).

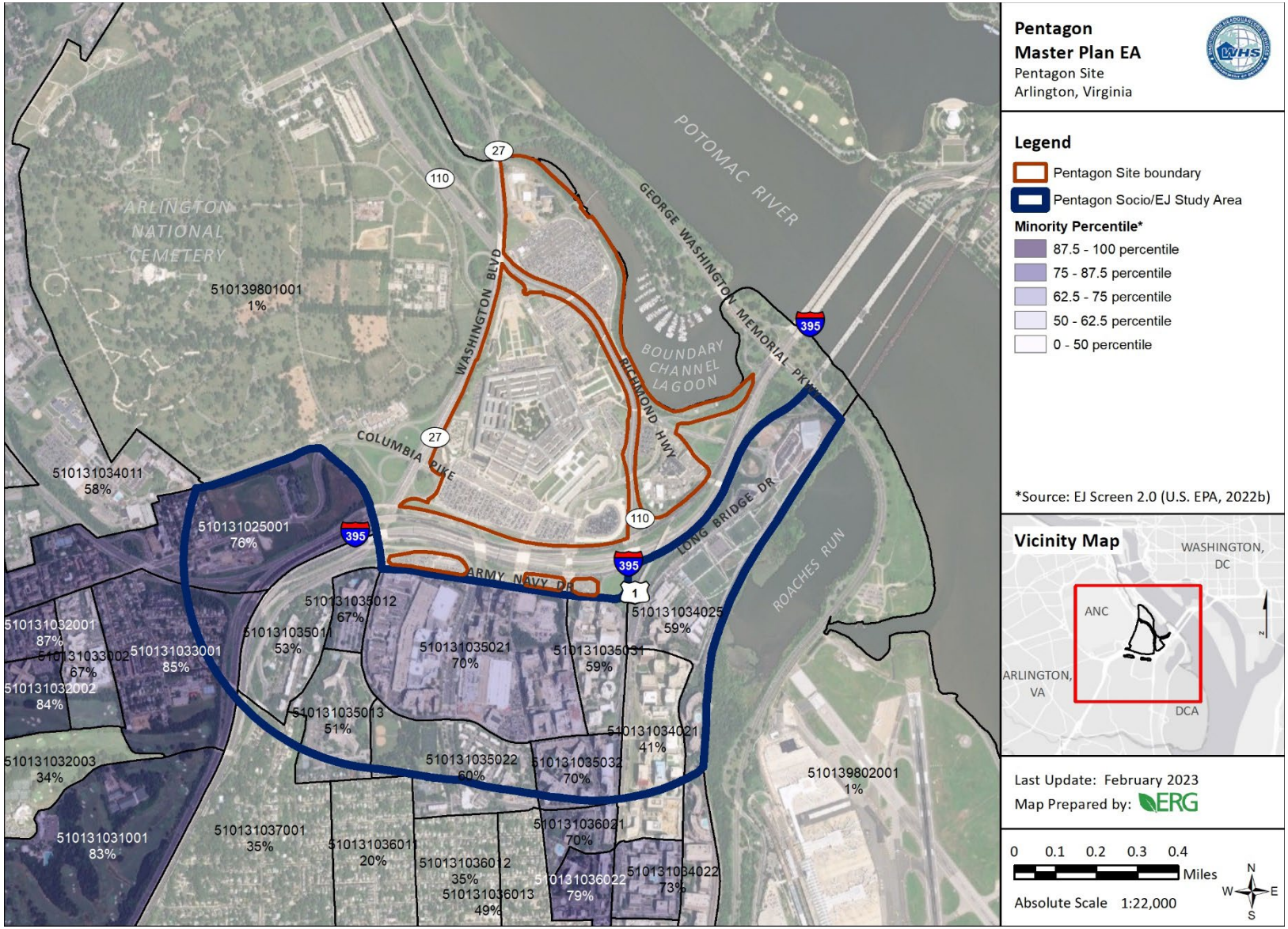

Figure 3-7. Minority Communities in the Vicinity of the Pentagon Site

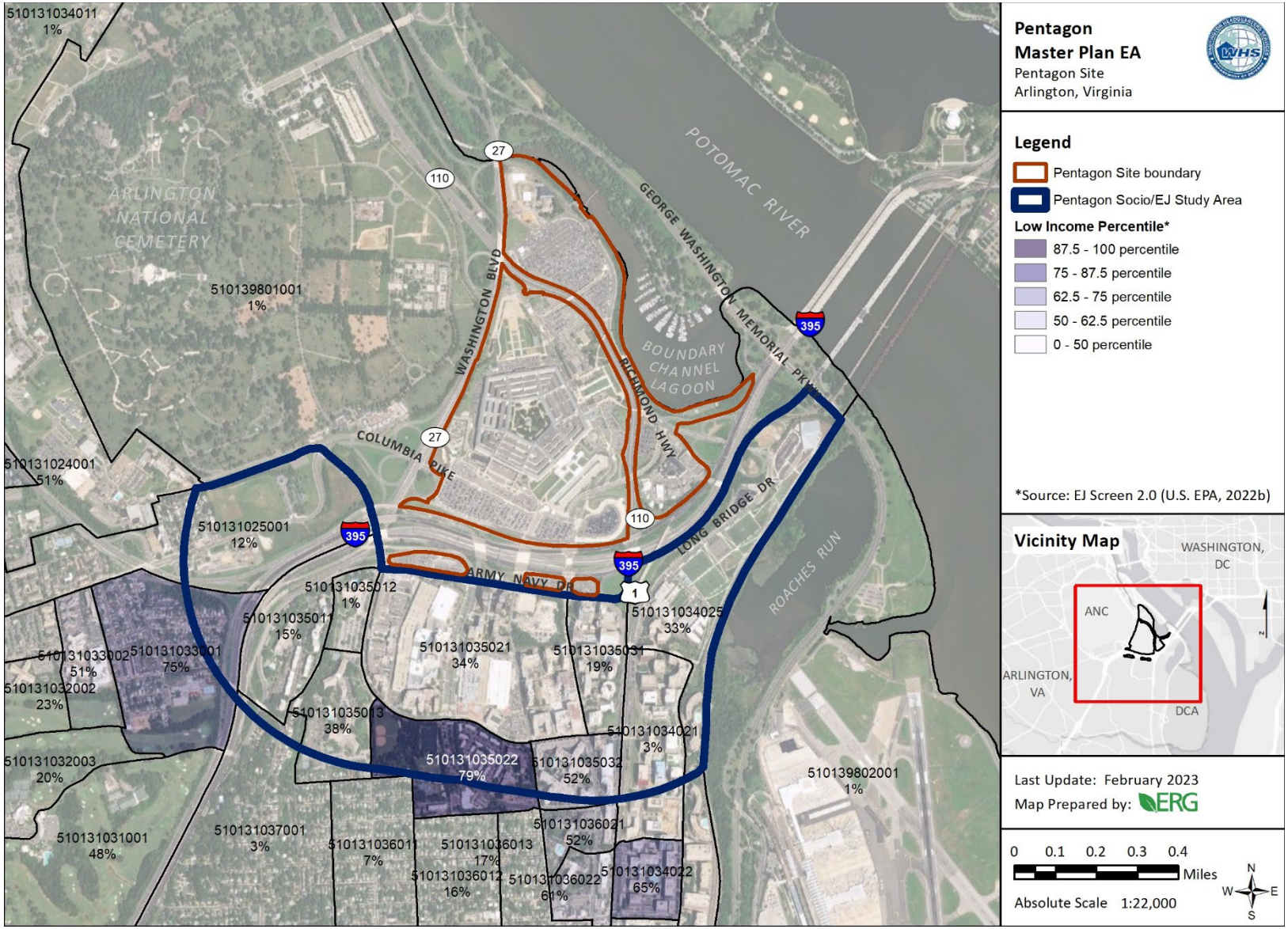

Figure 3-8. Low-Income Communities in the Vicinity of the Pentagon Site

3.13.2 Mark Center

WHS used EPA's EJScreen 2.0 as the primary screening tool to assess social, economic, environmental, and demographic data for block groups in the geographic scope of analysis.

The population in the Mark Center Socio/EJ Study Area is estimated to be approximately 17,811 (U.S. EPA, 2022c). Minority (people of color) and low-income populations exist throughout the Mark Center Socio/EJ Study Area. The Mark Center Socio/EJ Study Area itself is in the 84th percentile (relative to the state of Virginia as a whole) for minority populations and the 59th percentile for low-income populations (U.S. EPA, 2022c). Almost all individual block groups falling within the bounds of the Mark Center Socio/EJ Study Area are above the 50th percentile for minority populations, with the block group encompassing the Mark Center (515102001041) in the 85th percentile and 4 block groups immediately bordering the Mark Center (515102001021, 515102001042, 515102003022, and 515102001052) at or above the 90th percentile for minority populations (U.S. EPA, 2022c). Most block groups in the Mark Center Socio/EJ Study Area are also above the 50th percentile for low-income populations, with 4 block groups in the 50th to 74th percentiles, 3 block groups (including the block group that encompasses the Mark Center) in the 75th to 80th percentiles, and 3 block groups in or above the 94th percentile (including one block group [515102001061] with very high values in the 98th percentile) (U.S. EPA, 2022c). Minority and low-income population statistics and figures are provided in Figure 3-9 and Figure 3-10. For more minority and low-income population data, see Appendix C (Environmental Justice Supporting Data).

Many communities in the Mark Center Socio/EJ Study Area also experience extremely high burdens for certain environmental and social indicators, with the Mark Center Socio/EJ Study Area in or above the 90th percentile for $PM_{2.5}$, ozone diesel PM, air toxics cancer risk, air toxics respiratory HI, traffic proximity, and linguistic isolation (U.S. EPA, 2022c). Population statistics for certain indicators are provided in Table 3-16.

A review of CEJST indicated that the census tract containing the Mark Center (Tract 51510200104) is identified as disadvantaged because it meets more than one burden threshold *and* the associated socioeconomic threshold (CEQ, 2022h). Specifically, the census tract experiences burdens related to housing, transportation, and workforce development. The tract exceeds the housing burden threshold because it is in the 91st percentile for housing cost and in the 66th percentile for low income. The tract exceeds the transportation burden because it is in the 98th percentile for traffic proximity and volume and in the 66th percentile for low income. The tract exceeds the workforce development threshold because it is in the 93rd percentile for linguistic isolation and in the 19th percentile for high school education. No other census tracts within 0.5 miles of the Mark Center boundaries are identified as disadvantaged.

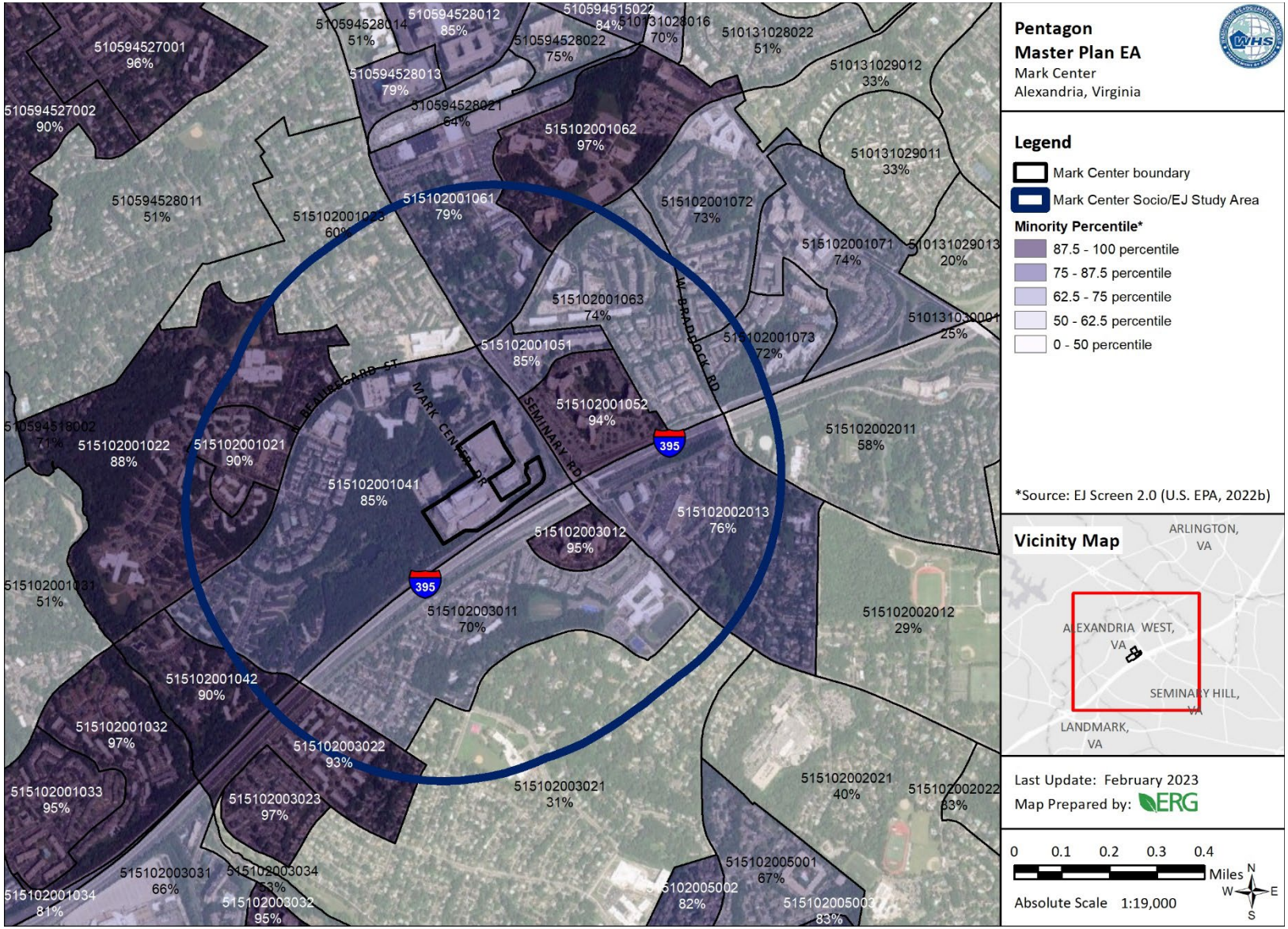

Figure 3-9. Minority Communities in the Vicinity of the Mark Center

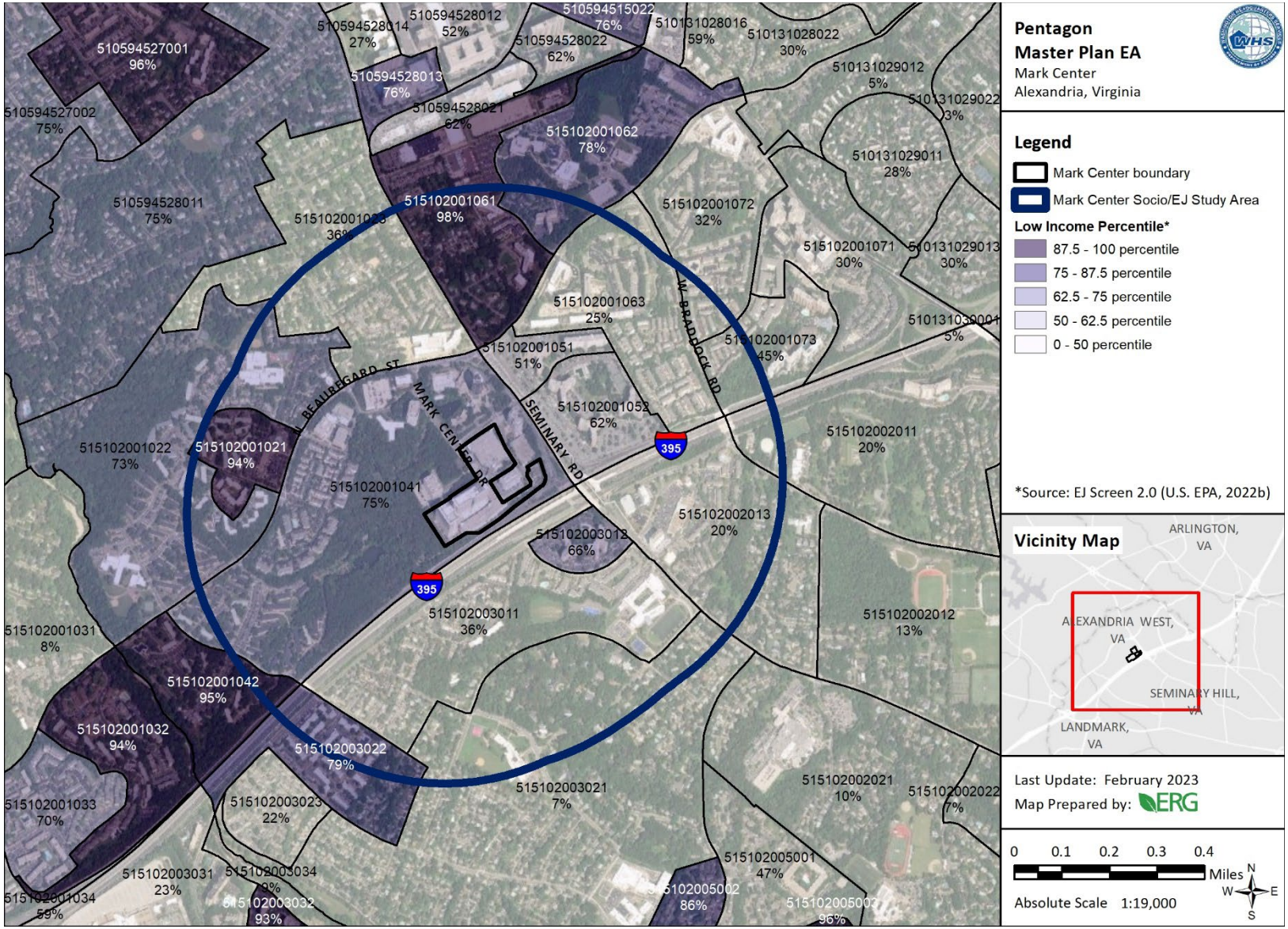

Figure 3-10. Low-Income Communities in the Vicinity of the Mark Center

3.14 Noise

Noise is unwanted or objectionable sound caused by a combination of loudness, pitch, and duration. At certain levels, noise can be detrimental to public health, safety, welfare, and quality of life. Noise is regulated at the Federal level by the Noise Control Act, the Occupational Safety and Health Administration, and through DoDI 6055.12 (*DoD Hearing Conservation Program*). The Noise Control Act of 1972 established programs for Federal research and activities in noise control, initiated Federal noise emissions standards for commercial products, and provides information to the public regarding noise emissions and noise reduction technology. The Occupational Safety and Health Administration regulates employers to reduce employee exposure to excessive noise. Job sites with an 8-hour time-weighted average sound level of 85 decibels (dB) or higher are required to have a hearing conservation program with hearing protection requirements (29 CFR Part 1910.95). WHS follows the DoD Hearing Conservation Program, which provides the procedures, noise limitations, and implementation guidelines for the program to protect the hearing of DoD personnel. For interior construction projects, WHS limits the maximum noise levels allowed during working hours to 80 dB.

Arlington County and the city of Alexandria have noise ordinances that regulate the duration and loudness of construction noise. Noise from construction-related activities as presented in the Master Plan would be regulated under these county and city ordinances. Table 3-17 presents the construction noise daytime and nighttime continuous and impulsive limits for each jurisdiction. Continuous limits are presented in the A-weighted decibel scale (dBA) which is a logarithmic scale generally used to measure noise levels because it can account for the sensitivity of the human ear across the frequency spectrum.

Table 3-13. Construction Noise Ordinance Limits

Jurisdiction	Daytime Continuous (dBA)	Daytime Impulsive (dB)	Nighttime Continuous (dBA)	Nightime Impulsive (dB)
Arlington County	60	95	55	90
City of Alexandria	65	80	- [a]	-

a — Construction not allowed in overnight hours unless issued a special permit.

Source: Arlington County Noise Control Ordinance (Arlington County Code Chapter 15); City of Alexandria Noise Control Ordinance (City of Alexandria Code, Title 11, Chapter 5).

3.14.1 Pentagon

The Pentagon site is located in an urban environment and is surrounded by highways and state and county roads (i.e., I-395, Washington Boulevard, Richmond Highway) with high levels of traffic (see Section 3.8 [Transportation]). DCA is located approximately 1 mile to the southeast, and the primary flight path for take-off and landing of commercial flights is over the Potomac River to the east of the site. In addition, occasional honor salutes and memorial flyovers are performed for ceremonies at the ANC, which can generate temporary bursts of noise (ANC, 2019).

Current activities that produce noise at the Pentagon site include intermittent generator use at the RDF, heating and cooling equipment operation at the HRP, small emergency generators throughout the site (e.g., South and North Villages and PLC2), aircraft operations at the Pentagon Heliport, heavy equipment use at construction sites around the Pentagon, landscaping equipment, ceremonial events, and vehicle traffic on surface roads and parking lots throughout the site. Buses arriving at the PTC via the bus loop and cars idling to pick up carpool participants are a daily source of noise in the southeast parking areas. A 2018 avian survey recorded ambient noise levels on the eastern edge of the Pentagon site in the riparian area as ranging from 54 to 69 dB (Luther, Clark, and Coddington, 2018a). Measurements taken in 2022 for a mass notification audibility model study found similar results, with ambient noise of 61 dB at North Village to 67 dB at South Village (Stanton Engineering, 2023).

As discussed in Section 3.8 (Transportation), aircrafts land and take off from the Pentagon Heliport in either of two directions—to/from the northwest or northeast. The Pentagon Heliport has an Installation Operational Noise Management Plan (IONMP) to analyze and manage the noise exposure to the surrounding area (WHS, 2009a). Based on the helipad's proximity to DCA and surrounding highways, the IONMP determined that the noise level of helicopter operations at the Pentagon Heliport would not exceed the average daily ambient sound levels. Therefore, no noise abatement procedures are currently in place at the Pentagon Heliport (WHS, 2009b).

The 9/11 Pentagon Memorial is the only sensitive noise receptor at the Pentagon site. Other sensitive noise receptors within a half mile of the Pentagon site are ANC to the west, Lyndon B. Johnson Memorial Grove to the east, the Air Force Memorial to the southwest, and medium- to high-density residential areas to the south of I-395. All of these sensitive noise receptors are separated from the Pentagon site by a major road, where the traffic would create ambient noise.

3.14.2 Mark Center

Existing anthropogenic sources of noise at the Mark Center include highway traffic on I-395, bus activity at the Mark Center Transit Station, high-altitude aircrafts, and landscaping equipment. Potential sensitive receptors around the Mark Center are separated from the site by the surface roads and highways, residential communities, and commercial areas. One sensitive receptor, Frances C. Hammond Middle School, is located within a half-mile of the Mark Center site, approximately 0.45 miles to the southeast.

4. ENVIRONMENTAL CONSEQUENCES

This section discusses the potential impacts associated with the construction and operation of the short-term projects, as well as the related mitigation measures. The impacts of long-term projects are also assessed in this section and are described to the extent feasible given the amount of detail known about the project scopes. However, long-term projects are likely to require future NEPA review.

4.1 Land Use

4.1.1 Pentagon

Proposed Action

Short-Term Projects

Most short-term projects would potentially result in minor and temporary changes in land use during construction activities. For example, during construction for the North Parking Bioretention Project, the North Parking Lot would have temporary laydown areas while the bioretention planters are being installed. During this time, select areas of the parking lot would be closed.

Several projects would moderately increase the amount of Green/Open Space at the Pentagon site. Most notably, the TES Project would add land to the Industrial/Utility land use category northeast of the HRP as a result of development of the parcel of land that would be aquired from VDOT (discussed below). The land acquisition would also add Green/Open Space to the Pentagon site. Table 4-1 presents the area of green space that short-term projects would add to the Pentagon site. The table does not include minor changes in green space from incorporation of minor bioretention areas and similar features.

Table 4-1. Green Space Impacts of Short-Term Projects of the Proposed Action

Project Type	Project Name	Additional Green Space (SF)
Environment and Sustainability	North Parking Bioretention Project	26,000
Environment and Sustainability	Old East Loading Dock Project	6,000
Environment and Sustainability	Corridor 5 Parking Project	11,000
Environment and Sustainability	South Secure Parking Project	18,000
Energy	TES Project (and VDOT Land Acquisition)	110,000
Security and Safety	CVIF Project	46,000
	Total	**217,000**

Implementation of eight other projects would lead to a small increase in the amount of Green/Open Space on the Pentagon site due to the incorporation of features such as bioretention areas, vegetated swales, stormwater planters, and tree box filters. These projects are the West End Safety and Security Project, North Rotary Road Security Fence and Bollards Project, Control Tower and Fire Day Station Project, North Parking Lot Improvements Project, Metro Entrance Pedestrian ACP Project, Tree Box Filters Project, Southeast Parking Project, and Pentagon COR8 Pedestrian ACP Project.

In 2022, VDOT and WHS signed a Memorandum of Agreement in which VDOT agreed to transfer real property ownership of a parcel of land along Boundary Channel Drive to WHS once VDOT improvements

along the Drive are completed. The land is located in the southwest quadrant of the I-395 and Boundary Channel Drive Interchange. One short-term project, the TES Project, would be built on this land. This land transfer and the TES Project would add additional Industrial/Utility and Green/Open space to the Pentagon site.

Several short-term projects would alter the amount of Parking/Vehicular Access land use, resulting in a net decrease in Parking/Vehicular Access land use at the Pentagon site. Although one short-term project, the Corridor 5 Parking Project, would slightly expand an existing parking area, other projects such as the North Parking Bioretention Project would replace Parking/Vehicular Access areas with Green/Open Space. See Section 4.8 (Transportation) for more information on impacts to parking.

None of the other short-term projects would alter Green/Open Space or Support land uses at the Pentagon site. Short-term projects would not alter Administration or Public Transportation land uses at the Pentagon site.

Because the Proposed Action would occur on federal property, it is not subject to the Arlington County GLUP. The Pentagon site is also not located within a Neighborhood Conservation Area. No short-term projects would impact the *Revitalization District Node of the Columbia Pike Neighborhoods Area Plan*, and the Pentagon site is not located within or next to a Special Neighborhood Revitalization District (Arlington County, 2016).

Long-Term Projects

Long-term projects would result in temporary changes in land use during construction activities, similar to those described for the short-term projects (e.g., the temporary conversion of space to laydown areas).

Implementation of long-term projects would also result in some permanent changes in land use categorization at the Pentagon site. One long-term project, the North Village and PSOC Green/Support Space Project, would result in the addition of one new land use category. As a result of this project, the total area devoted to the Support land use category would decrease at the Pentagon site as the MOC is demolished and replaced with hybrid Green Space/Support land use. The North Village and PSOC Project would add 73,000 SF of Green Space/Support land use, which would include areas for outdoor physical training and recreation and landscape storage. [redacted]

Long-term projects would not alter Administration, Public Transportation, or Industrial/Utility land uses at the Pentagon site.

The impact discussion related to county-level plans (e.g., GLUP) in the short-term project section above also applies to the long-term projects of the Proposed Action.

No-Action Alternative

Under the No-Action Alternative, some land use changes would still occur. Several of the projects under the No-Action Alternative would lead to minor increases in Green/Open Space by incorporating bioretention areas and other green features. The short-term projects in the No-Action Alternative that are also included in the Proposed Action would result in the same impacts described above. There would still be a net decrease in the Parking/Vehicular Access land use under the No-Action Alternative. .

4.1.2 Mark Center

Proposed Action

During construction of the Electric Vehicle Charging Stations and Infrastructure Project and the North Parking Garage Solar Project, some areas in the North Parking Garage would be converted to temporary laydown areas as features are installed. Implementation of short-term projects at the Mark Center would not result in any permanent land use impacts.

After implementation of these projects, the Mark Center would continue to be inconsistent with the NCPC's recommended parking ratio for sites within Suburban Areas Beyond Metrorail, which is one space to every two employees (1:2). The EV Charging Stations and Infrastructure Project would advance the Beauregard Small Area Plan's goal of increasing electric vehicle infrastructure, and the North Parking Garage Solar Project would advance the plan's goals of increasing renewable energy usage.

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative, and therefore the No-Action Alternative would not result in any land use impacts at the Mark Center.

4.2 Hydrological Resources

4.2.1 Pentagon

Proposed Action

Short-Term Projects

The short-term projects would not result in any temporary construction activities or permanent development in surface water bodies or wetlands and, therefore, would have no direct impacts to these features. General construction activities for short-term projects would disturb soils, resulting in potential increases in the amounts of sediments in stormwater runoff to the Pentagon Lagoon, Boundary Channel, and Potomac River as discussed in Section 4.3 (Stormwater Management). However, WHS would implement BMPs during construction to reduce erosion, and indirect effects to the Pentagon Lagoon, Boundary Channel, and Potomac River water quality would be negligible.

Short-term projects that incorporate permanent stormwater BMPs—such as bioretention areas, native landscaping, vegetated swales, stormwater planters, and tree box filters—are intended to reduce pollutant loadings to nearby water bodies (e.g., the Pentagon Lagoon and Potomac River) resulting from stormwater runoff. These projects would be expected to further regional efforts to improve surface water quality and comply with the Chesapeake Bay TMDL. See Section 4.3 (Stormwater Management) for additional discussion of stormwater-related improvements. No other short-term projects would involve changes in withdrawals from, or discharges to, the Pentagon Lagoon or other surface waters.

When assessing potential temporary impacts to floodplains, WHS considered both the effective and preliminary FEMA FIRM panels. Construction activities for the Connector Road and Boundary Channel Drive Intersection Improvements Project would potentially occur near both the 100-year and 500-year floodplains. No other projects would involve temporary construction in the 100-year floodplain. Temporary construction for the following projects would likely occur in the 500-year floodplain: North Village ACP Project, North Parking Bioretention Project, North Parking Lot Improvements Project, Secure

Manhole and Hand Hole Covers Project, Areawide Resurfacing and Rehabilitation Project, Areawide Sidewalk Improvements Project, Pilot EV Charging Stations Project, and Tree Box Filters Project. However, temporary construction activities would not be anticipated to alter elevations or gradients, and thus would have no impacts to the 500-year floodplain.

Some short-term projects would construct permanent infrastructure in the 500-year floodplain. The North Village ACP Project, North Parking Lot Improvements Project, Areawide Sidewalk Improvements Project, and Pilot EV Charging Stations Project would result in permanent development (i.e., fencing, a pedestrian gate, a VACP, an ACP, a pedestrian path, lamping, sidewalks, and EV charging stations) in the 500-year floodplain. However, development in the floodplain would not permanently obstruct floodwaters or alter elevations or gradients and thus would have no adverse impacts to the 500-year floodplain. The Connector Road and Boundary Channel Drive Intersection Improvements Project would install permanent features (e.g., road signals, sidewalks) near the 100-year and 500-year floodplains; however, measures would be taken to ensure permanent development is located outside of these floodplains to avoid flood impacts.

WHS reduces the risk of flood loss and minimizes impacts of floods on human safety and health in compliance with EO 11988 by avoiding development in the 100-year floodplain. No construction activities would occur during flood events.

Pursuant to CZMA § 307(c)(1) and 15 CFR Part 930, Subpart C, WHS prepared and submitted a Consistency Determination to the VA DEQ for review and concurrence. In the determination, WHS concluded that the Proposed Action affects the land or water uses or natural resources of Virginia's coastal resources and has demonstrated consistency with the enforceable policies of the Virginia Coastal Zone Management Program. Further discussion of effects can be found in Appendix D (Coastal Consistency Determination).

WHS would implement stormwater BMPs and adhere to applicable stormwater permitting requirements during construction to reduce potential effects to hydrological resources as discussed in Section 4.3 (Stormwater Management). Construction activities would also maintain the 100-foot RPA buffers around the Boundary Channel and Pentagon Lagoon as prescribed by the Chesapeake Bay Preservation Ordinance of Arlington County.

None of the other short-term projects would have impacts related to hydrological resources.

Long-Term Projects

Implementation of the long-term projects would not involve construction or permanent development in surface water bodies or wetlands and, therefore, would have no direct impacts to these features. General construction activities for long-term projects would disturb soils, resulting in potential increases in the amounts of sediments in stormwater runoff to the Pentagon Lagoon, Boundary Channel, and Potomac River as discussed in Section 4.3 (Stormwater Management). However, WHS would implement BMPs during construction to reduce erosion, and indirect effects to the Pentagon Lagoon, Boundary Channel, and Potomac River water quality would be negligible.

Some long-term projects would involve permanent changes to infrastructure within the 500-year floodplain. Implementation of the North Village and PSOC Green/Support Space Project would remove existing facilities (the MOC) and impervious surfaces within the 500-year floodplain, thus reducing the obstruction of floodwaters and promoting groundwater recharge. Implementation of the Pentagon-

Wide ZEV Fleet Infrastructure Project would involve minor new construction (ZEV charging stations) in existing impervious areas within the 500-year floodplain; this infrastructure would not be expected to obstruct floodwaters. The Microgrid Project and the Chiller Plant Upgrades Project would not be located in the 500-year floodplain.

Long-term projects would be further analyzed for potential impacts to hydrological resources in the future when project scopes are more clearly defined.

No-Action Alternative

The projects in the No-Action Alternative are also part of the Proposed Action and would result in the same impacts described above. No projects would include temporary construction activities or permanent development in surface water bodies or wetlands. Certain construction activities for the projects identified in the No-Action Alternative would disturb soils, resulting in potential increases in the amounts of sediments in stormwater runoff to the Pentagon Lagoon and Boundary Channel as discussed in Section 4.3 (Stormwater Management). Projects that implement BMPs would result in similar impacts to those described above for improvements to water quality. However, any improvements to water quality would be less than those anticipated to occur under implementation of the Proposed Action because there would be fewer projects implementing BMPs under the No-Action Alternative.

Construction activities and permanent development associated with the North Parking Bioretention Project, North Village ACP Project, Pilot EV Charging Stations Project, and Tree Box Filters Project would be located in the 500-year floodplain. Temporary construction activities would not be anticipated to alter elevations or gradients, and thus would have no impacts to the 500-year floodplain. Permanent development in the floodplain would not permanently obstruct floodwaters or alter elevations or gradients and thus would have no adverse impacts to the 500-year floodplain.

The No-Action Alternative would not result in any other impacts to hydrological resources.

4.2.2 Mark Center

Proposed Action

Construction activities for the Electric Vehicle Charging Stations and Infrastructure Project and the North Parking Garage Solar Project would not result in any impacts to nearby water bodies and would have little to no stormwater impacts as discussed in Section 4.3 (Stormwater Management). No other projects would include exterior construction components and therefore no other projects would have impacts to hydrological resources at the Mark Center.

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative, and therefore the No-Action Alternative would not result in any changes to hydrological resources at the Mark Center.

4.3 Stormwater Management

4.3.1 Pentagon

Proposed Action

Short-Term Projects

Construction activities associated with short-term projects have the potential to discharge pollutants and sediments in stormwater. As mentioned in Section 3.3 (Stormwater Management), the General VPDES MS4 Permit requires that construction stormwater controls be approved by a VESCP authority and installed during construction activities. Construction stormwater controls prevent and minimize erosion and sediment discharge. These controls include but are not limited to storm sewer inlet protection, dust control, stormwater conveyance protection, perimeter controls, and temporary and permanent soil stabilization. When properly installed and maintained, construction stormwater controls will limit discharges of pollutants and sediment from the project site and reduce the potential for impacts on the water quality of the Pentagon Lagoon, the Boundary Channel, and subsequently the Potomac River.

Implementation of the South Secure Parking Project, Tree Box Filters Project, Old East Loading Dock Project, and Pentagon COR8 Pedestrian ACP Project would require a Land Disturbing Activity Permit. In addition, the following projects would require Construction General Permit coverage from VA DEQ: the North Rotary Road Security Fence and Bollards Project, North Parking Bioretention Project, Corridor 5 Parking Project, CVIF Project, Southeast Parking Project, North Village ACP Project, Control Tower and Fire Day Station Project, and Metro Entrance Pedestrian ACP Project.

As discussed in Section 4.1 (Land Use), implementation of the North Parking Bioretention Project, Old East Loading Dock Project, Corridor 5 Parking Project, South Secure Parking Project, TES Project (and VDOT Land Acquisition), and CVIF Project would increase the square footage of permeable surfaces such as green space by approximately 217,000 SF and eliminate an undetermined amount of existing impervious surfaces. The Pentagon COR8 Pedestrian ACP would increase impervious area by approximately 8,300 SF.

Overall long-term improvements to the water quality of the Pentagon Lagoon, Boundary Channel, and Potomac River would be anticipated due to the stormwater BMPs incorporated into the West End Safety and Security Project, North Rotary Road Security Fence and Bollards Project, Control Tower and Fire Day Station Project, Pentagon South Pedestrian Safety Project, Metro Entrance Pedestrian ACP Project, South Secure Parking Project, Tree Box Filters Project, North Parking Bioretention Project, Old East Loading Dock Project, Southeast Parking Project, CVIF Project, and Corridor 5 Parking Project. The stormwater BMPs associated with these projects include bioretention areas, native landscaping, vegetated swales, stormwater planters, curbless parking lots, and tree box filters. Incorporation of permeable surfaces and stormwater BMPs would increase the amount of stormwater infiltrating through soils, which would help prevent pollutants such as oil and grease from roadways, pesticides and fertilizers from landscaping, sediment from construction sites, and improperly discarded trash from entering the Pentagon Lagoon, the Boundary Channel, and subsequently the Potomac River. Pollutants that enter these water bodies have the potential to decrease water quality, destroy local habitat, and harm aquatic life. Pollutant reductions would help WHS meet the WHS Chesapeake Bay TMDL Action Plan targets as required by the General VPDES MS4 Permit.

Long-Term Projects

Construction activities for the North Village and PSOC Green/Support Space Project, [redacted] and Pentagon-Wide ZEV Fleet Infrastructure Project would potentially increase stormwater pollutants and sediments. However, WHS would implement appropriate erosion and sediment control measures and keep them properly maintained to limit detrimental effects on the Pentagon Lagoon, Boundary Channel, and Potomac River.

The North Village and PSOC Green/Support Space Project would increase the permeable surface area and decrease the impervious area by demolishing a temporary building. Increases in permeable surfaces would allow more stormwater to infiltrate soils and would prevent fewer pollutants from entering the local surface waters.

The [redacted] would include a new building that would increase the area of impervious surfaces, potentially resulting in an increase in stormwater pollutants. This building would need to be designed to treat stormwater runoff to minimize negative impacts to the local waterways.

Operation of the Pentagon-Wide ZEV Fleet Infrastructure Project would result in no stormwater impacts.

Long-term projects would need to be further analyzed for potential impacts to stormwater management when project scopes are more clearly defined.

No-Action Alternative

Certain construction activities for the projects identified in the No-Action Alternative would disturb soils, resulting in potential increases in the amounts of sediments in stormwater runoff to the Pentagon Lagoon and Boundary Channel. However, construction activities would implement BMPs to control erosion runoff, and potential indirect effects on the Pentagon Lagoon and Boundary Channel water quality would be negligible. Overall long-term improvements to the water quality of the Boundary Channel and Pentagon Lagoon would be anticipated under the No-Action Alternative due to the stormwater BMPs incorporated into the Control Tower and Fire Day Station Project, Pentagon South Pedestrian Safety Project, Metro Entrance Pedestrian ACP Project, South Secure Parking Project, North Rotary Road Security Fence and Bollards Project, Tree Box Filters Project, Southeast Parking Project, North Parking Bioretention Project, CVIF Project, Old East Loading Dock Project, and Corridor 5 Parking Project.

The No-Action Alternative would not result in any other impacts to stormwater management.

4.3.2 Mark Center

Proposed Action

Implementation of the Electric Vehicle Charging Stations and Infrastructure Project and North Parking Garage Solar Project would result in limited stormwater impacts at the Mark Center, perhaps none, because there would be little to no earthwork involved in the construction of these projects.

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative, and therefore the No-Action Alternative would not result in any changes to stormwater management at the Mark Center.

4.4 Biological Resources

4.4.1 Pentagon

Proposed Action

Short-Term Projects

Most short-term projects would potentially result in temporary, minor disturbances to wildlife, such as migratory birds residing in the Pentagon site's riparian area, due to increases in lighting, noise, and vibration from equipment during construction activities. Construction activities would also potentially result in fugitive dust emissions and soil erosion that would potentially temporarily degrade nearby wildlife habitat. Projects located close to the Pentagon site's riparian area would be most likely to disturb wildlife. These projects would include the Connector Road and Boundary Channel Drive Intersection Improvements Project, North Village ACP Project, North Parking Bioretention Project, North Parking Lot Improvements Project, and TES Project. However, potential disturbances and habitat degradation would be minor, and wildlife would likely return and resume habits after construction. See Section 4.14 (Noise) for additional information on noise-related impacts.

As discussed in Section 3.4 (Biological Resources), the North Village ACP Project, Control Tower and Fire Day Station Project, and Pentagon COR8 Pedestrian ACP Project have begun construction since 2014. These projects have resulted in the removal of mostly ornamental, non-native trees on the interior of the Pentagon site, though trees were typically replaced with native vegetation and the overall number of trees on the interior of the Pentagon site has decreased only by a minor amount. No other short-term projects would be expected to result in tree removal, and any trees removed would be replaced with like-kind or native vegetation when possible. Most construction for other short-term projects would occur in previously disturbed or paved areas. Some construction activities may temporarily disturb landscaped areas; however, disturbed landscaped areas would be restored with native vegetation (when possible) following completion of construction. Additionally, affected vegetated areas currently consist mostly of ornamental turfgrass, are regularly maintained, and offer little habitat value.

Some short-term projects would increase the area of impervious surfaces (i.e., the South Secure Parking Project would add approximately 11 parking spaces, the Corridor 5 Parking Project would add approximately 24 parking spaces, and the Pentagon COR8 Pedestrian ACP Project would increase the impervious area by approximately 8,300 SF). However, implementation of short-term projects as a whole would result in a net increase of vegetated areas and green space. Most increases in green space would result from reductions in parking and incorporation of stormwater BMPs. Specifically, the North Parking Bioretention Project, Old East Loading Dock Project, Corridor 5 Parking Project, South Secure Parking Project, TES Project (and VDOT Land Acquisition), and CVIF Project would result in an increase of approximately 5 acres of green space at the Pentagon site. The use of BMPs, planting of native vegetation, and increase in green space would improve potential habitat quality at the Pentagon site. Additionally, incorporation of stormwater BMPs could improve stormwater runoff quality, thus potentially improving the habitat quality of the Pentagon site RPA, as well as nearby water bodies such as the Boundary Channel, Pentagon Lagoon, and Potomac River. See Section 4.3 (Stormwater Management) for additional information on stormwater-related impacts.

Operational noise would be produced by the animals in the kennels constructed as a result of the CVIF Project. The CVIF kennels would be located on the western edge of the Pentagon site, approximately 0.5 miles from the RPA. Noise from the kennels would dissipate in the surrounding area and would not

reach the RPA. Therefore, there would be no potential for the CVIF Project to result in long-term disturbances to wildlife.

Operational noise would also be produced by aircraft using the helipad facility developed through the Remote Delivery Facility Roof Project. The Remote Delivery Facility Roof Project, which is currently in progress, was previously analyzed in the [redacted] which stated that since future air operations are unknown and WHS does not control air operations at the Pentagon Heliport, minor indirect impacts to noise-sensitive wildlife due to changes in air operations are possible but uncertain. Surrounding anthropogenic noise (e.g., transportation noise from highway traffic and from aircraft at DCA airport) already contributes to ambient noise levels, so it is unlikely that changes in operational noise at the RDF Roof would result in long-term disturbances to wildlife (WHS, 2021c). See Section 4.14 (Noise) for additional information on noise-related impacts.

There is little to no potential for federally listed or state-listed species to be present at the Pentagon site due to lack of adequate habitat. No critical habitat exists at the Pentagon site. Additionally, short-term projects would be implemented in the interior of the Pentagon site, would not be expected to include further tree removal, would not involve any in-stream work, and would not be located in the riparian area—which is the only area of habitat value on the Pentagon site. Therefore, the short-term projects would have no impacts to federally listed or state-listed species or critical habitat.

As described in Section 3.4 (Biological Resources), WHS obtained a USFWS Official Species List for the Pentagon site on February 2, 2023, through the IPaC system (USFWS, 2023a). WHS then assessed whether the short-term projects would have negative impacts on species afforded special protection under the ESA. WHS determined that short-term projects would have no effect on the northern long-eared bat—the only ESA-listed species on the Official Species List—because there is no adequate habitat in the project areas and therefore the species would not be present, because the projects would not otherwise present a risk to the species, and because no additional tree removal is proposed. WHS reviewed the *Programmatic Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions* (USFWS, 2016) and, on February 2, 2023, WHS completed the Northern Long-Eared Bat Consultation and 4(d) Rule Consistency Determination Key through the IPaC system. Results of the determination key showed that there is no need to coordinate further with USFWS for short-term projects at the Pentagon site.

In accordance with ESA Section 7, WHS determined that the short-term projects would have no effect on Atlantic sturgeon, a species under the jurisdiction of the National Marine Fisheries Service (NMFS). Because there would be no in-stream work in Boundary Channel or the Pentagon Lagoon, there would be no plausible routes of effects to the species as a result of the short-term projects. ESA Section 7 consultation with NMFS is not required.

To ensure compliance with the Migratory Bird Treaty Act, no tree or shrub removal would be performed during the migratory bird nesting season (i.e., March 15–August 15) unless surveys are conducted first to ensure there are no migratory birds nesting at the project site(s).

To minimize impacts to the habitat in the RPA, RMA, and nearby water bodies (i.e., the Pentagon Lagoon, Boundary Channel, and the Potomac River), the use of pesticides and herbicides would be avoided to the maximum extent practicable. If other integrated pest management techniques have been considered and pesticides or herbicides are required, the chemicals proposed for use must be

approved by ESB and only applied per the product label, in proper weather conditions, by a certified pesticide applicator, and in accordance with all applicable laws and regulations.

All earthmoving activities and soil disposal would be conducted in accordance with the *WHS Guidance Document for Proper Handling of Soil at the Pentagon*. To the maximum extent practicable, native vegetation would be used for seeding and planting to improve native habitat quality.

None of the other short-term projects would have impacts to biological resources.

Long-Term Projects

Construction activities for long-term projects would result in temporary, minor disturbances to wildlife similar to those resulting from short-term projects. The North Village and PSOC Green/Support Space Project and Pentagon-Wide ZEV Fleet Infrastructure Project would be located close to the Pentagon site RPA and would be more likely to disturb wildlife through typical construction activities (i.e., noise from heavy construction vehicles, use of temporary lighting for worker safety). However, potential disturbances and habitat degradation would be temporary and minor, and wildlife would likely return and resume habits after construction. Construction of long-term projects would potentially involve minimal tree removal of ornamental or landscape species in direct project footprints; however, trees removed would likely be replaced with native vegetation. No direct effects (i.e., habitat or tree removal) would occur in the RPA.

Implementation of the North Village and PSOC Green/Support Space Project would involve demolition of the MOC and replacement with primarily open space, resulting in 1.7 acres of additional green space. That project would also repurpose a large portion of the North Village as green space, which would reinforce and expand the green edge along the riparian area to improve the quality of wildlife habitat on the Pentagon site.

Increases in green space would improve potential habitat quality at the Pentagon site. Reductions in impervious surfaces could also reduce stormwater runoff quantity and pollutant loadings, thus potentially improving the habitat quality of the Pentagon site RPA and RMA as well as nearby water bodies, such as the Boundary Channel, Pentagon Lagoon, and Potomac River. See Section 4.3 (Stormwater Management) for additional information on stormwater-related impacts.

Long-term projects would need to be further analyzed for potential effects to state-listed and federally listed species and critical habitat, and ESA Section 7 consultation requirements for long-term projects would need to be completed in the future when project scopes are more clearly defined.

No-Action Alternative

The majority of the projects implemented under the No-Action Alternative would result in minor disturbances to wildlife similar to those resulting from implementation of the Proposed Action short-term projects. The North Parking Bioretention Project, the North Village ACP Project, and the TES Project would be located closest to the Pentagon site's riparian area and would therefore be more likely to disturb wildlife than other No-Action Alternative projects. However, potential disturbances and habitat degradation would be temporary and minor, and wildlife would likely return and resume habits after construction.

Changes in tree cover due to implementation of the No-Action Alternative would be the same as those resulting from implementation of the Proposed Action short-term projects, specifically the North Village ACP Project, Control Tower and Fire Day Station Project, and Pentagon COR8 Pedestrian ACP Project. No other projects implemented under the No-Action Alternative would be expected to result in tree removal, and any trees removed would be replaced with like-kind or native vegetation when possible. Most construction for other projects would occur in previously disturbed or paved areas. Some construction activities could temporarily disturb landscaped areas; however, disturbed landscaped areas would be restored with native vegetation (when possible) following completion of construction. Additionally, affected vegetated areas currently consist mostly of ornamental turfgrass, are regularly maintained, and offer little habitat value.

Some projects implemented under the No-Action Alternative would increase the area of impervious surfaces (i.e., the South Secure Parking Project would add approximately 11 parking spaces, the Corridor 5 Parking Project would add approximately 24 parking spaces, and the Pentagon COR8 Pedestrian ACP Project would increase the impervious area by approximately 8,300 SF). However, implementation of the No-Action Alternative would result in a net increase of vegetated areas and green space. Implementation of the No-Action Alternative would result in the same changes in green space and habitat quality as those resulting from implementation of the Proposed Action short-term projects, except that the TES Project (110,000 SF of additional green space) would not occur under the No-Action Alternative.

Changes in operational noise due to implementation of the No-Action Alternative would be the same as those resulting from implementation of the Proposed Action short-term projects, specifically the CVIF Project and the Remote Delivery Facility Roof Project.

Under the No-Action Alternative, conclusions about the potential effects on federally listed and state-listed species would be the same as those resulting from implementation of the Proposed Action short-term projects.

The No-Action Alternative would incorporate the same compliance and mitigation measures as those for the Proposed Action short-term projects.

None of the No-Action Alternative projects would have impacts to biological resources.

4.4.2 Mark Center

Proposed Action

Construction activities for the Electric Vehicle Charging Stations and Infrastructure Project and the North Parking Garage Solar Project would potentially result in minor disturbances to wildlife due to temporary use of construction lighting and noise from construction vehicles and equipment. However, potential disturbances would be minor, and wildlife would likely return and resume habits after construction. Construction activities would occur in previously disturbed or paved areas and would not occur within the RPA.

There is little to no potential for federally listed or state-listed species to be present at the Mark Center due to lack of adequate habitat. No critical habitat exists at or near the Mark Center. Additionally, Mark Center projects would not include tree removal. Therefore, the projects would have no impacts to federally listed or state-listed species or critical habitat.

As described in Section 3.4 (Biological Resources), WHS obtained a USFWS Official Species List for the Mark Center on February 3, 2023, through the IPaC system (USFWS, 2023b). WHS then assessed whether the short-term projects would have negative impacts on species afforded special protection under the ESA. WHS determined that Mark Center projects would have no effect on the northern long-eared bat—the only ESA-listed species on the Official Species List—because there is no adequate habitat in the project areas and therefore the species would not be present, because the projects would not otherwise present a risk to the species, and because no tree removal is proposed. WHS reviewed the *Programmatic Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions* (USFWS, 2016) and, on February 3, 2023, WHS completed the Northern Long-Eared Bat Consultation and 4(d) Rule Consistency Determination Key through the IPaC system. Results of the determination key showed that there is no need to coordinate further with USFWS for short-term projects at the Mark Center.

To prevent impacts to the RPA, nearby surface water bodies, and associated species inhabiting these habitats, the use of pesticides and herbicides would be avoided to the maximum extent practicable.

No other Mark Center projects would have impacts to biological resources.

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative, and therefore the No-Action Alternative would not result in any impacts to biological resources at the Mark Center.

4.5 Cultural and Historic Resources

4.5.1 Pentagon

Proposed Action

Short-Term Projects

Short-term projects would be located throughout the Pentagon site, both adjacent to and within the Pentagon Historic District boundary.

The following five short-term projects would directly affect exterior features of contributing resources within the Pentagon Historic District boundary:

- [redacted] These are non-original, non-character-defining features and their replacement is not likely to be considered an adverse effect. Once the design concepts for these projects are sufficiently developed, WHS would consult with VDHR pursuant to NHPA Section 106 and, if necessary, would either adjust project designs to avoid adverse effects or pursue a Memorandum of Agreement (MOA) to resolve adverse effects.
- The Building Envelope Weatherization Project would replace exterior doors (in-kind) and weatherization materials on the Pentagon building. WHS determined that these are non-original, non-character-defining features and their replacement would not result in any potential to effect.

- The Center Courtyard Stage and Stairs Project would replace the existing, temporary stage with a permanent facility that meets safety, ADA, and ceremonial design requirements. The current stage and associated stairs are non-original, non-character-defining features and construction of the new stage is not likely to be considered an adverse effect. Once the design concept is sufficiently developed, WHS would consult with VDHR pursuant to NHPA Section 106 and, if necessary, would either adjust the project design to avoid adverse effects or pursue an MOA to resolve adverse effects.

The following five short-term projects would involve construction or modification of substantial facilities within the Pentagon site (but outside of the Pentagon Historic District boundary), resulting in potential effects due to viewshed impacts:

- The Control Tower and Fire Day Station Project, which is currently in progress, would improve the architectural consistency of the Pentagon site by replacing temporary facilities with a new facility designed in accordance with the Pentagon ESM. WHS received conditional approval from VDHR on the July 2015 35 percent Bridging Documents. VDHR reviewed the 65 percent designs in 2021, and stated that the project as designed would have no adverse effect on the Pentagon building.
- The Remote Delivery Facility Roof Project, which is currently in progress, was previously analyzed in the [redacted]. In 2021, VDHR concurred that Phase 1 would not adversely affect historic properties. WHS anticipates that Phases 2 through 4 would also not result in adverse effects. Once the design concepts for Phases 2 through 4 are sufficiently developed, WHS would consult with VDHR pursuant to NHPA Section 106 and, if necessary, would either adjust project designs to avoid adverse effects or pursue an MOA to resolve adverse effects.
- The CVIF Project would improve the viewscape between the Pentagon building, the 9/11 Pentagon Memorial, and the U.S. Air Force Memorial by replacing the existing temporary SAL fabric canopy with a squared canopy whose design would follow the precedent set by the Boundary Channel Drive and Mall Terrace VACPs. The design would incorporate visual and acoustical screening measures along the northeast perimeter between the CVIF and the 9/11 Pentagon Memorial. The CVIF Project would also improve the architectural consistency of the Pentagon site by replacing the prefabricated police booths with a permanent, consolidated facility designed in accordance with the Pentagon ESM to complement and maintain the architectural character of the Pentagon building in form, design, material, and detailing. The Pentagon Memorial Restrooms would also be designed in accordance with the Pentagon ESM. Implementation of the CVIF Project is therefore not likely to be considered an adverse effect. Once the design concept is sufficiently developed, WHS would consult with VDHR pursuant to NHPA Section 106 and, if necessary, would either adjust the project design to avoid adverse effects or pursue an MOA to resolve adverse effects.
- The Metro Entrance Pedestrian ACP Project would involve the construction of new ACP and employee screening facilities at the Pentagon entrance adjacent to the Pentagon Metro Station. WHS initially consulted with VDHR in 2011 regarding an early concept for this project that featured an asymmetrical layout, resulting in VDHR concurrence with a finding of no adverse effect despite concerns regarding the lack of symmetry. The current concept features a symmetrical layout for the ACP and employee screening facilities; WHS therefore anticipates

that the project is not likely to be considered an adverse effect. Once the design concept is sufficiently developed, WHS would consult with VDHR pursuant to NHPA Section 106 and, if necessary, would either adjust the project design to avoid adverse effects or pursue an MOA to resolve adverse effects.

- The TES Project would involve the construction of a large aboveground chilled water tank approximately 0.25 miles southeast of the Pentagon Historic District. A preliminary concept for the project depicts a 160-foot diameter tank that is 80 feet high, which would be visible from east-facing portions of the Pentagon building and would potentially result in a minor disruption of the viewshed of I-395 from the Southwest Façade (a proposed character-defining feature of the Pentagon building). However, the tank would be located immediately adjacent to the HRP (an Industrial/Utility area) and would therefore not be incongruous with existing development in this portion of the Pentagon site. Once the design concept is sufficiently developed, WHS would consult with VDHR pursuant to NHPA Section 106 and, if necessary, would either adjust the project design to avoid adverse effects or pursue an MOA to resolve adverse effects.

All designs for these projects would comply with the Pentagon ESM, and WHS does not anticipate that any of these projects would result in an adverse effect on historic resources.

In 2020, VDHR reviewed several of the stormwater projects under a single submission and determined that there would be no adverse effect on historic properties. The review submission included the South Secure Parking Project, Old East Loading Dock Project, Corridor 5 Parking Project, Tree Box Filters

Project, North Parking Bioretention Project, and North Rotary Road Security Fence and Bollards Project. Also in 2020, VDHR concurred that the Connector Road Bridge Upgrades Project would not have an adverse effect on historic properties.

All other short-term projects are expected to have minimal or no potential for adverse effects on historic properties.

Certain short-term projects would construct or modify features that would be visible from outside the Pentagon site, including from limited portions of nearby historic resources such as the ANC, Lyndon Baines Johnson Memorial Grove, and George Washington Memorial Parkway. Examples of these projects include the CVIF Project and the TES Project. This is not expected to adversely affect viewscapes to or from these historic resources.

As described in Section 3.5 (Cultural and Historic Resources), in 2022, WHS determined that the Pentagon site does not have the potential for intact archaeological resources. No further archaeological studies or impact avoidance measures are necessary.

Long-Term Projects

The North Village and PSOC Green/Support Space Project would include demolition of the MOC, a non-historic building. The Pentagon-Wide ZEV Fleet Infrastructure Project would include installation of charging stations in parking lots around the Pentagon site, but not within the Pentagon Historic District. None of these projects are expected to have potential for adverse effects on historic properties. The [redacted] would be evaluated for adverse effects once the location is determined.

No-Action Alternative

The projects in the No-Action Alternative are also part of the Proposed Action and would result in the same impacts described above. None of these projects are expected to result in adverse effects on historic properties.

4.5.2 Mark Center

Proposed Action

As described in Section 3.5 (Cultural and Historic Resources), the buildings at the Mark Center are not currently eligible for consideration for the NRHP, and the closest historic property (the Fort Ward Historic site) is located approximately 0.6 miles to the west. Additionally, the Mark Center site does not have the potential for intact archaeological resources, and no further archaeological studies or impact avoidance measures are necessary. The Proposed Action therefore does not have the potential to affect historic properties at, or in the vicinity of, the Mark Center site.

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative, and therefore the No-Action Alternative does not have the potential to affect historic properties at, or in the vicinity of, the Mark Center site.

4.6 Air Quality

4.6.1 Pentagon

Proposed Action

Short-Term Projects

All short-term projects that involve construction activities would result in minor, temporary direct emissions from sources and activities such as on-road and nonroad construction vehicles, compressors, generators, earth disturbance, and asphalt paving and resurfacing. These emissions would occur intermittently over the course of the next five years as individual short-term projects are implemented and would cease upon the completion of construction activities for each project. WHS would ensure that construction contractors prepare a Construction Air Quality Management Plan and Dust Mitigation Plan, provide dust control measures in accordance with UFC 3-260-17 to the extent practicable, and comply with applicable federal and local emissions regulations for portable and stationary internal combustion engines. For those projects that involve asphalt paving and resurfacing, WHS would ensure compliance with the requirements outlined in Virginia's Enforceable Policies, including the Standards for Visible Emissions, Standard for Fugitive Dust/Emissions, and Standard for Odor.

As discussed in Section 4.9 (Energy), implementation of short-term energy projects at the Pentagon site would reduce electrical use and total energy consumption. This would result in reduced direct emissions from natural gas combustion at the HRP and reduced indirect emissions from offsite electricity generation.

Several short-term projects would potentially lead to a minor reduction in fossil fuel combustion emissions at the Pentagon site by improving traffic flow and facilitating ridesharing. Additionally, implementation of the Pilot EV Charging Stations Project would result in reduced fossil fuel combustion emissions from vehicles at the Pentagon site. While this decrease would be partially offset by a minor increase in indirect emissions from offsite electricity generation, the project would result in a net reduction in total emissions due to 1) the significantly greater energy efficiency of EVs as compared to fossil fuel vehicles, and 2) the inclusion of renewable energy resources in the Dominion Energy generation portfolio (Dominion Energy, 2023).

The Remote Delivery Facility Roof Project, which is currently in progress, was previously analyzed in the [redacted] which stated that since future air operations are unknown and WHS does not control air operations at the Pentagon Heliport, indirect impacts due to changes in emissions from flight operations would be uncertain and not predictable. With the ability to land new aircraft, some change in emissions would be reasonably expected to occur. However, it is unclear which types of aircraft would be used or whether the frequency of air operations would increase, decrease, or stay the same, since this is dependent on the nature of the mission requirements of the requesting military branch. These operational impacts, which were described in the 2021 Final EA, remain current and applicable to the project.

Several short-term projects, including but not limited to the CVIF Project and other security and safety projects, could require the installation of new diesel emergency generators. Use of these generators during routine testing and infrequent grid outages and emergencies would result in minor, temporary direct emissions (diesel combustion). Otherwise, the short-term projects would not require the

installation or modification of permitted stationary sources and would not affect the State Operating Permit. Emissions from permitted units would remain well below the permitted limits.

The Proposed Action has been reviewed for General Conformity under 40 CFR Part 93, Subpart B. The review determined that total direct and indirect emissions for each project would be well below the applicable *de minimis* thresholds as conservatively addressed by the analysis shown in Appendix E (General Conformity Rule Record of Non-Applicability).

Long-Term Projects

All long-term projects that involve construction activities would result in minor, temporary direct emissions from sources and activities such as on-road and nonroad construction vehicles, compressors, generators, earth disturbance, and asphalt paving and resurfacing. WHS would follow the same construction emissions reduction measures as described for the short-term projects.

Implementation of the [redacted] would lead to a slight increase in demand on the HRP boilers and would result in small increases in associated direct emissions from natural gas combustion and indirect emissions from offsite electrical generation. However, implementation of the Pentagon-Wide ZEV Fleet Infrastructure Project would result in a complete transition to EVs for the Pentagon site fleet and a substantial net reduction in emissions, furthering the emissions reductions described above for the Pilot EV Charging Stations Project. Additionally, implementation of the North Village and PSOC Green/Support Space Project and the Chiller Plant Upgrades Project would reduce electricity demand and thus reduce indirect emissions from offsite electrical generation.

Implementation of the Microgrid Project would result in negligible changes in energy use. However, if the scope were expanded to include additional backup generators, operation of these generators would increase direct emissions at the Pentagon site during outages, tests, and emergency load response events.

As noted above, total direct and indirect emissions for each project are expected to be well below the applicable *de minimis* thresholds for General Conformity. However, the long-term projects are conceptual and will require additional NEPA analysis in the future when scopes are more well defined, at which time the General Conformity Rule applicability can be reassessed if appropriate (e.g., due to changes in project scopes).

No-Action Alternative

The projects in the No-Action Alternative are also part of the Proposed Action and would result in the same air quality impacts described above. Construction-related emissions would be minor and temporary, and would be less than those of the Proposed Action. The No-Action Alternative would include many of the Proposed Action's energy efficiency and transportation projects at the Pentagon site, as well as the Pilot EV Charging Stations Project, and would therefore result in many of the same emissions reductions as described for the Proposed Action.

4.6.2 Mark Center

Proposed Action

Construction activities for the North Parking Garage Solar Project and Electric Vehicle Charging Stations and Infrastructure Project would result in minor, temporary direct emissions from sources such as on-road and nonroad construction vehicles, compressors, and generators. WHS would follow the same construction emissions reduction measures as described for the short-term projects at the Pentagon site.

As discussed in Section 4.9 (Energy), implementation of energy projects at the Mark Center would reduce electrical use and total energy consumption. This would result in reduced direct emissions from natural gas combustion and reduced indirect emissions from offsite electricity generation.

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative; therefore, the No-Action Alternative would not result in any air quality impacts at the Mark Center.

4.7 Climate

4.7.1 Pentagon

Proposed Action

Short-Term Projects

According to CEQ guidance, when conducting NEPA reviews, federal agencies should consider the potential effects of a proposed action on climate change by analyzing any increases or reductions in GHG emissions from the proposed action, and assessing the effects of climate change on the proposed action and its environmental impacts (CEQ, 2016; CEQ, 2023).

GHG Emissions

Short-term projects would result in temporary increases in scope 1 and scope 2 emissions from the Pentagon site during construction activities. Projects that utilize fossil fuel–powered equipment, vehicles, and machinery would contribute to scope 1 emissions totals. Projects that utilize grid-supplied electricity to power equipment, tools, machinery, and vehicles would contribute to scope 2 emissions totals. Projects that purchase concrete and other building materials and require waste processing would contribute to scope 3 emissions totals.

Most short-term projects would involve only minor construction activities, such as equipment installation, upgrades, and replacements; upgrades to security infrastructure (e.g., barriers and ACPs); construction of small facilities; localized reconfigurations of roads and parking lots; and incorporation of localized stormwater BMPs. However, certain short-term projects are larger in scale and would have a relatively greater impact on scope 1, scope 2, and scope 3 emissions due to their longer duration of construction, more extensive use of vehicles and equipment (including larger vehicles and equipment types), and production of more waste. Examples of these larger projects include the Metro Entrance Pedestrian ACP Project, Remote Delivery Facility Roof Project, Southeast Parking Project, and TES Project.

As described in Section 4.9 (Energy), implementation of many of the short-term projects would reduce energy consumption and/or electrical use at the Pentagon site and would also lead to potential minor reductions in fossil fuel use by vehicles. This would result in reduced scope 1 and scope 2 operational emissions from the Pentagon site and from offsite electricity generation.

The Remote Delivery Facility Roof Project, which is currently in progress, was previously analyzed in the [redacted] which stated that since future air operations are unknown and WHS does not control air operations at the Pentagon Heliport, indirect impacts due to changes in emissions (including GHGs) from flight operations would be uncertain and not predictable. With the ability to land new aircraft, some change in emissions would be reasonably expected to occur. However, it is unclear which types of aircraft would be used or whether the frequency of air operations would increase, decrease, or stay the same, since this is dependent on the nature of the mission requirements of the requesting military branch (WHS, 2021c). These operational impacts, which were described in the 2021 Final EA, remain current and applicable to the project. However, WHS did not attempt to quantify these potential changes in GHG emissions from changes in flight operations.

Overall, implementation of the short-term projects would result in temporary increases in GHG emissions during construction activities and enduring decreases in GHG emissions due to reduced electrical use and fossil fuel combustion during operations. To approximate the GHG emissions during construction activities, WHS used estimated annual construction costs as a proxy in combination with U.S. Environmentally-Extended Input-Output (USEEIO) model data, which are employed in this project to estimate emissions associated with the purchase of construction goods and services. USEEIO spending categories are organized by commodities or industries. For the purposes of this analysis, WHS used commodity emission factors for these two sectors: 1) construction of highways, streets, and bridges, and 2) construction of other nonresidential structures. To estimate the avoided or reduced annual GHG emissions expected to result from energy efficiency measures (avoided natural gas and electricity consumption) or vehicle fleet electrification (trading gasoline for electricity consumption), WHS used emission factors extracted from EPA's Emissions & Generation Resource Integrated Database (eGRID) and the Argonne National Laboratory's Greenhouse gases, Regulated Emissions and Energy use in Technology (GREET) tool. WHS also used the GREET tool to estimate GHG emissions decreases from reduced natural gas and gasoline consumption.

Table 4-2 presents a high-level estimate of the annual and cumulative GHGs emitted for the short-term projects at the Pentagon site and the Mark Center. Results are presented both in metric tons (mt) of methane, carbon dioxide, nitrous oxide, and other GHGs and in carbon dioxide equivalents (mt CO_2e), used for expressing changes in global warming potential (GWP). These results indicate that short-term construction projects would result in large pulses of emissions but that the sum of these pulses would eventually be surpassed by total avoided emissions (from reduced energy use) within the first decade of Master Plan implementation.

As recommended by CEQ interim guidance (CEQ, 2023), WHS also analyzed the social cost of GHGs to provide further context regarding the significance of these changes in emissions. Social costs of GHGs are used to quantify the expected harm to society, the environment, and public well-being that would result from the additional emissions of carbon dioxide, methane, or nitrous oxide—or, conversely, the social benefits due to reductions in these emissions. This metric captures impacts such as flood risk, agricultural challenges, increased impacts from more frequent severe weather events, health impacts,

and impacts from climate variability. WHS used social cost estimates developed by the Interagency Working Group on the Social Cost of Greenhouse Gases. Table 4-3 presents the results of this analysis.

Effects of Climate Change

Climate-related storm events could increase the risk of flooding in the 500-year floodplain, which would increase flood risk to projects that add permanent infrastructure within the 500-year floodplain. These include the North Parking Bioretention Project and the Pilot EV Charging Stations Project, both of which would be at least partially located within the 500-year floodplain. See Section 4.2 (Hydrological Resources) for additional discussion of floodplain impacts.

There would be no additional climate-related risks to other short-term projects at the Pentagon site, and several short-term projects would improve the Pentagon site's climate resiliency. For example, the stormwater management projects would improve stormwater infrastructure at the Pentagon site, thus helping to mitigate flood risk due to intense storm events. The Remote Delivery Facility Roof Project would improve drainage and waterproofing systems at the RDF, while the Irrigation Improvements Project would help to ensure that irrigation rates are appropriately tailored to climate, plant, and soil conditions. The TES Project would reduce the Pentagon site's reliance on the electrical grid during peak hours when climate-related electrical grid disruptions (brownouts and blackouts) are more likely to occur.

Refer to Section 4.2 of the Pentagon Master Plan regarding the Master Plan's consistency with climate adaptation and resilience plans.

Table 4-2. Greenhouse Gas Emissions of Short-Term Projects under the Proposed Action (Pentagon Site and Mark Center)

Greenhouse Gas	Year 1 2024	Year 2 2025	Year 3 2026	Year 4 2027	Year 5 2028	Year 6 2029	Year 7 2030 [a]	Year 8 2031 [a]
Construction-Related Emissions [b]								
Carbon dioxide (mt)	39,140	13,668	26,456	3,872	0	6,219	0	0
Methane (mt)	123	42	86	11	0	19	0	0
Nitrous oxide (mt)	0	0	0	0	0	0	0	0
Other GHGs (mt)	1,725	573	1,246	145	0	248	0	0
Change in GWP (mt CO_2e)	44,516	15,484	30,258	4,350	0	7,019	0	0
Reduced Emissions due to Changes in Energy Use (Grid Electricity, Natural Gas, and Gasoline)								
Carbon dioxide (mt)	-45	-13,684	-13,728	-15,503	-16,265	-16,310	-16,310	-16,310
Methane (mt)	0	-17	-17	-20	-21	-21	-21	-21
Nitrous oxide (mt)	0	0	0	0	0	0	0	0
Change in GWP (mt CO_2e)	-46	-14,236	-14,282	-16,162	-16,954	-17,000	-17,000	-17,000
Net Change								
Net change in GWP, annual (mt CO_2e)	44,469	1,248	15,976	-11,812	-16,954	-9,981	-17,000	-17,000
Net change in GWP, cumulative (mt CO_2e)	44,469	45,718	61,694	49,882	32,928	22,947	5,947	-11,053

a — Annual changes in GHG emissions starting in Year 7 would continue in perpetuity due to reduced energy use.

b — WHS estimated construction-related emissions for projects at the Pentagon site. Projects at the Mark Center would involve minimal construction activities and, for purposes of this analysis, are assumed to result in negligible construction-related GHG emissions compared to projects at the Pentagon site.

Table 4-33. Social Cost or Benefit (2020 Dollars) of Changes in Greenhouse Gas Emissions due to Short-Term Projects under the Proposed Action (Pentagon Site and Mark Center)

Social Cost or Benefit	Year 1 2024	Year 2 2025	Year 3 2026	Year 4 2027	Year 5 2028	Year 6 2029	Year 7 2030	Year 8 2031 [a]
Lower Bound [b]								
Social cost (+)/benefit (-), annual	$2,497,379	$82,063	$944,085	-$694,547	-$1,018,245	-$608,862	-$1,058,690	-$1,075,935
Social cost (+)/benefit (-), cumulative	$2,497,379	$2,579,441	$3,523,526	$2,828,980	$1,810,735	$1,201,873	$143,183	-$932,751
Upper Bound [b]								
Social cost (+)/benefit (-), annual	$7,296,188	$195,967	$2,721,020	-$2,079,117	-$3,041,258	-$1,831,673	-$3,173,436	-$3,239,104
Social cost (+)/benefit (-), cumulative	$7,296,188	$7,492,155	$10,213,175	$8,134,057	$5,092,799	$3,261,126	$87,690	-$3,151,414

a — Net social benefits from reduced GHG emissions would continue in perpetuity due to reduced energy use.

b — The lower bound scenario incorporates an average/typical modeled assessment of climate change impacts, while the upper bound scenario incorporates a 95th percentile modeled assessment of climate change impacts. Both the lower bound and upper bound scenarios assume a 3 percent discount rate for inflation.

Long-Term Projects

GHG Emissions

All long-term projects that involve construction activities would result in minor, temporary scope 1 and scope 2 GHG emissions. Projects that purchase concrete and other building materials and require waste processing would contribute to scope 3 emissions totals.

Implementation of the [redacted] would result in slightly increased scope 1 (natural gas combustion at the HRP) and scope 2 (purchased electricity) emissions. However, implementation of the Pentagon-Wide ZEV Fleet Infrastructure Project would result in a complete transition to EVs for the Pentagon site fleet and a substantial net reduction in scope 1 emissions from the Pentagon site fleet, partially offset by a minor increase in scope 2 emissions from purchased electricity. Additionally, implementation of the North Village and PSOC Green/Support Space Project and the Chiller Plant Upgrades Project would reduce scope 2 emissions from purchased electricity.

Implementation of the Microgrid Project would result in negligible changes in scope 2 emissions from purchased electricity. However, if the scope were expanded to include additional backup generators, operation of these generators would increase scope 1 emissions at the Pentagon site during outages, tests, and emergency load response events.

WHS did not attempt to quantify these potential changes in GHG emissions for the long-term projects but anticipates that, over time, they would result in cumulative reductions in emissions due to reduced energy use.

Effects of Climate Change

Two long-term projects would improve climate resiliency at the Pentagon site. The North Village and PSOC Green/Support Space Project would remove infrastructure from within the 500-year floodplain and thus slightly reduce vulnerability to increased flood risk. The Microgrid Project would improve site-wide climate resiliency, ensuring continuous power to the Pentagon site in the event of a climate-related electrical grid disruption (brownout or blackout).

No-Action Alternative

The projects in the No-Action Alternative are also part of the Proposed Action and would result in the same climate impacts described above. Construction-related GHG emissions would be minor and temporary, and would be less than those of the Proposed Action. The No-Action Alternative would include many of the Proposed Action's energy efficiency and transportation projects at the Pentagon site, as well as the Pilot EV Charging Stations Project, and would therefore result in many of the same GHG emissions reductions as described for the Proposed Action.

4.7.2 Mark Center

Proposed Action

GHG Emissions

Construction activities for the North Parking Garage Solar Project and Electric Vehicle Charging Stations and Infrastructure Project would result in minor, temporary increases in scope 1, scope 2, and scope 3

emissions. However, these projects would involve minimal construction activities and are expected to result in negligible construction-related GHG emissions compared to projects at the Pentagon site.

As discussed in Section 4.9 (Energy), implementation of energy projects at the Mark Center would reduce electrical use and total energy consumption. This would result in reduced scope 1 emissions from natural gas combustion and reduced scope 2 emissions from purchased electricity. The results of the GHG analysis (Table 4-2) and the social cost of GHG analysis (Table 4-3) reflect these reduced emissions from Mark Center projects.

Effects of Climate Change

There are no anticipated climate-related impacts to Mark Center energy projects due, in part, to the relatively low risk of flooding (i.e., no nearby floodplains).

One energy project would improve climate resiliency at the Mark Center. The North Parking Garage Solar Project would enable the Mark Center to continue operations.

Refer to Section 4.2 of the Pentagon Master Plan regarding the Master Plan's consistency with climate adaptation and resilience plans.

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative; therefore, the No-Action Alternative would not result in any climate-related impacts at the Mark Center.

4.8 Transportation

4.8.1 Pentagon

Proposed Action

Short-Term Projects

Roadways and Traffic

Most short-term projects would result in temporary, minor traffic disruptions during construction activities. Sections of some minor roadways within and around the Pentagon site, such as South Rotary Road, may be temporarily shut down as surrounding projects are under construction. Installation of or improvements to features along roadways such as sidewalks, fencing, and K-rated bollards would also temporarily cause roadway disruptions if lane or shoulder closures are needed. Construction of some short-term projects would potentially result in more substantial temporary disruptions to roads surrounding the Pentagon site due to road closures and detours within the Pentagon site. For example, the realignment of the Connector Road, North Rotary Road, and Eads Street intersection under the Southeast Parking Project would cause shifts in roadway and intersection alignment during construction. The Connector Road and Boundary Channel Drive Intersection Improvements Project may also require temporary detours. Construction of the TES Project would potentially cause traffic congestion near the I-395 and Boundary Channel Drive interchange, specifically around the new Boundary Channel Drive traffic circle, as construction vehicles enter and exit the construction site. No lane or shoulder closures are expected on major highways surrounding the Pentagon site during short-term project construction.

During construction, worker vehicle traffic would temporarily increase traffic flow on roads within and surrounding the Pentagon site.

Several short-term projects would improve roadways and traffic flows within the Pentagon site. Signage would be installed to reduce pedestrian-vehicular and vehicular-vehicular conflicts on roadways and in parking lots as part of the following projects: Eads and Fern Streets Parking Lot Improvements Project, West End Safety and Security Project, Hayes Parking Lot Improvements Project, Pentagon COR8 Pedestrian ACP Project, and Pentagon South Pedestrian Safety Project. The Areawide Resurfacing and Rehabilitation Project would further improve roadway quality and safety. Under the Southeast Parking Project, intersection realignments at Connector Road, North Rotary Road, and Eads Street would improve flow at those intersections and create safer conditions for drivers and pedestrians. Although still in the planning phases, the Connector Road and Boundary Channel Drive Intersection Improvements Project would address the current conflict points at the Connector Road and Boundary Channel Drive intersection. The Southeast Parking Project would help alleviate traffic congestion and confusion by converting South Fern Street to a two-way road. Narrowing of traffic lanes under the North Rotary Road Security Fence and Bollards Project would result in minor inconveniences for drivers but would ultimately improve conditions for pedestrians through widened sidewalks. The West End Safety and Security Project would further improve traffic flow within the Pentagon site by minimizing conflicts between CVIF traffic and visitors to the 9/11 Pentagon Memorial.

The reconfiguration and/or addition of VACPs around the Pentagon site would improve parking lot circulation efficiency by reducing congestion. New or upgraded VACPs would be installed under the following projects: Mug Handle PFPA Officer Booth and Barrier Project, North Rotary and Fern Vehicle ACP Fence Project, and North Village ACP Project. Under the Pentagon South Pedestrian Safety Project, some parking lanes on the western side of the South Parking lot would be altered to improve the lot's internal circulation. Other parking lot quality and circulation improvements resulting from short-term projects would include additional signage, signalized intersections and crosswalks, installation of LED fixtures, pavement resurfacing, and implementation of stormwater management BMPs.

Parking

Construction of the short-term projects would cause minor-to-moderate interruptions in parking availability. Most short-term projects would result in temporary localized closures of parking areas within the Pentagon site to accommodate construction activities, vehicles, and materials. To reduce disruptions, WHS would post temporary signage to assist drivers as necessary.

Short-term projects that would add additional parking spaces are the South Secure Parking Project (11 spaces) and Corridor 5 Parking Project (24 spaces). The Pilot EV Charging Stations Project would increase parking accessibility for electric vehicles through installation of charging stations.

Public Transit, Pedestrian, and Bicycle Circulation

Construction of some short-term projects would result in minor-to-moderate temporary impacts to public transit. Road and lane closures, detours, and increases in worker vehicle traffic would potentially interrupt bus routes in the area. Pedestrians would potentially face interruptions in situations where construction leads to temporary closure of sidewalks, as would occur during projects such as the Connector Road Bridge Upgrades Project. Bicyclists would potentially face similar disruptions as a result of sidewalk and roadway closures and detours. WHS would install temporary wayfinding signage as necessary to direct drivers, bicyclists, and pedestrians during construction.

Short-term projects would lead to long-term improvements to public transit on the Pentagon site. Overall, improvements to roadway quality and increases in signage under several short-term projects would improve public transit circulation and access. Enhanced signage under the Pentagon South Pedestrian Safety Project would better direct visitors between the Metro station and the bus bays at the PTC, as well as to the 9/11 Pentagon Memorial and the MEF Visitor ACP. Additionally, there would be improvements in pedestrian circulation and efficiency at the Pentagon Metro Station as a result of the Metro Entrance Pedestrian ACP Project, which would redevelop the existing ACP to increase the access point's safety, security, and efficiency. Informal (i.e., sluggers) and formal rideshare participants would benefit from new designated drop-off lanes under the North Rotary Road Security Fence and Bollards Project. These new drop-off lanes would also enhance the efficiency of traffic, particularly at the beginning and end of the workday when pick-up and drop-off rates are typically at their highest.

Several short-term projects at the Pentagon site would result in major improvements for pedestrian and bicycle circulation, safety, and efficiency. The Connector Road Bridge Upgrades Project would increase the number of ADA-accessible pedestrian paths. The Area Sidewalk Improvements Project would implement improvements to sidewalks throughout the Pentagon site. Under the Pentagon South Pedestrian Safety Project, pedestrian safety would improve due to the installation of defined walkways, raised crosswalks, additional sidewalks and crosswalks, improved signage, and intersection signals along North and South Rotary Roads, which connect to the I-395 pedestrian tunnel and the pedestrian walkway through the South Parking Lot. Furthermore, signed on-street bike routes would be incorporated on North and South Rotary Roads. Under the North Parking Lot Improvements Project, a new pedestrian path would be installed from the Circulator stop near the North Village ACP to the North Parking Connector Bridge and the Boundary Channel VACP/Boundary Channel Drive. This path would run through the North Parking Lot and would maintain vehicular circulation while providing a designated space for pedestrians. The Pentagon COR8 Pedestrian ACP Project would add a new walkway and an accessible ramp from the new Corridor 8 pedestrian ACP to the North Secure parking lot. Two new Pentagon employee bike racks and one new public bike rack would be installed on the Pentagon site, furthering bike accessibility.

Air Traffic

The Proposed Action does not include any proposed changes in air traffic operations and would not directly result in an increase or decrease in helicopter landings or takeoffs at the Pentagon. The Remote Delivery Facility Roof Project, which is currently in progress, was previously analyzed in the [redacted], which stated that reconstruction of the Remote Delivery Facility roof and reconstruction of the helipad would improve safety and access of the facility (WHS, 2021c). These findings, which were described in the 2021 Final EA, remain current and applicable to the project.

Due to its proximity to Reagan National Airport, the TES Project would require coordination with and approvals from the Federal Aviation Administration to ensure that the height of the structure does not interfere with airspace during plane takeoffs and landings (WHS, 2019).

Long-Term Projects

Long-term projects would result in temporary, minor-to-moderate traffic disruptions during construction activities. The North Village and PSOC Green/Support Space Project would disrupt both vehicular and pedestrian circulation in the North Village, as construction would cause interior roadways and walkways to be shut down and rerouted or removed. [redacted]

[redacted]

Implementation of long-term projects would have minor but beneficial impacts to transportation on the Pentagon site. Parking accessibility for electric vehicles owned by WHS would increase with implementation of the Pentagon-Wide ZEV Fleet Infrastructure Project. The North Village and PSOC Green/Support Space Project would provide more pedestrian pathways and thus improve pedestrian accessibility for employees in that area. Long-term projects would not impact bus or metro routes or access. Long-term projects would have no air traffic–related impacts.

No-Action Alternative

Under implementation of the No-Action Alternative, several projects would still result in construction-related impacts to transportation at the Pentagon site. During construction, worker vehicle traffic would increase traffic flow on roads within and surrounding the Pentagon site. Temporary lane or road closures on North Rotary Road could occur during construction for the North Rotary Road Security Fence and Bollards Project. Some areas of parking lots around the Pentagon site could be temporarily unavailable to drivers as features are installed for the Tree Box Filters Project, North Parking Bioretention Project, Pentagon South Pedestrian Safety Project, Southeast Parking Project, Corridor 5 Parking Project, CVIF Project, and Pilot EV Charging Stations Project. No other lane or road closures would be expected. With fewer projects, the No-Action Alternative would have fewer negative temporary transportation impacts compared to the Proposed Action.

The No-Action Alternative would improve conditions on some roads within the Pentagon site. The North Rotary Road Security Fence and Bollards Project would improve circulation and road quality for North Rotary Road. Narrower lanes on this road would result in minor inconveniences for drivers, though this impact would be temporary, as drivers would adjust to new lane widths. New designated drop-off lanes under this project would also enhance efficiency of traffic, particularly at the beginning and end of the workday when pick-up and drop-off rates are typically at their highest. Pedestrians would benefit from the widened sidewalks and new lighting along North Rotary Road. The Southeast Parking Project would help alleviate traffic congestion and confusion by converting South Fern Street to a two-way road. The new and/or improved ACPs under the North Village ACP Project and the Metro Entrance Pedestrian ACP Project would enhance the efficiency of pedestrian and vehicular circulation around the North Village and pedestrian circulation around the MEF, respectively. Overall, implementation of projects under the No-Action Alternative would not be expected to have significant impacts to major roadways surrounding the Pentagon site.

The No-Action Alternative would result in temporary localized closures of parking areas within the Pentagon site to accommodate construction activities, vehicles, and materials. Parking lot quality improvements would include better lighting under the Pentagon South Pedestrian Safety Project as well as various improvements to roads and walkways under the North Rotary Road Security Fence and Bollards Project. The Pentagon South Pedestrian Safety Project would also include a new pedestrian path across the parking lot and would define sidewalks and crosswalks, resulting in net safety benefits for pedestrians in that area. The Pilot EV Charging Stations Project would increase parking accessibility for electric vehicles through installation of charging stations.

4.8.2 Mark Center

Proposed Action

Construction of the North Parking Garage Solar Project and of the Electric Vehicle Charging Stations and Infrastructure Project would potentially create minor interruptions to vehicular and pedestrian circulation in the North Parking Garage.

Parking accessibility for electric vehicles would improve under the Electric Vehicle Charging Stations and Infrastructure Project. No other projects would have transportation-related impacts at the Mark Center.

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative, and therefore the No-Action Alternative would not result in any transportation impacts at the Mark Center.

4.9 Energy

4.9.1 Pentagon

Proposed Action

Short-Term Projects

[redacted]

Implementation of most short-term energy projects at the Pentagon site would reduce electrical use and total energy consumption and assist WHS in meeting the energy goals described in Section 3.9 (Energy). The security and safety projects would result in minimal to no change in energy use and would cause no substantial change in the volume of climate-controlled areas. Several short-term projects, including but not limited to the CVIF Project and other security and safety projects, could require the installation of new diesel emergency generators for use during power outages and emergencies. Circulation projects would potentially lead to a minor reduction in privately owned vehicle (POV) fuel use by improving traffic flow. Other projects would potentially lead to a minor reduction in POV fuel use by facilitating ridesharing (e.g., the North Rotary Road Security Fence and Bollards Project).

The TES Project would install a stratified chilled water TES tank at the HRP. During nighttime hours when grid electricity is least expensive and the building cooling load is low, chillers would operate to fill the tank with chilled water. During daytime hours, the system would discharge chilled water from the tank to cool buildings around the Pentagon site, while continuing to run a reduced number of chillers. This project would reduce the cost of cooling and lessen overall peak electricity demand from the Pentagon site. It would result in minimal changes in energy use because the chillers would provide the same amount of chilled water needed to sustain the Pentagon's cooling load but would primarily

operate during off-peak hours. There would be a slight reduction in electricity consumption by the chillers because the tank would increase chiller plant energy efficiency during cooling load fluctuations.

Implementation of the Chilled Water Plant Improvements Project and other efficiency upgrade projects (i.e., the Project Recommissioning/HVAC Efficiency Upgrades Project, the Lighting Improvements Project, the Domestic Water Improvements Project, and the Refrigeration Improvements Project) would result in reductions in electricity demand from the grid. Table 4-4 provides estimated energy use impacts of select projects (i.e., those with available data).

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

Implementation of the Pilot EV Charging Stations Project, which would construct 10 EV dual port stations, would result in an initial small-scale transition of the Pentagon site fleet to EVs, which would shift a small amount of energy usage from fossil fuels to the electrical grid. WHS anticipates that, on average, the EV charging stations would be utilized approximately 10 percent of the time, translating to an annual electricity consumption rate of approximately 126,000 kWh (430 MMBtu). This would result in a minor increase in electricity consumption at the Pentagon site.

Long-Term Projects

Implementation of the North Village and PSOC Green/Support Space Project would result in a reduction in electrical usage due to demolition of the MOC and elimination of the associated power demands.

[redacted]

Implementation of the Pentagon-Wide ZEV Fleet Infrastructure Project would result in a complete transition to EV for the Pentagon site fleet, which would shift energy usage for all fleet vehicles from fossil fuels to the electrical grid. This project would result in an increase in electricity usage at the

Pentagon site because vehicles that used to be fueled offsite would instead require electricity from the grid.

Implementation of the Microgrid Project would result in negligible changes in energy use. However, there is a chance that further backup generators or another resiliency power source (e.g., new solar PV with batteries, new fuel cells, etc.) would be included as part of the scope. If new generators were installed, they would run only during outages, tests, and emergency load response events. If new solar panels or other renewables were installed, they would operate daily. Implementation of the Chiller Plant Upgrades Project would result in a reduction in electricity demand from the grid.

The short-term and long-term projects, when viewed in combination, would substantially reduce energy use (including electricity demand) at the Pentagon site.

No-Action Alternative

The projects in the No-Action Alternative are also part of the Proposed Action and would result in the same energy impacts described above. Energy-related projects in the No-Action Alternative include the Chilled Water Plant Improvements Project and other efficiency upgrade projects (i.e., the Lighting Improvements Project, Domestic Water Improvements Project, Irrigation Improvements Project, and Refrigeration Improvements Project), along with the Pilot EV Charging Stations Project.

4.9.2 Mark Center

Proposed Action

Implementation of the North Parking Garage Solar Project would reduce energy usage from the electrical grid during normal operations. This project would also allow for a reduced reliance on generators during an outage, but only if installed alongside a battery with a capacity of several MW. The system would enable the Mark Center to continue critical mission operations in the event of extended outages.

Implementation of the FRCS Modernization Project would improve efficiency by reducing electricity demand from the grid and natural gas use. Implementation of the LED Lighting Upgrades Project, Optimize Data Center Performance Project, and Variable Speed Primary Hot Water Pumping Project would improve efficiency and reduce electricity demand from the grid. Implementation of the Electric Vehicle Charging Stations and Infrastructure Project would promote the transition to EVs for the Mark Center fleet, which would shift energy usage for fleet vehicles from fossil fuels to the electrical grid. This project would result in a minor increase in electricity usage at the Mark Center site because vehicles that used to be fueled offsite would instead require electricity from the grid.

Table 4-5 presents the estimated energy use impacts of the short-term projects to be implemented at the Mark Center.

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative. The No-Action Alternative would limit long-term progress toward energy efficiency, emissions reductions, and electrification goals.

4.10 Other Utilities and Infrastructure

4.10.1 Pentagon

Proposed Action

Short-Term Projects

Certain short-term projects would potentially result in temporary, minor impacts to existing utilities during construction. For example, the North Rotary Road Security Fence and Bollards Project, North Parking Bioretention Project, and Corridor 5 Parking Project would be constructed in areas with dense utility infrastructure located near the ground surface. The projects would be designed to minimize conflicts and the need to relocate existing utilities. To avoid accidental disruption from construction activities, the existing underground utilities would be identified on construction plans and marked in the field by the construction company before excavation occurs. In some cases, there could be a need to temporarily turn off localized utility connections (e.g., electric circuits) so that the construction crew could connect to or modify the utility. In such cases, the construction contractor would coordinate with the Pentagon Building Management Office (PBMO) to manage the outages and minimize disruption to the tenants.

Certain short-term projects with large construction footprints, including the Metro Entrance Pedestrian ACP Project, North Village ACP Project, and South Secure Parking Project, would potentially require the permanent relocation of existing utility infrastructure. The projects would be designed to minimize the

need to relocate existing utilities, and any relocation efforts would be closely coordinated with the PBMO.

All short-term projects are expected to produce some solid waste from construction and operation, as well as negligible amounts of hazardous waste. WHS has a construction specification with a target of diverting a minimum of 60 percent of construction waste from landfills; that target would be applied to the projects in the Proposed Action.

Most short-term projects involve replacing or modifying existing structures at the Pentagon site, so they would not introduce new connections to the utilities and associated infrastructure or create substantial new demand for utility capacity. Certain short-term projects, including the Domestic Water Improvements Project and the Irrigation Improvements Project, would be expected to reduce domestic water consumption. Startup of operations for the TES Project would require an initial filling of the TES tank, sourced from the domestic water supply. Thereafter, operations under the TES Project would result in minimal continuing change in domestic water demand at the Pentagon site. The TES tank would also provide additional water resilience for the Pentagon site by serving as an alternate source (e.g., for fire protection or boiler makeup water) in times of emergencies when other water sources are unavailable.

Long-Term Projects

Impacts from long-term projects would be similar to those from the short-term projects. Long-term projects would apply similar techniques to minimize disruption, including use of project designs that reduce utility rerouting and use of construction phases to minimize utility outages.

Under the North Village and PSOC Green/Support Space Project, the removal of the MOC would result in reduced utility use and connections at the North Village. However, overall utility use at the Pentagon site would likely change very little, since personnel would be relocated from the MOC to other office space at the Pentagon site. Depending on the proposed location, the [redacted] would potentially require new utility connections from the existing infrastructure and would likely result in a minor increase in overall utility use.

No-Action Alternative

The projects in the No-Action Alternative are also part of the Proposed Action and would result in the same impacts described above. Some projects in the No-Action Alternative that have large construction footprints, including the Metro Entrance Pedestrian ACP Project, North Village ACP Project, and South Secure Parking Project, would potentially require the permanent relocation of utility structures as part of construction.

4.10.2 Mark Center

Proposed Action

Projects at the Mark Center would have minor, temporary impacts to existing utilities, as most of them would require a temporary outage during construction to connect to the existing utility grid. The Mark Center building management office would coordinate with the construction contractors to isolate electrical, mechanical, or water outages to minimize tenant disruption. For the LED Lighting Upgrades Project, the light fixture replacement in tenant spaces would occur overnight and on weekends. For the

other projects, if a utility outage is needed at a larger scale or for a longer duration, construction would occur during off hours or over weekends.

Implementation of the projects at the Mark Center would produce small amounts of solid waste during construction, as well as negligible amounts of hazardous waste or solid waste during operations.

No water or sanitary sewer impacts would occur as a result of projects at the Mark Center.

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative, and therefore the No-Action Alternative would not result in any changes to utilities at the Mark Center.

4.11 Sustainability

4.11.1 Pentagon

Proposed Action

Short-Term Projects

Implementation of the projects in the Master Plan would help the Pentagon site meet energy efficiency, electrification, and GHG reduction targets outlined by EO 14057 and other federal guidance. Construction projects at the Pentagon site are subject to UFC performance and sustainability standards for planning, design, construction, restoration, and modernization. In addition, for all projects at the Pentagon site, WHS adheres to a set of guide specifications that requires procurement of environmentally preferrable materials and energy- and water-efficient products. WHS would pursue LEED certification for applicable projects that would construct more than 1,000 SF of occupied space, including the CVIF Project, Control Tower and Fire Day Station Project, Pentagon COR8 Pedestrian ACP Project, and Metro Entrance Pedestrian ACP Project. WHS would also demonstrate compliance with the *Guiding Principles for Sustainable Federal Buildings* for projects exceeding 10,000 SF, and would pursue applicable and practically achievable strategies related to energy and water efficiency, occupant health, waste diversion, and green procurement for smaller projects. WHS views the construction of new structures and facilities as an opportunity to improve the overall efficiency and reduce the energy- and water-use intensity of its building inventory.

The energy projects in the Master Plan would further improve energy and water efficiency for the site, helping WHS contribute toward DoD's sustainability targets. As described in Section 4.9 (Energy), most of the short-term energy projects would reduce energy consumption and associated GHG emissions for the Pentagon site.

Stormwater projects would create more permeable surface area throughout the Pentagon site, as discussed in Section 4.3 (Stormwater Management). Increasing permeability and implementing stormwater BMPs are ways to prevent pollutants from entering local waterways and damaging local habitat.

While construction and demolition waste from short-term projects would temporarily increase waste generation totals for the Pentagon site, WHS requires all projects to divert at least 60 percent of construction and demolition waste from landfills, thereby reducing the overall impact.

Long-Term Projects

Like the short-term energy projects, the long-term energy projects in the Pentagon Master Plan would further improve energy and water efficiency for the site, helping WHS contribute toward DoD's sustainability targets. The Pentagon-Wide ZEV Fleet Infrastructure Project would have varying impacts on WHS's sustainability metrics. This project would help meet fleet electrification goals, thereby reducing Scope 1 GHG emissions, but would potentially increase overall electricity consumption for the site and increase Scope 2 GHG emissions until Dominion Energy is able to provide uninterrupted supply of carbon pollution–free electricity.

Similar to short-term projects, construction wastes from long-term projects would temporarily increase waste generation totals for the Pentagon site.

The construction of the [redacted] would need to demonstrate compliance with the *Guiding Principles for Sustainable Federal Buildings,* if the new structure exceeds 10,000 SF. For this project, WHS would pursue applicable and achievable strategies related to energy and water efficiency, occupant health, waste diversion, and green procurement. This new structure would be an opportunity for WHS to improve the overall efficiency and reduce the energy- and water-use intensity of its building inventory.

No-Action Alternative

The projects in the No-Action Alternative are also part of the Proposed Action and would result in the same impacts described above. Compared to the Proposed Action, the No-Action Alternative would limit long-term progress toward sustainability goals, including energy and water efficiency, emissions reductions, waste reduction, and electrification, because fewer projects designed to meet sustainability goals would be implemented.

4.11.2 Mark Center

Proposed Action

The energy projects proposed for the Mark Center would help the site meet sustainability performance targets. As discussed in Section 4.9 (Energy), most of the projects would result in energy savings for the site. The North Parking Garage Solar Project would provide significant progress toward renewable energy and carbon pollution–free electricity targets outlined in EO 14057. Additionally, the Mark Center's LEED recertification efforts would help maintain its status as a high-performing, high-efficiency building.

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative. The No-Action Alternative would limit long-term progress toward sustainability goals, including energy and water efficiency, emissions reductions, and electrification.

4.12 Socioeconomic

4.12.1 Pentagon

Proposed Action

Short-Term Projects

Short-term projects would result in potential benefits to socioeconomic resources through minor, temporary increases in employment (e.g., hiring of construction and specialized workers) and economic activity during construction (e.g., purchasing of project supplies, meals for construction workers, etc.). Temporary increases in employment opportunities would not be expected to strain local housing markets or rental property availability because the local construction workforce is expected to be adequate to meet construction employment needs. No other temporary impacts of short-term projects would be anticipated.

Operation of short-term projects at the Pentagon site would not directly affect socioeconomic demographics in the vicinity of the site. Specifically, short-term project operations would not impact residential population, linguistic patterns, income and employment, or housing prices and patterns.

Long-Term Projects

Long-term projects would result in potential benefits to socioeconomic resources through minor, temporary increases in employment and economic activity during construction, similar to those of the short-term projects described above.

[redacted]

The Pentagon-Wide ZEV Fleet Infrastructure Project would result in an indirect, long-term benefit by encouraging economic activity for the electric vehicle market, as WHS would purchase electric vehicles from suppliers to meet Pentagon ZEV fleet goals. Long-term project operation would not impact residential population, linguistic patterns, or housing prices and patterns.

No-Action Alternative

The projects in the No-Action Alternative are also part of the Proposed Action and would result in the same benefits described above. These benefits would not be as extensive as those under the Proposed Action. The No-Action Alternative would not impact residential population, linguistic patterns, or housing prices and patterns.

4.12.2 Mark Center

Proposed Action

Projects at the Mark Center would result in potential benefits to socioeconomic resources through minor short-term increases in employment and economic activity during construction. The potential benefits would be similar to those specified above for the Pentagon site but less extensive because there are fewer proposed construction projects at the Mark Center. Operation of projects at the Mark Center would not impact residential population, linguistic patterns, income and employment, or housing prices and patterns.

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative; therefore, the No-Action Alternative would not result in any socioeconomic impacts at the Mark Center.

4.13 Environmental Justice

4.13.1 Pentagon

Proposed Action

Short-Term Projects

Most short-term projects would result in temporary, minor traffic impacts and increases in air emissions (including $PM_{2.5}$ and diesel PM) and noise during construction activities. Some of these activities would occur within 0.5 miles of minority communities that currently experience environmental overburdens due to air emissions and traffic. However, all construction activities would occur within the Pentagon site, and only very minor construction activities (e.g., installation of tree box filters, lighting, signage, and utilities) would take place south of I-395 in close proximity to communities with environmental justice concerns. Most projects near the southern perimeter of the Pentagon site (across I-395 from residential areas in Pentagon City) would involve relatively small-scale construction activities such as paving, equipment upgrades, and installation of security infrastructure and stormwater management features. The TES Project in the southeast corner of the Pentagon site would potentially involve more extensive construction activities; however, the project site is located approximately 0.4 miles across I-395 from the nearest residential development.

As discussed in Sections 4.6 (Air Quality) and 4.8 (Transportation), all criteria pollutant emissions from construction would be very low compared to GCR *de minimis* thresholds, and the expected increase in counts of vehicles during construction would be very low compared to existing average daily traffic volumes. Most traffic disruptions would occur within the Pentagon site. The Southeast Parking Project, TES Project, and Connector Road and Boundary Channel Drive Intersection Improvements Project would result in a minor-to-moderate increase in traffic flow on roads surrounding the Pentagon site due to detours and road closures. However, construction activities for individual projects would be short-term and designed to minimize traffic disruptions; the volume of construction vehicles would be spread out across the Pentagon site; and changes in traffic would be negligible when compared to existing average daily traffic volumes. Therefore, construction-related impacts to communities with environmental justice concerns would not be considered disproportionately high and adverse.

Several short-term projects are intended to improve traffic flows within the Pentagon site and promote the use of public transit, bike and pedestrian infrastructure, and ridesharing (e.g., slugging). Also, the Pilot EV Charging Stations Project would help meet the Pentagon's plans to implement zero emissions infrastructure for its vehicle fleet and would facilitate the use of Evs. These projects would be expected to reduce the combustion of fossil fuels by mobile sources at the Pentagon site, resulting in minor local improvements to air quality. This would potentially help alleviate air quality–related overburdens (i.e., $PM_{2.5}$, diesel PM, air toxics cancer risk, and air toxics respiratory HI) in the surrounding communities.

The Remote Delivery Facility Roof Project, which is currently in progress, was previously analyzed in the [redacted] which stated that since future air operations are unknown and WHS does not control air operations at the Pentagon Heliport, indirect impacts to minority and low-income communities due to changes in air operations would be uncertain and not predictable. The ability to land new aircraft could result in increases in noise, emissions, or flight frequency near residential areas. However, aircraft would still be anticipated to use typical flight paths, and any changes in air operations would result in minimal impacts to communities in comparison to existing air traffic. Operation of aircraft after implementation of the Remote Delivery Facility Roof Project would be expected to result in minimal impacts to surrounding communities, and those impacts would not be disproportionately high and adverse (WHS, 2021c). The descriptions of these operational impacts in the 2021 Final EA remain current and applicable to the project.

Both minority and low-income populations, as well as communities overburdened for one or more environmental indicators, are present in the Pentagon Socio/EJ Study Area, which includes communities in the vicinity of construction and operational activities of short-term projects. Therefore, pursuant to EOs 12898, 13990, 13985, and 14008, WHS has assessed the impacts of the short-term projects on these populations and determined that the projects would not result in disproportionately high and adverse effects on minority and low-income populations, including the potential for exacerbation of existing social, economic, health, or environmental burdens. For short-term projects implemented, WHS would develop and incorporate mitigation measures as described in Sections 4.6 (Air Quality) and 4.8 (Transportation) to avoid, minimize, or compensate for potential effects.

None of the other short-term projects would have impacts related to environmental justice.

Long-Term Projects

The Pentagon-Wide ZEV Fleet Infrastructure Project would allow WHS to realize a Pentagon-wide ZEV fleet, thus reducing the combustion of fossil fuels by mobile sources at the Pentagon site. This would result in minor improvements to air quality and potentially help alleviate air quality–related overburdens (i.e., $PM_{2.5}$, diesel PM, air toxics cancer risk, and air toxics respiratory HI) in the surrounding communities.

The North Village and PSOC Green/Support Space Project, [redacted], the Microgrid Project, and the Chiller Plant Upgrades Project would not be expected to result in impacts to environmental justice or overburdened communities.

Pursuant to EOs 12898, 13990, 13985, and 14008, WHS would complete an analysis in the future, when long-term project scopes are more clearly defined, to determine whether, and to what extent, long-term projects would result in disproportionately high and adverse effects on minority and low-income populations, including the potential for exacerbation of existing social, economic, health, or

environmental burdens. WHS would develop and incorporate mitigation measures to avoid, minimize, or compensate for potential effects.

No-Action Alternative

Most projects implemented under the No-Action Alternative would result in temporary, minor traffic impacts and increases in air emissions and noise during construction activities, as stated in the short-term projects section above. Some of these activities would occur within 0.5 miles of minority communities that currently experience environmental overburdens due to air emissions and traffic. Projects implemented under the No-Action Alternative that are located in the southern portion of the Pentagon site (across I-395 from residential areas in Pentagon City) would involve relatively small-scale construction activities, as described above. Construction-related impacts would not be considered disproportionately high and adverse.

The projects implemented under the No-Action Alternative would result in the same impacts described in the short-term projects section above. The combined impact of the projects in the No-Action Alternative would be less extensive than the impacts described above for the Proposed Action because fewer projects are included in the No-Action Alternative.

4.13.2 Mark Center

Proposed Action

Projects at the Mark Center would not be expected to result in temporary impacts to communities with environmental justice concerns during construction. Construction activities at the Mark Center would be minor, temporary, and localized, and would not be expected to require the extended use of heavy vehicles or equipment. Construction activities would result in a slight increase in construction vehicle traffic to the Mark Center; however, construction-related changes in the number of vehicles in the community would be negligible when compared to existing average daily traffic volumes. While construction activities would generate temporary air emissions from fossil fuel vehicle use, the work would involve small construction crews and equipment fleets. Construction-related impacts at the Mark Center would therefore be minor and not disproportionately high and adverse.

Projects at the Mark Center would potentially result in minor short-term increases in employment and economic activity during construction. These benefits would potentially help alleviate socioeconomic burdens (i.e., low-income, workforce development) in the surrounding communities.

No other projects would have impacts to environmental justice.

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative; therefore, the No-Action Alternative would not result in any impacts to environmental justice at the Mark Center or in the surrounding community.

4.14 Noise

4.14.1 Pentagon

Proposed Action

Short-Term Projects

Most short-term projects would result in minor, temporary increases in noise during construction activities. Typical construction noise includes noise from dump trucks, paving equipment, earth-moving equipment, and other heavy construction vehicles. Table 4-6 presents the typical noise levels of construction equipment types that would result from construction equipment. All projects would also include minor increases in noise from worker vehicle traffic accessing the construction sites. Short-term projects such as the North Rotary Road Security Fence and Bollards Project and the Pentagon Perimeter Vehicle Barriers Project would likely result in impulse noises from jack hammers or other ground-disturbing equipment used to install fencing, barriers, and bollards. The Old East Loading Dock Project and the Corridor 5 Parking Project would produce impulse noises from the demolition of the existing K-9 kennel building and the existing old helipad, respectively.

Table 4-6. Typical Noise Levels of Construction Equipment

Equipment	Average Noise Level (dBA)	Maximum Noise Level (dBA)
General equipment	85.4	110.9
Grader	86.4	108.0
Mobile crane	87.9	108.1
Backhoe	89.3	115.5
Loader	93.0	112.3
Welding and cutting equipment	94.9	112.8
Scraper	99.1	117.6
Chipping concrete	102.9	120.3

Source: University of Washington, 2004a; University of Washington, 2004b.

The TES Project would result in moderate construction noise for an extended duration due to the size and scale of the project. The TES Project would be located near the HRP (an Industrial/Utility area with existing noise sources from routine operations) and the newly constructed Boundary Channel Drive cloverleaf interchange in the southeast section of the Pentagon site. At this location, there are no nearby sensitive receptors and construction noise would be dispersed by the ambient noise from the nearby I-395.

Five projects are located in the vicinity of the only sensitive receptor at the Pentagon site, the 9/11 Pentagon Memorial. These are the CVIF Project, West End Safety and Security Project, Pentagon Pedestrian Doors Project, Corridor 5 Parking Project, and Pentagon Perimeter Vehicle Barriers Project. In general, these projects would result in minor noise impacts to visitors at the memorial only during their construction phases. The one exception is the CVIF Project, which would potentially produce minor local noise from routine screening activities (similar to noise from existing activities at the SAL Remote Screening Facility) and from the animals in the newly constructed kennel. Acoustic screening measures (e.g., evergreen hedges) between the CVIF and the memorial would help to decrease these noise impacts.

The Remote Delivery Facility Roof Project, which is currently in progress, was previously analyzed in the [redacted] which stated that since future air operations are unknown and WHS does not control air operations at the Pentagon Heliport, indirect noise impacts from changes in flight operations would be uncertain and not predictable. The ability to land new aircraft could result in increased noise during some future aircraft landings at the Pentagon Heliport, since new aircraft could be reasonably expected to generate more noise during operations than lightweight helicopters. However, it is unclear which types of aircraft would be used or whether the frequency of air operations would increase, decrease, or stay the same, since this is dependent on the nature of the mission requirements of the requesting military branch (WHS, 2021c). These operational impacts, which were described in the 2021 Final EA, remain current and applicable to the project.

The operation of the three new chillers for the Chilled Water Plant Improvements Project would result in occupational noise within the plant buildings. Since these new units are replacing old units, existing noise controls in the plant and protective equipment for workers would mitigate the occupational noise exposure. Audibility measurements at the South Village found an average ambient noise measurement of 67.3 dB, which indicates that the HRP building dampens the noise from chiller operations (Stanton Engineering, 2023).

Implementation of the TES Project would shift the operating schedules of chillers at the HRP such that they would primarily operate during off-peak (i.e., nighttime) hours. Noise from nighttime operations, when ambient noise levels (e.g., from traffic, aircraft, and construction activities) are generally lower, would potentially be more perceptible to receptors in the project vicinity as compared to the same level of noise produced by the chillers during daytime operations. However, the residential buildings nearest to the HRP are approximately 0.3 miles to the south in Pentagon City and Crystal City. This distance is expected to provide for sufficient attenuation to ensure that perceived noise levels do not exceed nighttime limits established in the Arlington County Noise Ordinance.

Several other short-term projects, including (but not limited to) the CVIF Project and other security and safety projects, could require the installation of new diesel emergency generators. Operation of any such generators, and the associated temporary noise impacts, would be limited to power outages, emergencies, and periodic maintenance/testing/training activities.

Any noise-generating construction and operations activities would need to comply with DoDI 6055.12 and the Arlington County Noise Ordinance.

None of the other short-term projects would have noise-related impacts.

Long-Term Projects

The long-term projects would result in minor, temporary increases in noise during construction activities. Each of the projects would involve some level of demolition or construction. During the construction phase, worker traffic, the use of heavy-duty equipment, and trucks entering and leaving the construction site would increase the ambient noise levels. Any noise-generating construction and operations activities would need to comply with DoDI 6055.12 and the Arlington County Noise Ordinance.

The Chiller Plant Upgrades Project would result in occupational noise impacts similar to those from the Chilled Water Plant Improvements Project. Since the six new units would be replacing old units, existing

noise controls in the plant and protective equipment for workers would mitigate the occupational noise exposure

There would be negligible noise impacts from the long-term projects' operations. [redacted]

No-Action Alternative

The projects in the No-Action Alternative are also part of the Proposed Action and would result in the same noise impacts described above.

4.14.2 Mark Center

Proposed Action

Construction activities for the North Parking Garage Solar Project and Electric Vehicle Charging Stations and Infrastructure Project would potentially result in temporary, minor noise impacts from activities such as cutting concrete, drilling, and using heavy equipment. Refer to Table 4-6 above for typical noise levels of construction equipment. However, there are no nearby sensitive receptors that would be impacted by noise from construction activities.

All projects would also produce minor increases in noise from an increase in worker vehicle traffic or deliveries accessing the Mark Center site. This noise would be dispersed by the ambient noise from the nearby I-395.

No-Action Alternative

No projects would take place at the Mark Center under the No-Action Alternative; therefore, the No-Action Alternative would not result in any changes to noise levels within the Mark Center site or the surrounding community.

5. CUMULATIVE IMPACTS

The Proposed Action, in combination with other past, present, or reasonably foreseeable actions near the Pentagon site and Mark Center, could contribute to cumulative effects on certain environmental resources. Cumulative effects can result from individually minor but collectively substantial actions taking place over a period of time (40 CFR § 1508.1(g) [2022]). The extent of the cumulative effects analysis is generally limited to the geographic/natural boundaries of the affected resource areas. CEQ indicates that the geographic extent for the analysis can be defined on a case-by-case basis and is dependent on the affected resources (CEQ, 1997).

Table 5-1 lists the past, present, and reasonably foreseeable actions that WHS considered in the cumulative effects analysis. These actions include projects or actions that are known to have occurred, are currently underway, or are likely to occur in the future in the areas surrounding the Pentagon and/or Mark Center. All Mark Center projects under the Proposed Action would be located within the Mark Center's existing infrastructure and would not result in any moderate or substantial effects outside of the Mark Center. Therefore, past, present, or reasonably foreseeable actions near the Mark Center would not result in any cumulative effects when viewed in combination with the Proposed Action and were are not discussed further in this analysis.

Table 5-1. Past, Present, and Reasonably Foreseeable Actions Considered for Cumulative Effects

Action	Proponent	Location	Description	Status
9/11 Pentagon Memorial Visitor Education Center	Pentagon Memorial Fund	Arlington County	Construct a 9/11 Pentagon Memorial Visitor Education Center along Columbia Pike west of Washington Boulevard.	Planned
Realignment of Columbia Pike (ANC Defense Access Roads Project)	FHWA; Arlington County	Arlington County	Realign Columbia Pike, modify the South Joyce Street Intersection and the Columbia Pike/Washington Boulevard Interchange, replace Southgate Road with a new segment of South Nash Street, widen the sidewalks, add transit stations, and add pedestrian and bicycle facilities and street lighting to improve multimodal capacity and safety.	Ongoing
Amazon Second Corporate Headquarters (HQ2) Project	Amazon; Arlington County	Crystal City, Arlington County	Construct a second headquarters for Amazon in Crystal City, Arlington County, which is expected to create at least 25,000 new full-time jobs. Phase 1 of the project (known as Metropolitan Park) constructs underground parking and approximately 2.1 million SF of building space, including approximately 67,000 SF of ground-floor retail space, in two 22-story buildings that can accomodate more than 14,000 employees. Phase 2 of the project (known as PenPlace) converts an 11-acre site within the Aurora Highlands neighborhood that will host approximately 3.3 million SF of building space in three 22-story office buildings with ground-floor retail and a destination building called “the Helix.” The project will include 2.5 acres of open public space and underground vehicular access.	Ongoing [a]
Long Bridge Aquatics and Fitness Center	Arlington County	Arlington County	Constructed a 92,000-SF facility to serve as both a recreational resource and a host to competitive swimming and diving events.	Completed

Table 5-1. Past, Present, and Reasonably Foreseeable Actions Considered for Cumulative Effects

Action	Proponent	Location	Description	Status
Long Bridge Project	Virginia Passenger Rail Authority; NPS	Arlington County; Washington, D.C.	Construct two new rail tracks (resulting in four tracks total) within a widened right-of-way between Rosslyn in Arlington County and L'Enfant Plaza in Washington, D.C. Construct new retaining walls and landscaping and a new bicycle-pedestrian bridge parallel to the Long Bridge that will connect Long Bridge Park in Arlington County to East Potomac Park in Washington, D.C.	Planned
Boundary Channel Drive/I-395 Interchange Modification	VDOT	Arlington County	Implement improvements to Boundary Channel Drive at the I-395 interchange to improve safety and traffic flow by reducing underutilized roadway capacity, installing roundabouts, reconfiguring ramps, adding crosswalks, constructing an 8-foot-wide eastbound sidewalk, and constructing a 12-foot-wide westbound shared-use path that will link the Mount Vernon Trail to the Pentagon site and Long Bridge Park.	Ongoing
ANC Southern Expansion	ANC; USACE	Arlington County	Increase the contiguous acreage of ANC by closing, realigning, and relocating local roadways and developing a parcel south of the cemetery and directly west of the Pentagon site across Washington Boulevard.	Ongoing
George Washington Memorial Parkway South Section and Mount Vernon Trail Improvement Plan	NPS	Arlington County	Implement improvements along the southern portion of the George Washington Memorial Parkway and the Mount Vernon Trail to address maintenance and safety needs, including rebuilding the concrete pavement; reducing the number of travel lanes and reallocating space for two shoulders, a center turn lane, or a striped median; installing signals and crosswalks; and widening trails.	Planned

Table 5-1. Past, Present, and Reasonably Foreseeable Actions Considered for Cumulative Effects

Action	Proponent	Location	Description	Status
Joint Base Myer-Henderson Hall Master Plan	DoD; Army; FHWA	Arlington County	Includes approximately 182,800 SF of new construction, approximately 1,045,700 SF of renovations, 120 SF of demolition, and 10,000 linear feet of perimeter fencing at Fort Myer-Henderson Hall in Arlington County, as well as additional construction, renovation, and demolition activities at Fort McNair in Washington, D.C.	Planned

a — Phase 1 (Metropolitan Park) of the Amazon HQ2 Project is scheduled to open for employees in June 2023. Construction for Phase 2 (PenPlace) is currently paused, and it is unclear when it will resume.

5.1 Cumulative Effects Analysis

The Proposed Action, in combination with the other past, present, or reasonably foreseeable actions near the Pentagon site listed in Table 5-1, could contribute to cumulative improvements to and effects on certain environmental resources. Cumulative effects can result from individually minor but collectively substantial actions taking place over a period of time. WHS focused this cumulative effects analysis on those resource areas outside the Pentagon site that could reasonably be expected to experience a perceptible effect as a result of implementation of short-term and long-term projects in the Proposed Action. WHS then considered whether any of the actions listed in Table 5-1 would have the potential to combine with the Proposed Action to present cumulative effects, including beneficial and adverse effects, to these resource areas. Specifically, this analysis evaluated potential cumulative effects to the following resource areas: hydrological resources, stormwater management, biological resources, cultural and historic resources, air quality, climate, transportation, energy, socioeconomics, environmental justice, and noise.

Hydrological Resources and Stormwater Management

As discussed in Section 4.2 (Hydrological Resources) and Section 4.3 (Stormwater Management), implementation of the Proposed Action would result in potential increases in sediments and pollutants in stormwater runoff to the Pentagon Lagoon, Boundary Channel, and Potomac River during construction activities. Of the actions listed in Table 5-1, certain planned and ongoing actions occurring near these surface water bodies (i.e., Amazon HQ2 Project, Long Bridge Project, Boundary Channel Drive/I-395 Interchange Modification, and George Washington Memorial Parkway South Section and Mount Vernon Trail Improvement Plan) will also potentially increase sediments and pollutants in stormwater runoff. WHS would mitigate effects to surface water bodies by implementing temporary BMPs and stormwater controls during construction. Additionally, many projects implemented under the Proposed Action would incorporate permanent stormwater BMPs to reduce pollutant loadings to nearby water bodies. The state and county construction stormwater permitting processes (e.g., Land Disturbing Activity Permits and Construction General Permits) would also ensure that stormwater effects associated with larger actions would be properly mitigated.

Implementation of the Proposed Action would result in a net increase in green space and installation of permanent stormwater BMPs. Other actions in Table 5-1 will either increase or reduce the area of impervious surfaces on their individual sites. Additionally, some other actions in Table 5-1 (i.e., ANC Southern Expansion, Long Bridge Aquatics and Fitness Center, and Amazon HQ2 Project) will reduce the likelihood of cumulative effects to stormwater by incorporating permanent stormwater management features (e.g., ponds) and/or stormwater BMPs such as stormwater meadows. Because the Proposed Action would result in a net long-term benefit to stormwater, it would either reduce adverse cumulative effects or would contribute to positive cumulative effects to stormwater.

As discussed in Section 3.3 (Stormwater Management), the Pentagon site's MS4 has interconnections with MS4s for Arlington County, ANC, and the VDOT. Certain actions in Table 5-1 will result in permanent modifications to stormwater infrastructure. For example, the ANC Southern Expansion will demolish existing storm drains and storm drain trunk lines along Patton Drive and replace them with a new storm drainage system. Additionally, the proposed location of the 9/11 Pentagon Memorial Visitor Education Center is sited in an area with existing stormwater infrastructure and an existing outfall that may need to be removed, modified, or redesigned. These actions will likely have indirect effects on the Pentagon storm sewer infrastructure. Therefore, the Proposed Action, when viewed in combination

with the actions in Table 5-1, would potentially result in minimal cumulative effects to runoff volume entering the Pentagon's MS4, but modifications to stormwater infrastructure would not affect the Pentagon site's General VPDES MS4 Permit.

Certain projects in the Proposed Action would involve construction and/or permanent development in the 500-year floodplain. Some actions in Table 5-1 (i.e., the Long Bridge Project, Boundary Channel Drive/I-395 Interchange Modification, and George Washington Memorial Parkway South Section and Mount Vernon Trail Improvement Plan) will also result in construction and/or permanent development in the 500-year floodplain (as well as in the 100-year floodplain, in some cases). The action with the most substantial effects to the floodplain, the Long Bridge Project, will include new bridge embankments and piers in the 100-year floodplain. The Final Environmental Impact Statement and Record of Decision for the Long Bridge Project determined that none of the floodplain encroachments would be significant because the project will not result in a considerable probability for loss of human life or pose a significant flooding risk (U.S. Federal Railroad Administration, District Department of Transportation, and Virginia Department of Rail and Public Transportation, 2020). New infrastructure from both the Proposed Action and actions in Table 5-1 would not be expected to obstruct floodwaters, and any permanent development resulting from implementation of the Proposed Action would be sited and designed to avoid risks of flooding. The Proposed Action, when viewed in combination with the actions in Table 5-1, would potentially result in minor cumulative effects to floodplains.

Biological Resources

As discussed in Section 4.4 (Biological Resources), implementation of the Proposed Action would potentially result in temporary, minor wildlife disturbances and habitat degradation and minimal tree removal during construction. All planned and ongoing actions in Table 5-1 also have the potential to result in wildlife disturbances and habitat degradation. Construction activities under the Proposed Action and actions in Table 5-1 could take place concurrently, resulting in habitat degradation, tree removal, and temporary, moderate cumulative wildlife disturbances. Although the cumulative effect would be moderate, the contribution of the Proposed Action to this cumulative effect would be relatively minor, and the Proposed Action would have no effects on federally listed or state-listed species or critical habitat. Certain actions in Table 5-1 contain elements that will reduce the potential for negative cumulative effects to biological resources by incorporating native plant and pollinator gardens, planting over 100 native plant species, and planting over 500 new trees (Amazon HQ2 Project); using specialized glass to prevent avian collisions in buildings (Long Bridge Fitness and Aquatics Center); and/or increasing vegetation and providing new habitat for native species (ANC Southern Expansion). Additionally, under the Proposed Action, WHS would plant native vegetation and increase the net area of green spaces at the Pentagon site, which would result in permanent improvements in habitat quality at the site. Therefore, the Proposed Action, when viewed in combination with the actions in Table 5-1, would result in long-term cumulative improvements to biological resources.

Cultural and Historic Resources

As discussed in Section 4.5 (Cultural and Historic Resources), implementation of the Proposed Action would involve projects that directly affect exterior features of contributing resources within the Pentagon Historic District boundary or that involve construction or modification of infrastructure within the Pentagon site that would be visible from the Pentagon Historic District, ANC, Lyndon Baines Johnson Memorial Grove, and/or George Washington Memorial Parkway. None of the actions in Table 5-1 are

expected to affect the proposed character-defining features of the contributing resources within the Pentagon Historic District (e.g., "unobstructed viewshed to the Monumental Core of Washington, D.C.").

Air Quality

As discussed in Section 4.6 (Air Quality), implementation of the Proposed Action would result in minor, temporary increases in air emissions during construction activities, potential minor increases in stationary source emissions at the Pentagon site, reduced mobile source emissions, and reduced indirect emissions from energy generation. Implementation of actions in Table 5-1 will result in additional effects on air quality, including temporary construction-related emissions, direct and indirect emissions from energy use, and mobile source emissions resulting from enhanced roadway capacity (from the Long Bridge Project and the George Washington Memorial Parkway South Section and Mount Vernon Trail Improvement Plan) and potential increases in traffic (from the 9/11 Pentagon Memorial Visitor Education Center, Amazon HQ2 Project, and Long Bridge Aquatics and Fitness Center). The Proposed Action, when viewed in combination with actions in Table 5-1, would potentially result in both temporary cumulative effects (from concurrent construction activities) and enduring cumulative effects to air quality. However, certain actions (i.e., Realignment of Columbia Pike [ANC Defense Access Roads Project], Long Bridge Project, Boundary Channel Drive/I-395 Interchange Modification, George Washington Memorial Parkway South Section and Mount Vernon Trail Improvement Plan, and Joint Base Myer-Henderson Hall Master Plan) will create more efficient commuting patterns, reduce traffic congestion, and/or promote multimodal transportation, which could help reduce the potential for enduring cumulative effects to air quality from single-occupancy vehicles. The Proposed Action would further these efforts by achieving long-term net reductions in emissions from mobile sources and energy generation.

Climate

In accordance with CEQ guidance, the climate analysis presented in Section 4.7 (Climate) is inherently cumulative; thus, no further analysis has been completed for this section (CEQ, 2023).

Transportation

As discussed in Section 4.8 (Transportation), implementation of certain projects under the Proposed Action (e.g., the Circulation projects and the TES Project) would result in temporary, minor-to-moderate transportation impacts during construction activities (e.g., disruptions to parking availability and vehicular and pedestrian circulation within the Pentagon site, and increases in traffic within and around the site). Construction activities under the Proposed Action could take place concurrently with those for actions in Table 5-1, resulting in potential temporary moderate cumulative effects to traffic. Although the cumulative effect would be moderate, the contribution of the Proposed Action to this cumulative effect would be relatively minor.

Implementation of the Proposed Action would result in a net decrease in parking spaces on the Pentagon site. This would potentially result in a slight increase in demand for off-site public parking and/or an increase in off-site use of pedestrian or shared-use pathways or public transportation, which could result in cumulative effects when viewed in combination with the actions in Table 5-1 that would also contribute to a demand for public parking or public transportation (i.e., the 9/11 Pentagon Memorial Visitor Education Center and the Amazon HQ2 Project). Of these projects, the Amazon HQ2 Project will result in the greatest enduring traffic and parking demands; however, the Amazon HQ2 Project will encourage pedestrian, bicycle, and public transportation over the use of single-occupancy

vehicles by installing a multimodal path, a network of pedestrian and shared-use pathways, and over 900 bicycle storage stalls. Certain projects under the Proposed Action (i.e., the Circulation projects and the North Rotary Road Security Fence and Bollards Project) would also result in enduring improvements to public transportation and pedestrian and bicycle circulation within and surrounding the Pentagon site. Additionally, the majority of the actions in Table 5-1 (i.e., Realignment of Columbia Pike [ANC Defense Access Roads Project], Long Bridge Project, Boundary Channel Drive/I-395 Interchange Modification, ANC Southern Expansion, George Washington Memorial Parkway South Section and Mount Vernon Trail Improvement Plan, and Joint Base Myer-Henderson Hall Master Plan) are intended to improve vehicular, pedestrian, and bicycle circulation and promote multimodal transportation in Arlington County around the Pentagon site. Therefore, the Proposed Action would result in enduring cumulative improvements to multimodal transportation when viewed in combination with actions in Table 5-1.

Energy

As discussed in Section 4.9 (Energy), the Proposed Action would substantially reduce energy use (including electricity demand) at the Pentagon site due to improved energy efficiency and shifting from fossil-fueled vehicles to EVs. Other planned and ongoing actions in Table 5-1 are expected to increase energy consumption during construction activities, and certain actions (i.e., 9/11 Pentagon Memorial Visitor Education Center, Amazon HQ2 Project, Long Bridge Aquatics and Fitness Center, ANC Southern Expansion, and Joint Base Myer-Henderson Hall Master Plan) will potentially result in increased energy consumption during operations. However, because the Proposed Action would result in a net reduction in energy use, it would help to reduce these adverse cumulative effects.

Socioeconomics

As discussed in Section 4.12 (Socioeconomic), the Proposed Action would result in potential benefits to socioeconomic resources through minor, temporary increases in employment and economic activity during construction. Construction activities for planned and ongoing actions in Table 5-1 will result in similar temporary socioeconomic benefits. However, if taking place concurrently with the Proposed Action, these actions could contribute to straining local housing markets or rental property availability if the local construction workforce is too small to meet construction employment needs.

Operation of certain projects implemented under the Proposed Action would result in enduring benefits to socioeconomic resources. Implementation [redacted] of the Pentagon-Wide ZEV Fleet Infrastructure Project would encourage economic activity for the electric vehicle market. Operation of certain actions in Table 5-1 (i.e., the 9/11 Pentagon Memorial Visitor Education Center, Amazon HQ2 Project, and Long Bridge Aquatics and Fitness Center) will result in socioeconomic impacts through increases in employment and economic activity. For example, the Amazon HQ2 Project is expected to bring over 25,000 jobs to the region, which could affect local housing markets and rental property availability. However, the Proposed Action would not affect residential population or housing prices and patterns and would not contribute to this potentially adverse cumulative effect.

Environmental Justice

As discussed in Section 4.13 (Environmental Justice), the Proposed Action would result in temporary, minor traffic effects and increases in air emissions (including $PM_{2.5}$ and diesel PM) and noise during

construction activities. All projects in Table 5-1 (with the exception of the 9/11 Pentagon Memorial Visitor Education Center and the Joint Base Myer-Henderson Hall Master Plan) will occur at least partially within the Pentagon Socio/EJ Study Area. Construction activities under the Proposed Action could take place concurrently with those for actions in Table 5-1, resulting in the potential to cumulatively contribute to the identified environmental justice concerns. Although the cumulative effect would be moderate, the contribution to the effect by the Proposed Action would be minor and would not be considered disproportionately high and adverse. Certain other projects in Table 5-1 (i.e., Amazon HQ2 Project) will increase traffic and air emissions around communities with existing overburdens (e.g., traffic proximity and air quality–related overburdens), which could contribute to enduring cumulative effects to these communities. By implementing a shift from fossil fuel vehicles to EVs, the Proposed Action would be expected to reduce the combustion of fossil fuels by mobile sources at the Pentagon site, resulting in minor local improvements to air quality and potentially helping alleviate air quality–related overburdens to these communities.

Noise

As discussed in Section 4.14 (Noise), most projects implemented under the Proposed Action would result in minor, temporary increases in noise during construction activities, with the exception of the TES Project construction, which would result in moderate construction noise for an extended duration. Construction activities under the Proposed Action and actions in Table 5-1 could take place concurrently, resulting in potential temporary, moderate cumulative noise impacts. Although the cumulative effect would be moderate, the contribution of the Proposed Action to this cumulative effect would be relatively minor, and most construction noise from projects under the Proposed Action would be dispersed by the ambient noise from the nearby I-395. The Proposed Action, when viewed in combination with other actions in Table 5-1, would not be expected to result in operational cumulative noise effects.

6. LIST OF PREPARERS

Table 6-1 shows the personnel who were involved in the preparation of this EA.

Table 6-1. List of Preparers

Name	Affiliation	Experience
Joe Eichenlaub	WHS Facilities Services Directorate Environmental and Sustainability Branch	• B.S., Environmental Science • 34 years of environmental experience • 23 years of NEPA experience
Brian King	WHS Facilities Services Directorate Environmental and SustainabilityBranch	• B.S., Chemical Engineering • M.S., Chemical Engineering • 33 years of environmental engineering experience • 21 years of NEPA experience
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Libby Kretzing	Eastern Research Group, Inc.	• B.S., Mechanical Engineering • 2 years of experience in energy engineering
Kenny Wu	Eastern Research Group, Inc.	• B.E., Mechanical Engineering • 4 years of energy engineering and design experience
Ashley Tatge	Eastern Research Group, Inc.	• B.S., Biological Sciences • M.S., Environmental Studies • 10 years of experience in multi-media environmental compliance, sustainability, and stormwater management

7. LIST OF AGENCIES AND PERSONS CONSULTED

WHS has coordinated or consulted with various internal agencies and/or persons as part of this environmental review. The Final EA will include a full list of the external agencies or persons that were consulted throughout the NEPA process.

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