



# Pre-Final Environmental Assessment

## Pentagon Reservation Master Plan Update



**August 2014**

Prepared for:  
Washington Headquarters Services  
Department of Defense

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# PENTAGON RESERVATION MASTER PLAN UPDATE

## PRE-FINAL ENVIRONMENTAL ASSESSMENT

**Department of Defense  
Washington Headquarters Services  
Facilities Services Directorate**

August 2014

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### Abstract

The Department of Defense (DoD), Washington Headquarters Services (WHS) has prepared this Environmental Assessment (EA) to evaluate the effects of implementing the proposed Pentagon Reservation Master Plan Update. The Master Plan Update addresses new facilities, circulation improvements, security enhancements, and site improvements for the Pentagon Reservation in Arlington, Virginia. This EA was prepared in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended, and Council of Environmental Quality and DoD Regulations implementing NEPA. The Master Plan Update Alternative and No Action Alternative were evaluated in the EA. Potential effects associated with the alternatives have been identified and evaluated.

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# LIST OF ACRONYMS

AADT	Annual Average Daily Traffic
ACHP	Advisory Council on Historic Preservation
ACP	Access Control Point
ANC	Arlington National Cemetery
APE	Area of Potential Effect
ART	Arlington County Transit
AT/FP	Anti-Terrorism/Force Protection
BMP	Best Management Practices
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CDC	Child Development Center
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Commission of Fine Arts
CFR	Code of Federal Regulations
CHP	Combined Heat and Power
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
CRMP	Cultural Resources Management Plan
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dB	Decibel(s)
dBA	A-weighted Decibel(s)
DDOE	District of Columbia Department of the Environment
DFD	Defense Facilities Directorate
DoD	Department of Defense
DOT – FHA	United States Department of Transportation, Federal Highway Administration
EA	Environmental Assessment
ECP	Entry Control Point
EISA	Energy Independence and Security Act of 2007
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FOB2	Federal Office Building 2
GHG	Greenhouse Gas
GWMP	George Washington Memorial Parkway
HABS	Historic American Building Survey
HOV	High-Occupancy Vehicle
HRP	Heating and Refrigeration Plant
I-395	Interstate 395
ICRMP	Integrated Cultural Resources Management Plan
L3	Level 3

## LIST OF ACRONYMS (CONTINUED)

LED	Light-Emitting Diode
LEED	Leadership in Energy and Environmental Design
LID	Low Impact Development
LOS	Level of Service
MACC	Multiple Award Construction Contract
MEF	Metro Entrance Facility
µg/m <sup>3</sup>	Micrograms Per Cubic Meter
MOC	Modular Office Complex
MS4	Municipal Separate Storm Sewer System
MSL	Mean Sea Level
MWCOG	Metropolitan Washington Council of Governments
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NCPC	National Capital Planning Commission
NCR	National Capital Region
NHL	National Historic Landmark
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
O <sub>3</sub>	Ozone
OSHA	Occupational Safety and Health Administration
PAC	Pentagon Athletic Center
Pb	Lead
PenRen	Pentagon Renovation
PFPA	Pentagon Force Protection Agency
PM <sub>2.5</sub>	Particulate Matter with particles less than or equal to 2.5 micrometers
PM <sub>10</sub>	Particulate Matter with particles less than or equal to 10 micrometers
PPT	Parts Per Thousand
PRTC	Potomac and Rappahannock Transit Company
PSOC	Pentagon Support Operations Center
PTC	Pentagon Transit Center
PV	Photovoltaic
RCRA	Resource Conservation and Recovery Act
RDF	Remote Delivery Facility
RMA	Resource Management Area
RPA	Resource Protection Area
SAL	Secure Access Lane
SARA	Superfund Amendments and Reauthorization Act
SF	Square Foot (Feet)
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO <sub>2</sub>	Sulfur Dioxide
SWPPP	Stormwater Pollution Prevention Plan
TDS	Total Dissolved Solids

## LIST OF ACRONYMS (CONTINUED)

TMDL	.....	Total Maximum Daily Load
TMP	.....	Transportation Management Plan
TPY	.....	Tons Per Year
TSCA	.....	Toxic Substances Control Act
TSS	.....	Total Suspended Solids
UFC	.....	Unified Facilities Criteria
U.S.	.....	United States
USACE	.....	United States Army Corps of Engineers
USEPA	.....	United States Environmental Protection Agency
USGBC	.....	United States Green Building Council
VDCR	.....	Virginia Department of Conservation and Recreation
VDEQ	.....	Virginia Department of Environmental Quality
VDGIF	.....	Virginia Department of Game and Inland Fisheries
VDHR	.....	Virginia Department of Historic Resources
VDOT	.....	Virginia Department of Transportation
VFR	.....	Visual Flight Rules
VMRC	.....	Virginia Marine Resources Commission
VOC	.....	Volatile Organic Compound
VPDES	.....	Virginia Pollution Discharge Elimination System
VSMA	.....	Virginia Stormwater Management Act
VSMP	.....	Virginia Stormwater Management Program
WHS	.....	Washington Headquarters Service
WIP	.....	Watershed Implementation Plan
WMATA	.....	Washington Metropolitan Area Transit Authority
WTP	.....	Water Treatment Plant
WUS	.....	Waters of the United States

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# 1.0 PURPOSE AND NEED FOR PROPOSED ACTION

## 1.1 Introduction

In 2005, the Washington Headquarters Services (WHS) within the Department of Defense (DoD) prepared a Master Plan to guide long-term development at the Pentagon Reservation. In 2014, the Master Plan was updated to include a number of newly constructed and planned facilities on the Pentagon Reservation property. This Environmental Assessment (EA) addresses potential environmental impacts associated with implementation of the 2014 Master Plan Update. The Pentagon Reservation is located in Arlington County, Virginia and includes the Pentagon Building, along with its associated structures and parking areas (See *Figure 1-1*).

The 2014 Master Plan Update focuses on recently constructed development on the Pentagon Reservation (e.g., the Pentagon 9/11 Memorial), as well as the following improvements planned for the Pentagon Reservation: new security measures to control vehicular and pedestrian access; relocation and modernization of certain existing facilities; demolition of older, vacant facilities; re-use of laydown and construction areas associated with the 10-year Pentagon Renovation project; and creating a more “green” and sustainable campus through the use of surface parking combined with stormwater management techniques to reduce water quality impacts to the Potomac River and Chesapeake Bay.

This EA has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended, the Council on Environmental Quality (CEQ) Regulations implementing NEPA, and DoD Directives 6050.7, 6050.1, and 4715.9. The WHS is the lead agency, responsible for the preparation of this EA under NEPA. A review process in accordance with the Advisory Council on Historic Preservation’s regulations implementing Section 106 of the National Historic Preservation Act (NHPA) (36 CFR 800, Protection of Historic Resources) is being conducted separately and parallel with this NEPA process.

The EA describes the purpose and need for the proposed Master Plan Update, documents existing conditions of identified affected resource areas, identifies the potential environmental impacts resulting from the implementation of the Master Plan Update, and recommends mitigation for identified impacts.

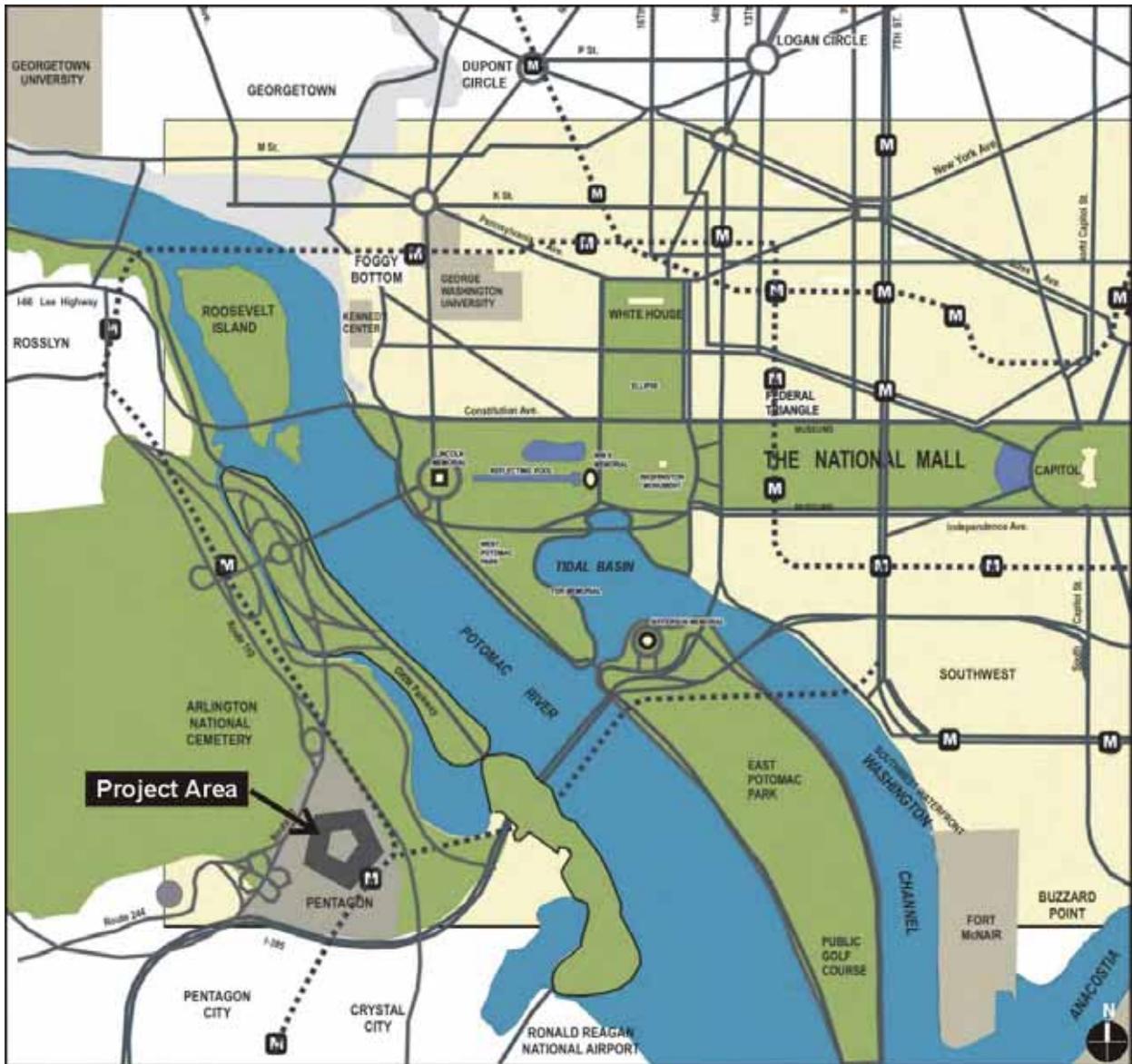


Figure 1-1: Project Location Map

## 1.2 Overview of the Master Plan Area

The study area for the 2014 Master Plan Update consists of approximately 238 acres. The area surrounding the Pentagon is bound on the north and east by Boundary Channel Drive and the Pentagon Lagoon, on the south by Interstate 395 (I-395), and on the west by Route 27 (Washington Boulevard) (see *Figure 1-2*). The Master Plan study area also includes three parcels located between Army-Navy Drive and I-395 just south of the Pentagon which are currently used for parking. In addition, the Master Plan study area includes the northern traffic cloverleaf at the intersection of Route 244 and Route 27. The land is owned by DoD, but it is not actively used as it is reserved for the Pentagon Memorial Fund's future development of a Pentagon Memorial Visitor Education Center.

The Master Plan study area contains a series of buildings and associated parking areas. The largest structure, the Pentagon Building, has 6.5 million gross square feet of space that serves as the headquarters for the DoD. In addition, the Master Plan study area includes the Pentagon's Remote Delivery Facility (RDF), Heating and Refrigeration Plant (HRP), the North Village, a helipad, the Pentagon Transit Center (PTC) with access to the regional Metrorail and Metrobus systems, the Pentagon 9/11 Memorial to the Victims of September 11, 2001, and parking spaces.

Beyond the Master Plan area, the Pentagon Reservation previously included the Federal Office Building 2 (FOB2) facility located to the west of Route 27. The former FOB2 site encompasses approximately 42 acres that provided office space for various organizations within DoD. Employees working in the building were relocated to other DoD facilities prior to the demolition of FOB2. The relocation of these employees, demolition of FOB2, and the reuse of the FOB2 site by Arlington National Cemetery were mandated under the National Defense Authorization Act for Fiscal Year 2000. The property transfer and other actions related to FOB2 were the subject of separate environmental documentation and plans prepared by WHS and are not addressed in this document.

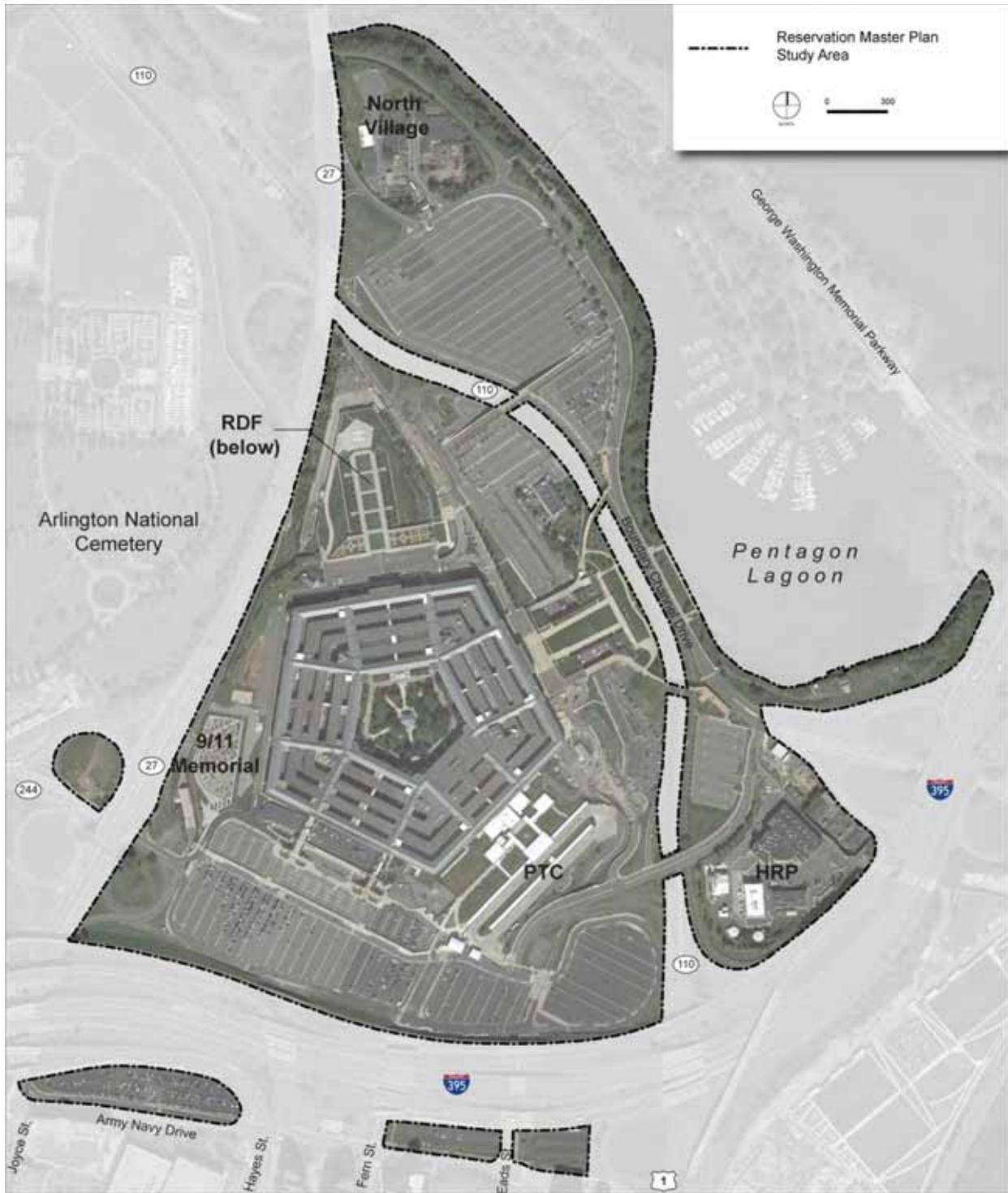


Figure 1-2: Pentagon Reservation – Master Plan Study Area

## 1.3 Purpose and Need for the Proposed Action

The terrorist attack on the Pentagon on September 11<sup>th</sup>, 2001 resulted in heightened security concerns within the Pentagon Reservation. In addition, several changes have occurred on and around the Pentagon Reservation that require an update to the 2005 Master Plan. The Master Plan Update aims to address the following:

- *New Security Requirements* – After 9/11 and in response to new DoD Anti-Terrorism/Force Protection (AT/FP) criteria, new security requirements have been established around the Pentagon facilities. Among other measures, a defined program of screening vehicles and pedestrians via access control points – called the Sentry Program – was established and is being implemented with support from the U.S. Army Corps of Engineers (USACE). Temporary screening facilities were constructed until more permanent, long-term facilities could be programmed and approved. The 2014 Master Plan Update includes all the long-term security and screening projects for the Pentagon Reservation that have not been constructed yet under the Sentry Program. Separate environmental assessments have been or will be prepared for the Sentry Program projects, which are in varying stages of design and construction based on approval and funding provided by the U.S. Congress.
- *Vehicular and Pedestrian Circulation Systems and Parking* – The 2005 Master Plan addressed ways to reduce congestion on the Pentagon Reservation by improving the operation, organization, and function of circulation systems, and consolidating parking within the Master Plan study area. The plan has been revised in several ways including circulation changes affected by new security requirements and other changes, such as construction of the Pentagon 9/11 Memorial. These changes are included in the 2014 Master Plan Update along with other recommendations provided in a 2014 Transportation Management Plan (TMP) prepared for the Pentagon Reservation.
- *Renovation or Replacement of Exterior Pentagon Facilities* – Many exterior Pentagon facilities are temporary buildings or are past their expected life span and need improvements to meet DoD mission needs and safety and security requirements. These changes are needed to provide new functionality, meet DoD requirements, and aesthetically improve buildings and sites. The 2014 Master Plan Update includes projects to address facilities which need to be replaced due to age or temporary status.
- *Implementation of Sustainability Strategies* – One of the major purposes of the 2005 Plan was to address environmental sustainability issues for the Pentagon Reservation. Since 2005, further guidance has been issued through recent legislation, as well as Executive Orders directed to Federal Agencies including DoD and WHS, to reduce the environmental impacts and energy consumption of Federal facilities and buildings. The 2014 Master Plan Update addresses the latest environmental requirements applicable to the Pentagon as a Federal institution to help promote its position as a leader in environmental sustainability and a flagship for other DoD building complexes within the Washington, DC area.

## 1.4 Public Agency Coordination

The preparation of the Master Plan has involved numerous meetings with various agencies and groups to identify issues that need to be addressed. The agencies that were consulted include: the National Capital Planning Commission (NCPC), National Park Service (NPS), U.S. Commission of Fine Arts (CFA), Arlington National Cemetery (ANC), Virginia Department of Transportation (VDOT), Virginia Department of Historic Resources (VDHR), Washington Metropolitan Area Transit Authority (WMATA), and Arlington County Government.

The EA will be circulated among the agencies listed in Appendix C for review and comment in the summer of 2014. The distribution list includes the above agencies as well as others who may have an interest in proposed improvements and changes at the Pentagon Reservation. A number of these same agencies will also be reviewing the 2014 Master Plan Update and TMP, coordinated by NCPC, later in the fall of 2014.

## 1.5 Cumulative Impact Projects

A number of planned projects in the area could generate cumulative impacts when considered together with the impacts of the proposed action. Major projects being considered, underway, or recently completed in the vicinity of the Pentagon are as follows:

- Demolition of the FOB2 building and transfer of the site to ANC for expansion of the cemetery and to Arlington County for a new Heritage Center. (As mentioned above, these actions were subject to separate environmental documentation.)
- Long-range revitalization plan for Columbia Pike corridor including realignment of the eastern end of Columbia Pike connecting to Joyce Street. This planning effort also includes a new streetcar system called the Columbia Pike Transit Initiative.
- Columbia Pike Multimodal Street Improvements including transportation analysis, environmental documentation, and preliminary design of streetscape and related road improvements for pedestrians, bicycles, transit, and vehicles along Arlington's 3.5-mile Columbia Pike corridor.
- Crystal City Street Car Project including transportation and environmental analysis as well as conceptual engineering plans. The proposed project would connect Pentagon City, Crystal City and Potomac Yard, generally along Route 1 and Crystal City Drive.
- Improvement of the 14<sup>th</sup> Street Bridge Corridor through a multi-agency effort including the Federal Highway Administration, National Park Service, District of Columbia Department of Transportation, Virginia Department of Transportation, and Arlington County.
- Reuse of the North Tract area located at the north end of Crystal City between Old Jefferson Davis Highway and Roaches Run Waterfowl Sanctuary for recreational facilities proposed as part of Long Bridge Park. Phase I of the park was completed in 2011 by Arlington County and additional phases including an Aquatics, Health and Fitness Center are planned.
- Modification of the Boundary Channel Drive/I-395 interchange to serve the proposed Long Bridge Park Regional Aquatics Center and the recently completed Long Bridge outdoor recreation park.
- Pentagon City Multimodal Improvements currently under construction including pedestrian enhancements along South Hayes Street from 15th Street to Army-Navy Drive (traffic signal upgrades, minor turn lane modifications, streetcar accommodations, bus stop upgrades, sidewalk upgrades, and landscaping and stormwater retention).
- 12th Street corridor improvements being planned in order to extend 12th Street between South Fern and South Eads Streets. The proposed project would create a connection that does not currently exist.
- Construction of Boeing's Regional Headquarters on the north side of Crystal City, adjacent to Long Bridge Park. The development includes the consolidation of the Boeing Company's area workforce in approximately 453,000 square feet of office space, and is currently under construction.

- Modification and repair of the Route 27 (Washington Boulevard) bridge over Jefferson David Highway (Route 110) to widen and extend the bridge to meet current design standards and facilitate pedestrian access via a shared-use path and a sidewalk.
- Army Navy Drive multimodal improvements to create a two-way dedicated bicycling facility on the south side of the right-of-way along the sidewalk. The proposed project would transform Army Navy Drive into a Complete Street, which is a street designed to safely accommodate all users including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities.
- South Clark Street/South Bell Street reconfiguration proposed to deconstruct the elevated portions of South Clark Street and South Bell Street and reconstruct them to existing grade as a two-directional roadway. The planning effort is currently in the initial stages.
- Proposed Route 110 trail improvements to update and improve the existing gravel path that runs along the east side of Route 110. Upgrades being considered include widening, paving, and re-grading the trail.
- The Arlington National Cemetery Real Property Master Plan for future development to add burial capacity, facilitate cemetery operations, enhance family services and visitor experience, and promote sustainability.

# 2.0 ALTERNATIVES CONSIDERED

## 2.1 Introduction

This EA addresses the implementation of the Pentagon Reservation Master Plan Update. The Master Plan Update consists of a long-term vision for the Pentagon Reservation including future development, land use, and circulation. The EA analyzes two alternatives: Alternative A, which is the Master Plan Update Alternative, and Alternative B, which is the No Action Alternative. Chapter 2 also discusses other alternatives that were developed but, after preliminary analysis, were eliminated from further consideration.

## 2.2 Alternative A – Master Plan Update Alternative

The Pentagon Reservation Master Plan Update constitutes a policy framework for the long-term development of the Master Plan Area, which includes approximately 238 acres of DoD property. The Master Plan Area includes the Pentagon Building, parking lots, the RDF, the HRP, a transit center with access to Metrorail and Metrobus, the North Village, the Pentagon 9/11 Memorial, and other landscaped areas and open space.

### 2.2.1 Baseline Assumptions

Several assumptions were developed by WHS and the planning team to guide the preparation of the 2014 Master Plan Update. These established parameters include the following:

- *Population:* The total number of employees on the Pentagon Reservation would remain at its current level of approximately 23,000 employees.
- *Security Perimeter:* A permanent security perimeter was created in response to the heightened need for security. The permanent security perimeter zone defines vehicular and pedestrian access to the site and buildings.
- *Circulation:* Improvements in vehicular and pedestrian movement, public transit, and parking would be developed in coordination with the permanent secure perimeter zone to enhance overall site circulation, efficiency, and pedestrian and visitor wayfinding.
- *Parking Ratio:* The proposed Master Plan projects would reduce the number of parking spaces on the Pentagon Reservation, such as the South Parking Lot Reconfiguration project, which would account for a majority of the reductions, as well as the Pentagon South Pedestrian Safety Project, the North Parking Lot Improvements, and other projects. The parking ratio would be reduced slightly from the present ratio (1 parking space for every 2.7 employees) to 1 parking space for every 3.2 employees. This 1:3.2 ratio could decrease in the future as other commuting alternatives besides single occupancy vehicles are promoted (in accordance with the 2014 TMP). There are currently approximately 8,494 employee parking spaces on the Pentagon Reservation. The implementation of the Master Plan Update projects would reduce the number of parking spaces by approximately 1,295 to 7,199.

- *Emerging Functions:* Strategies for potential development of new or relocated functions within the Pentagon Reservation as well as the replacement of temporary facilities would be provided. These include auxiliary and support functions, such as the Pentagon Support Operations Center (PSOC) and the Pentagon Motor Pool. New and consolidated functions and facilities would be integrated with the existing buildings and surrounding features. Where possible and appropriate, these functions would be co-located with similar and related uses in appropriate functional zones.
- *Sustainability Criteria:* There are currently multiple DoD programs in place to meet, or exceed, required environmental mandates and recent Executive Orders addressing sustainability goals for Federal facilities. A comprehensive sustainability guideline is needed to support and coordinate ongoing and future environmental objectives and programs.
- *Architectural Character:* Exterior design standards have been prepared to guide all future development on the Pentagon Reservation. These design standards provide a consistency to any new construction to reinforce the unity and identity of the Pentagon Reservation, and ensure improvements to its historic and aesthetic character. All new projects included in the Master Plan Update should follow these standards.

### 2.2.2 Proposed Facility Improvements Recommended by the Master Plan Update

The Master Plan Update defines seven functional use zones. These are classified as administration (the Pentagon Building), utilities, support, green space/open space, culture, public transportation, and parking (see *Figure 2-1*). The Master Plan Update proposes the consolidation of these zones through the development of several new facilities, which are included in *Figure 2-5* and *Table 2-1*, as described below:

- *Pentagon Support Operations Center (PSOC):* This facility would provide updated and permanent space for the Pentagon Force Protection Agency (PFPA) on the northernmost portion of the Pentagon Reservation property at the North Village formerly used for temporary contractor operations associated with the Pentagon Renovation (PenRen) project. The proposed PSOC facility would be a one-story, approximately 25,825 square foot (SF) facility housing an indoor firing range, a K9 facility, and Court Liaison and Evidence Room facilities. The K9 facility would accommodate a military working dog kennel and support facilities. The PSOC would be low-scale and screened with vegetation. The three outdoor dog areas associated with the K9 facility (obedience course, exercise area, and break area) would be located south of the PSOC facility within the North Village. The outdoor dog areas would include three separate fenced, grassy open areas comprising a total of approximately 23,500 square feet. Parking would be provided on-site for government vehicles. The building would be constructed to meet U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental (LEED) Silver rating.
- *North Village Modifications:* The North Village, located in the northern end of the Pentagon Reservation, would be redeveloped to accommodate the PSOC and outdoor K9 facilities, as well as reserve land to meet the Pentagon Reservation's future development needs, as would be identified and assessed in future planning phases. While future space requirements beyond the scope of the Master Plan Update are unknown, the North Village Modifications would accommodate future low-scale, compatible growth at the North Village area.

A new vehicular and pedestrian access control point (ACP) would replace the existing temporary ACP at the entrance to the North Village. The existing landscape operations, an office building at the center of the site, and an existing ammunitions bunker would be retained. Temporary modular buildings, a small storage building, and the north and south sewage settling tanks (not operational) would be removed. After demolition, areas not utilized for the PSOC would be converted into open space reserved for future development beyond the Master Plan planning horizon.

- *Helipad Control Tower/Fire Station:* The temporary fire station and control tower facilities at the Pentagon, which were constructed after the September 11, 2001 terrorist attack, would be replaced with a permanent, stand-alone Fire Station/Control Tower building (5,629 net SF) on the southwest side of the RDF at the site of the existing facility. The current control tower/fire station would be temporarily relocated nearby while the new facility is constructed in its location to ensure continuity of operations. The current facility would be removed when the new facility is completed.

The Helipad Control Tower/Fire Station would only service the helipad operations (fire and emergency services for the Pentagon Building are provided by Arlington County). The proposed Fire Station would be a one-story fire truck garage with space for two fire trucks and associated equipment and a one-story support space with accommodations for staff and a dispatch office. The attached control tower would provide space and equipment for personnel to oversee helicopter operations using the helipad. The control tower would be four stories tall, with the ground floor housing fire station and control tower support spaces. The building would be constructed to meet USGBC's LEED Silver certification. The helipad would remain in its existing location on the David O. Cooke Terrace deck on top of the RDF.

- *Pentagon Motor Pool – Location to be determined:* The Pentagon Motor Pool would be used to provide parking for motor pool vehicles, space for waiting and dispatch areas (approximately 600 net SF), and a secured parking area (fenced) for 20 vehicles.
- *Pentagon Power Security Upgrade:* This project would provide back-up power to the Pentagon Reservation. The Pentagon Power Security Upgrade project would include diesel-powered emergency generators and associated fuel storage space to provide back-up power. The plant would be planned to operate in conjunction with a future Combined Heat and Power (CHP) facility that includes natural gas-powered steam turbines that would help to meet Pentagon Reservation heating and cooling loads and generate electricity. The Pentagon Power Security Upgrade project would be located at the East Loading Dock site (near the eastern most point of the Pentagon), underground or bermed and covered with a green roof. The planning and design of this project and the Cogeneration/Combined Heat and Power facility would be coordinated. The size and design would be determined during the detailed design process after completion of the Master Plan.
- *Cogeneration/Combined Heat and Power:* The Cogeneration/Combined Heat and Power project is a combined heat and power plant that would increase the Pentagon Reservation's independence from the commercial power grid. The project would be located in the existing power plant building in the HRP area and would replace three of the existing boilers in the HRP with multiple gas turbines fitted with heat recovery steam generators to generate electricity on site, as well as meet Pentagon steam loads during the winter by utilizing steam generated by waste heat from

the gas turbines. During the summer, excess steam would be directed to steam-powered chillers to provide chilled water to the Pentagon. The three remaining boilers would provide redundancy and supplemental steam when necessary. Low nitrous oxide-emitting gas turbines would be used to minimize onsite emissions. The planning and design of this project and the Pentagon Power Security Upgrade would be coordinated. The size of the new equipment would be determined during the design process and may require expanding the footprint of the existing power plant to accommodate the new equipment.

- *Classified Waste Destruction:* This project would provide an alternate, more sustainable method to destroy classified waste by installing an additional system to dispose of classified waste at the existing incinerator plant within the HRP. The size of the new disposal system would be determined during the detailed design process and may require expanding the footprint of the existing incinerator plant.
- *Pentagon Memorial Visitor Education Center:* This project would develop a visitor education center to educate visitors about the memorial and the events that took place on September 11, 2001. It would also serve as an ideal complement to the Pentagon 9/11 Memorial. The Pentagon Memorial Fund is currently raising funds for this project.

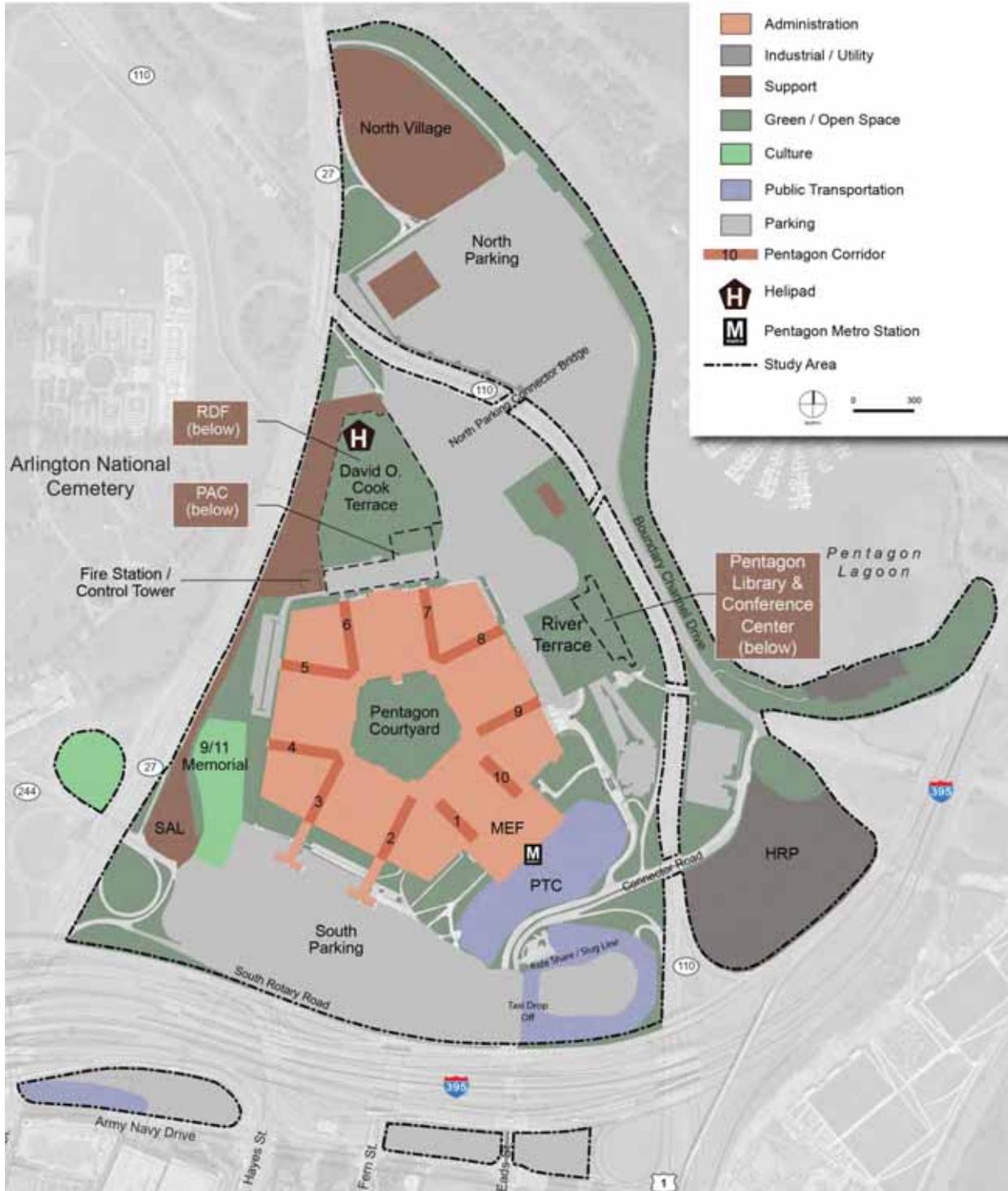


Figure 2-1: Master Plan Update Land Uses

### 2.2.3 Proposed Circulation Improvements Recommended by the Master Plan Update

A number of vehicular and pedestrian improvements are recommended in the Master Plan Update (and described in detail in the TMP prepared in parallel with the master planning effort). These are illustrated in *Figures 2-2 and 2-3* and discussed below:

- *South Parking Lot Reconfiguration:* A major change is proposed to the circulation system in the South Parking Lot. The lot would be reconfigured in its current footprint to provide more efficient internal circulation and limit the number of vehicle access points onto North and South Rotary Roads, as well as to enhance pedestrian safety, bike access, and stormwater management. South Rotary Road east of Eads Street would be converted from a one-way route to two-way, dedicated bus-only ingress and egress route with direct access to the PTC. North Rotary Road would be retained as a one-way road. This would segregate bus traffic away from other vehicular and pedestrian circulation routes to reduce conflicts. Connector Road would be realigned to meet Eads Street so that Connector Road no longer intersects with North Rotary Road to the east of Eads Street. Controlled intersections and crossings would be installed along North and South Rotary Roads at Fern Street and Eads Street. The commuter plaza would be relocated to the eastern side of the South Parking Lot and informal ridesharing, or 'slugging' would be consolidated here with a dedicated rideshare lane and waiting areas, as well as a taxi stand. A raised crosswalk with an advanced pedestrian warning system would be installed between North and South Rotary Roads in the middle of the western parking lot. Additional pedestrian walkways and signalized crosswalks would be incorporated. Light-emitting diode (LED) lamping would also be added to the South Parking Lot. Bike lanes along North and South Rotary Roads and Connector Road would also be installed. New landscaping and Low Impact Development (LID) measures would be added to the parking lot to manage and reduce pollution from stormwater. In the long-term, South Rotary Road would be extended under a new underpass beneath Route 27 to connect to the new Columbia Pike realignment proposed by Arlington County.
- *North Parking Lot Improvements and Boundary Channel Drive:* Pedestrian safety improvements and stormwater management would be installed in the North Parking Lot and Boundary Channel Drive to reduce vehicular-pedestrian conflicts in this area, provide for a more comfortable and aesthetically pleasing pedestrian experience, and reduce potential surface water pollution affecting the nearby Boundary Channel/Pentagon Lagoon and Potomac River. A north-south tree-lined pedestrian path with LID measures would run through the North Parking Lot from the North Village to the North Parking Lot Connector Bridge. Light-emitting diode (LED) lamping would also be added to the North Parking Lot. A signed on-street bike lane would be installed along Boundary Channel Drive from its intersection at Routes 110 and 27 to the future I-395 roundabout and would be signed for use by DoD/Pentagon badge holders. A bike path would be added from the future I-395 roundabout along Boundary Channel Drive between the fence line and the Pentagon Lagoon via an easement provided by WHS to Arlington County for the path's construction. This path would connect to the NPS multi-use trail.
- *Pentagon South Pedestrian Safety Project:* The Pentagon South Pedestrian Safety Project would relocate the tour bus drop-off area from the South Parking Lot to the Hayes Street Parking Lot adjacent to Army Navy Drive. As part of a TIGER Grant, a total of eight bus bays would be included, four for DoD use and four for Washington Metropolitan Area Transit Authority

(WMATA) use. In addition, Arlington County is planning a streetcar stop in the median of Army Navy Drive in this location. The project concept design has been coordinated with Arlington County and WMATA. Pedestrians would access both the Pentagon 9/11 Memorial and the Pentagon Building itself through the pedestrian tunnel under I-395 and the new walkways provided within and adjacent to the South Parking Lot. Public bike parking would also be incorporated into this area.

- *Relocate Impound Lot/MACC Trailers:* In order to make room for the Boundary Channel Access Control Point, the impound lot would be relocated to the northwestern corner of the North Parking Lot.

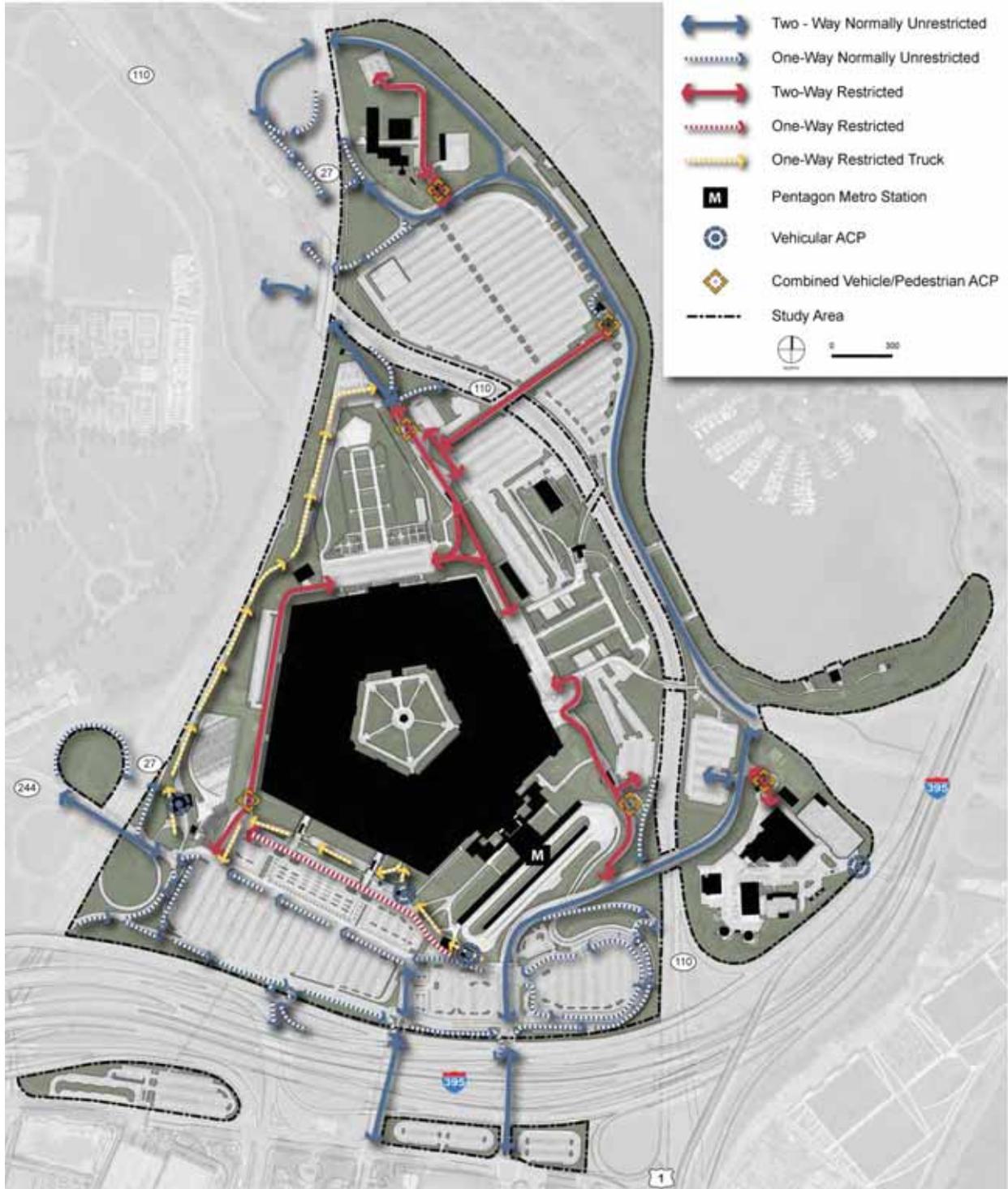


Figure 2-2: Proposed Vehicular Circulation

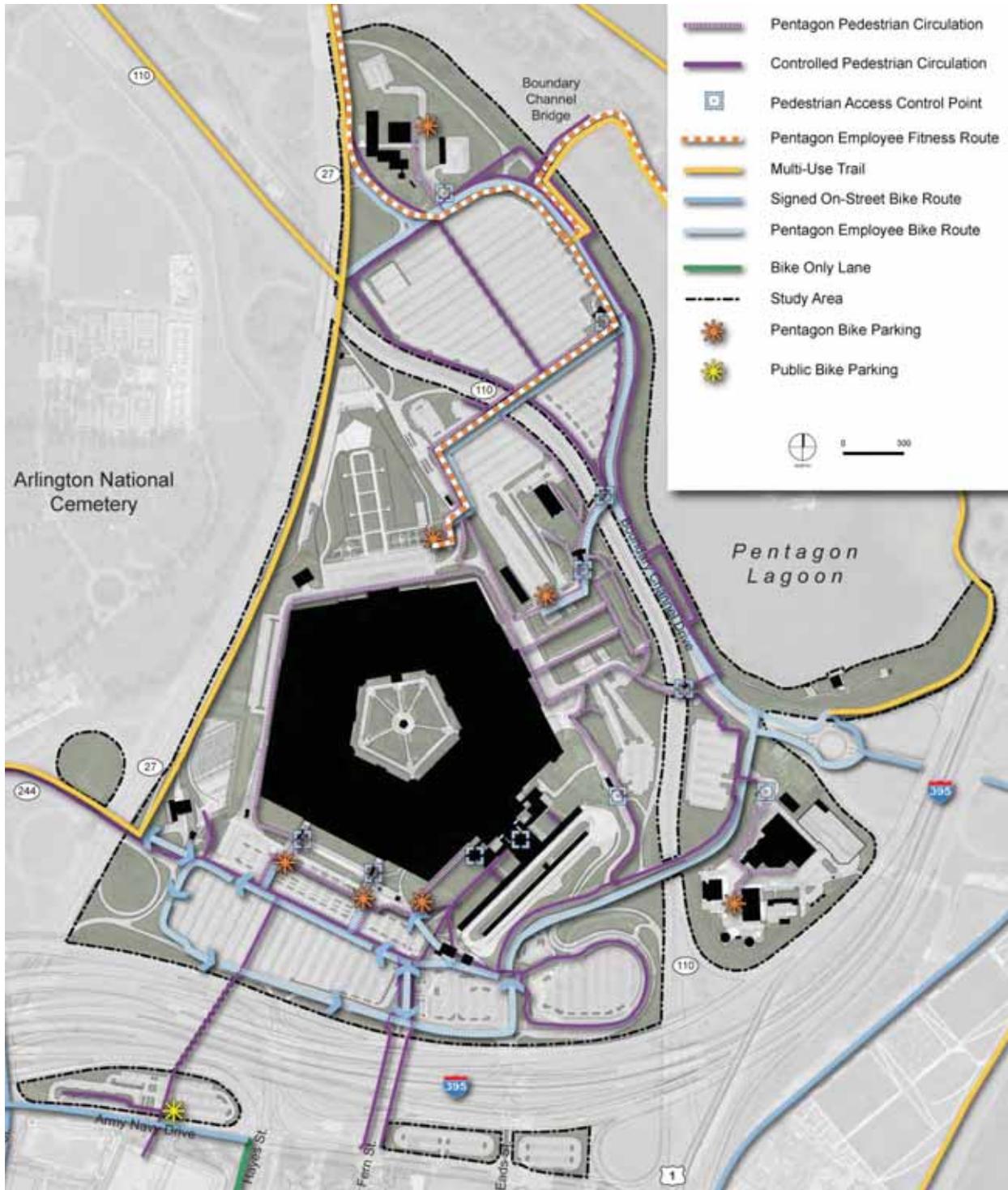


Figure 2-3: Proposed Pedestrian and Bicycle Circulation

## 2.2.4 Proposed Security Improvements Recommended by the Master Plan Update

Increased security strategies are a key element of the Master Plan Update. They are:

- A permanent and secure vehicular and pedestrian barrier/fence would be completed around the perimeter of the Pentagon Building, as well as around the HRP, and the North Village.
- Permanent vehicular and pedestrian access control points (ACPs) have been consolidated under a single program called Sentry to expedite their programming, approvals and implementation. These projects replace temporary facilities constructed after 9/11 that were installed until more permanent facilities could be funded and constructed. The vehicular and pedestrian ACPs that would be constructed under the Master Plan Update are ACPs where temporary facilities have not been replaced with permanent facilities. Permanent screening facilities for employees and visitors and personnel without passes are planned at the Metro Entrance Facility (MEF) entrance (the MEF Visitor and Employee Pedestrian ACPs). Separate environmental documentation has been prepared for these Sentry facilities.

These ACPs include new gatehouse, surveillance and vehicular screening facilities at the following points around the Pentagon Reservation:

- Boundary Channel Vehicular and Pedestrian ACP
- MEF Employee Pedestrian ACP
- MEF Visitor Pedestrian ACP
- Corridor 8 Pedestrian ACP
- Secure Access Lane (SAL)

## 2.2.5 Proposed Site Improvements Recommended by the Master Plan Update

In addition to security measures and new facilities, the Master Plan Update recommends general improvements to the Pentagon Reservation grounds. These site improvements are illustrated in *Figures 2-4 and 2-5* and discussed below:

- *West End Safety Upgrades:* To provide for events related to the Pentagon 9/11 Memorial and to better accommodate visitors coming to see the Memorial, a pedestrian plaza would be established adjacent to the Memorial next to the South Parking Lot. The area would be accessed using new walkways and crosswalks provided within and adjacent to the South Parking Lot, including the pedestrian tunnel under I-395, to reduce pedestrian and vehicular conflicts and provide a safer pedestrian experience for visitors to the Pentagon 9/11 Memorial.
- *Stormwater Quality Improvements to meet Total Maximum Daily Load (TMDL) Action Plan:* The project would implement water quality improvement measures in order to meet TMDL pollutant load reduction requirements associated with the Pentagon Reservation's Municipal Separate Storm Sewer System (MS4) permit. The project would need to be implemented if total necessary pollutant load reductions are not achieved through the implementation of stormwater management requirements associated with other Master Plan projects. A LID Reference Manual was prepared by WHS addressing LID improvements to stormwater management and treatment on the Pentagon Reservation grounds in June 2012. The LID Reference Manual provides suggested locations and LID measures, which are included in the Master Plan Update. These potential locations and measures are listed below and shown in *Figure 2-4*. The exact location of Stormwater Quality Improvement projects would be determined after further study during the detailed design process and could be in multiple locations throughout the Reservation.
  1. Corridor 5 Parking Lot
  2. Utility Area near Corridor 4
  3. West End Safety Upgrade
  4. South Parking Lot (includes stormwater management improvements as well as circulation changes described above)
  5. Corridors 2 and 3 Bridge Areas
  6. Vegetated Swale at New Metro Entrance
  7. Turf along I-395 Hill
  8. New Rideshare Area in South Parking Lot (includes improvements described above)
  9. Secretary of Defense Drive
  10. South Parking Pedestrian Walkways
  11. Riparian Buffer Area along Pentagon Lagoon
  12. North Parking Lot (includes improvements described above)
  13. HRP Area
  14. Corridor 6.5 Green Roof Demonstration
  15. PSOC Area
  16. Helipad Control Tower/Fire Station
  17. Permeable Paving between Corridors 2 and 3

- *Center Courtyard Stage:* A new, larger stage is planned in the center courtyard of the Pentagon to replace the existing stage on the west side of the courtyard space. This new stage would allow more space for ceremonies and other DoD functions and avoid having a temporary stage brought in and assembled when larger events are conducted in the outdoor courtyard area.
- *Corridor 8 Exterior Bridge Canopy:* A canopy covering is planned for the pedestrian bridge connecting Corridor 8 with the North Parking Lot.
- *Pentagon Electric Upgrade (East Utility Tunnel):* The Pentagon Electric Upgrade is a project on the east side of the Pentagon that would install an electrical substation enclosure set partially inside an existing grassy hill at the Corridor 8 Bridge to accommodate major electrical equipment that would enhance the Reservation's electrical systems and increase reliability to support the Pentagon mission. The 10,000 square foot, one-story structure would be approximately 26 feet in height.



An Illustrative Plan that shows all the planned projects included in the 2014 Master Plan Update (listed in *Table 2-1*) is provided in *Figure 2-5*. The locations of the Pentagon Motor Pool project is under analysis, and therefore not shown in *Figure 2-5*. The proposed Master Plan Update improvements would be implemented over a twenty year timeframe. Planned projects would be implemented in two phases of development: short-term (0-5 years) and long-term (> 5 years). The planned sequencing for the proposed projects is provided in *Table 2-1* and illustrated in *Figure 2-6* and *Figure 2-7*.

**Table 2-1: Master Plan Update Projects**

Map ID	Master Plan Project	Time Frame
1	Secure Access Lane (SAL) (Sentry)	Short
2	West End Safety Upgrade	Short
3	South Parking Improvements (includes LED lamping)	Short
4	Pentagon South Pedestrian Safety Project	Short
5	MEF Visitor Pedestrian ACP (Sentry)	Short
6	MEF Employee Pedestrian ACP (Sentry)	Short
7	Classified Waste Destruction	Short
8	Cogeneration/Combined Heat and Power	Long
9	Pentagon Power Security Upgrade	Long
10	Helipad Control Tower / Fire Station	Short
11	Center Courtyard Stage	Long
12	Corridor 8 Exterior Bridge Canopy	Long
13	Corridor 8 Pedestrian ACP (Sentry)	Short
14	Pentagon Electric Upgrade (East Utility Tunnel)	Short
15	Boundary Channel Vehicular and Pedestrian ACP (Sentry)	Short
16	North Parking Lot Improvements (SWM & LED lamping)	Long
17	Relocate Impound Lot/MACC Trailers	Short
18	North Village Modifications	Long
19	Pentagon Support Operations Center (PSOC)	Short
20	Pentagon Motor Pool – Location TBD(not shown on Figure 2-4)	Long
21	Stormwater Quality Improvements to meet TMDL Action Plan (not shown on Figure 2-5)	Short and Long
22	Pentagon Memorial Visitor Education Center	Long

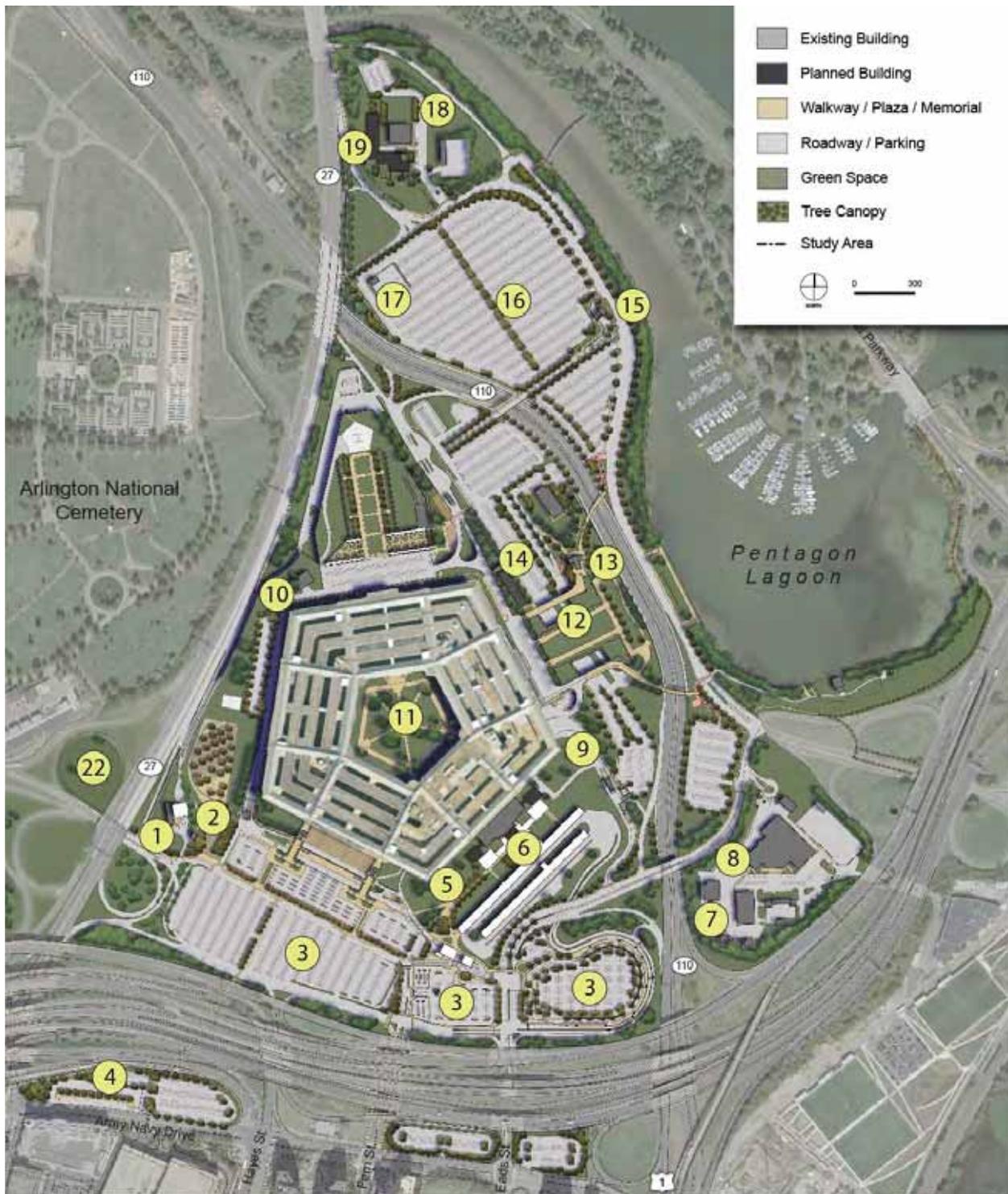


Figure 2-5: Pentagon Reservation – Illustrative Master Plan Update

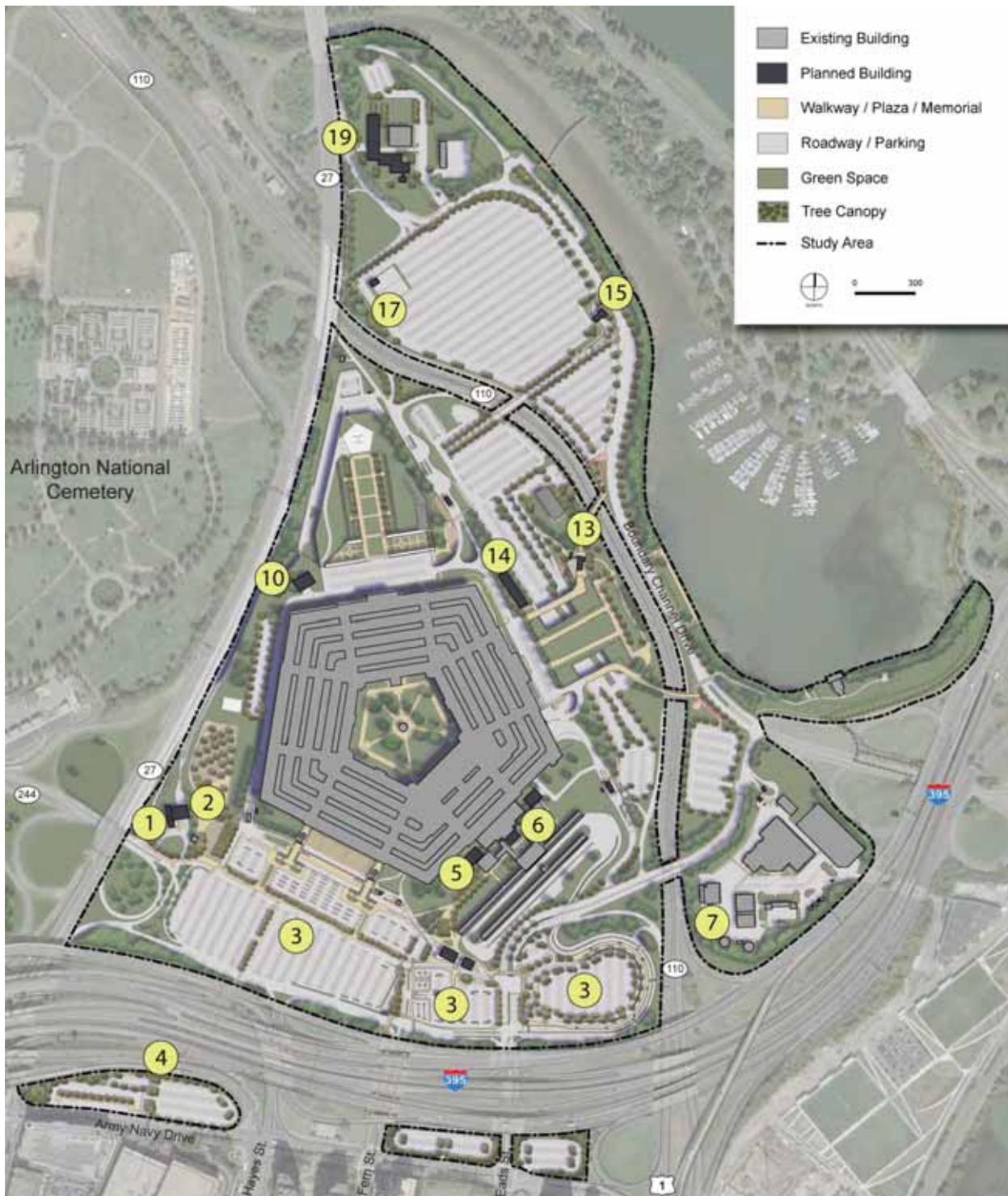


Figure 2-6: Planned Short-term Project Phasing

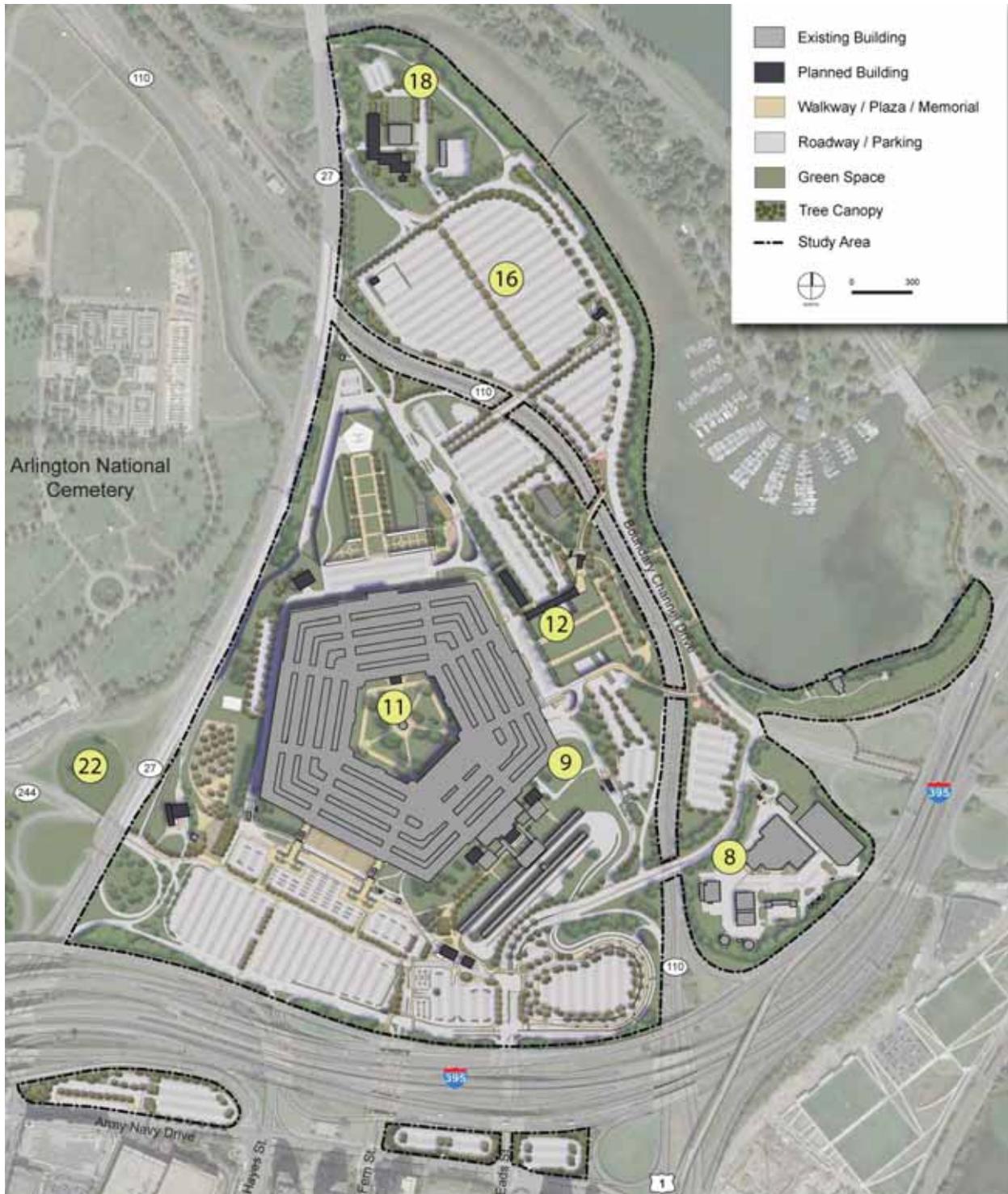


Figure 2-7: Planned Long-term Project Phasing

## 2.3 Alternative B – No Action Alternative

The No Action Alternative assumes that the Master Plan Area would continue to function similarly to existing conditions. Specifically, the North and South Parking Lots would remain as surface parking areas without improvements or reconfiguration; the helipad control tower and fire station would remain as temporary facilities on and adjacent to the David O. Cooke Terrace at the RDF; a permanent secure perimeter would not be completed; and power upgrades and energy efficient power generating capabilities would not be added to the Pentagon Reservation. In addition, future development at the Pentagon Reservation would occur without a comprehensive strategy for planning, siting, and sequencing.

A number of these projects are necessary – the control tower and fire station need permanent facilities; a permanent secure perimeter with upgraded screening facilities needs to be completed around the Pentagon; and circulation issues need to be addressed. Therefore, the No Action Alternative would necessitate further study for developing these projects that may occur individually and without a comprehensive strategy. Although the No Action Alternative would not meet DoD's future requirements for the Pentagon Reservation, it is evaluated in the EA to serve as a comparison with the Master Plan Update Alternative, in accordance with NEPA and the Council on Environmental Quality's guidance.

## 2.4 Preferred Alternative

WHS has selected Alternative A – Master Plan Update Alternative as its preferred alternative. Alternative A best meets the purpose and need of the proposed action. Implementation of the 2014 Master Plan Update would improve DoD Headquarters and Pentagon security by meeting new security requirements; enhance the safety and quality of life of employees and visitors through improved vehicular and pedestrian circulation and the renovation or replacement of exterior temporary facilities; and enhance environmental sustainability on the Reservation. In addition, it would establish a comprehensive plan for future development on the Reservation to support DoD’s future requirements and would be in keeping with NCPC master planning requirements for federal installations.

## 2.5 Alternatives Considered but Eliminated

During the development of the Master Plan Update, a number of alternatives for individual elements included in the plan were analyzed before a preferred alternative was reached. The alternatives not selected were eliminated for varying reasons including environmental impacts, as well as impacts to existing operations, facilities, security provisions and other considerations. Alternatives considered but eliminated during the master planning process include the following:

### **Heliport Alternatives:**

A number of different locations and configurations for a Heliport were analyzed during the master planning process. The alternatives included the existing helipad location on the RDF, three different configurations on the North Parking Lot, and two configurations on an elevated structure at the parking lot adjacent to the former Childcare Development Center Building. The different configurations at these locations included using either Standard Visual Flight Rules (VFR) or Limited VFR approach zones and clearance areas in accordance with DoD's Unified Facilities Criteria (UFC) for helicopter operations. In addition, co-location of a heliport with a permanent motor pool located beneath the heliport structure was considered. None of the locations other than using the existing helipad location on the RDF were feasible from a cost and operations perspective. They also created potential additional visual and circulation impacts that were substantive. Therefore, the existing location was retained and new control tower and fire station facilities included in the Plan to better serve the existing helipad location on the RDF.

### **Helipad Control Tower/Fire Station Alternatives:**

The location of the permanent control tower/fire station was analyzed as part of the planning process, including the co-location with a new helipad described above in the heliport alternatives considered but eliminated. Several sites were investigated as potential locations for the permanent control tower/fire station to serve the existing helipad. A site to the southwest of the existing control tower/fire station and a site on top of the RDF were considered. These two sites were removed from consideration due to operational needs related to response times and clear visibility to the helipad. In addition, the site on the RDF created potential visual impacts. Therefore, the site of the existing temporary facility was retained as the location for the permanent control tower/fire station.

### **Permanent Motor Pool:**

Siting a Permanent Motor Pool facility on the Pentagon Reservation at the Executive Parking Lot between Route 110 and the HRP was explored as an alternative to accommodate the motor pool function located off-site in leased space. This facility would require a large amount of space to accommodate the vehicle parking area and support spaces necessary to operate a full motor pool. The option was not a feasible one from a space, cost, and operations perspective. Therefore, a motor pool function to provide access to only the motor vehicles being used on the Pentagon Reservation that day was included in the Master Plan.

### **Tour Bus Drop-off Alternatives:**

Two alternatives were explored for a new tour bus drop-off for Pentagon Building and Pentagon 9/11 Memorial visitors. Currently, a tour bus drop-off area is provided in the easternmost parking area in the South Parking Lot between the Connector Road and Route 110. This location is too distant for visitors to the Pentagon 9/11 Memorial and, in the future, is proposed to be reconfigured to better accommodate rideshare lanes and transit access as described in the circulation section. Tour bus drop-offs were studied adjacent to South Rotary Road and at the Hayes Street Parking Lot next to Army-Navy Drive. The latter option has been chosen for security reasons and is included in the 2014 Master Plan Update.

### **Structured Parking:**

The 2005 Master Plan proposed four parking garages to replace the major surface parking lots at the Pentagon Reservation. During the master planning effort, the Master Plan team and WHS spent considerable time analyzing the possibilities for structured parking at the Pentagon Reservation, particularly for the North and South Parking Lots. In the end, the Master Plan team and WHS decided that the surface parking should be retained at all locations but modified to incorporate the latest techniques in stormwater management and treatment to reduce water pollution affecting nearby water bodies, including the Potomac River and the Chesapeake Bay. Besides costs, the following reasons for not including structured parking were decision-making factors in the analysis:

- The original plans for the Pentagon Reservation as laid out in the late 1930s included surface parking in the same location and approximate configuration as the North and South Parking Lots that exist today.
- Garages in both the North and South Parking Lots have height limitations due to viewshed issues (limited to one-to-two stories above grade).
- Garages in both locations have depth issues due to underground utilities and the high water table on-site (limited to one story or less).
- Garages in both locations would require a green roof (as proposed in the 2005 Master Plan) because of viewshed issues. In typical applications for garages with green roofs, this is only provided for garages with many levels rather than a one or two-story garage as would be required at the Pentagon Reservation, for the reasons mentioned above.
- Garages in both locations would have limited access and egress points, potentially requiring security controls, which would negatively affect employees using these garages during morning and afternoon peak hour.

### **Pentagon Support Operations Center:**

An option to consolidate multiple directorates of the PFFA and staff from the Washington Headquarters Service within permanent facilities at the North Village was analyzed. The facility considered was designed to house 180 personnel and would include a military police station, emergency operations center, armory, indoor firing range, administrative offices, and a military working dog kennel. The option was not feasible from a cost and operations perspective. Instead, a smaller PSOC facility was developed to meet specific PFFA needs by replacing temporary facilities and was included in the Master Plan.

**South Parking Lot Area:**

The South Parking Lot area was analyzed during the master planning process in order to determine how to improve its circulation and operations. An option explored re-oriented the parking aisles in the western lot by 90 degrees and converted the eastern lot in the South Parking Lot to green space with rideshare lanes on its exterior. It was determined that this design option was too costly and would not meet operational needs and was therefore eliminated from consideration. The Master Plan includes a reconfiguration of the circulation around the South Parking Area to address vehicular, transit, ridesharing, and pedestrian circulation.

## 3.0 AFFECTED ENVIRONMENT

For the purposes of this EA, the Master Plan Area is the area considered to be directly influenced by the Pentagon Reservation Master Plan Update. The study area for each affected resource includes this area but may extend outside the Master Plan Area to include adjacent areas indirectly influenced by the Master Plan Update, depending on the resource.

### 3.1 Socio-Economic Resources

#### 3.1.1 Land Use Patterns

##### **Master Plan Area**

The Master Plan Area is located in Arlington County, Virginia, west of I-395's crossing of the Potomac River and encompasses approximately 238 acres. The area is bound by the Boundary Channel/Pentagon Lagoon to the north and east; Route 27 to the west; and I-395 to the south. The Master Plan Area consists of several parcels including one large parcel that contains the Pentagon Building. The primary land uses within the Master Plan Area are government office space, employee parking, public transportation land uses, ancillary infrastructure servicing the Pentagon, and open space.

The primary feature on the main parcel is the Pentagon Building, which serves as the headquarters for the Department of Defense (DoD). Located in a low-lying area near the Boundary Channel of the Potomac River, the Pentagon Building has five sides which form a pentagonal shape, with an interior open-air courtyard. The building comprises approximately 6.5 million gross square feet. Approximately 23,000 military and civilian employees pass through the 17.5 miles of building corridors daily. Built in 1943, it is recognized internationally as the largest low-rise office building in the world. In addition to the Pentagon, the Master Plan Area contains several large surface parking lots for employees and visitors, the Pentagon Transit Center (PTC), the Heating and Refrigeration Plant (HRP), the Remote Delivery Facility (RDF), North Village, a helipad, and the Pentagon 9/11 Memorial to Victims of September 11, 2001 (*Figure 3-1*).

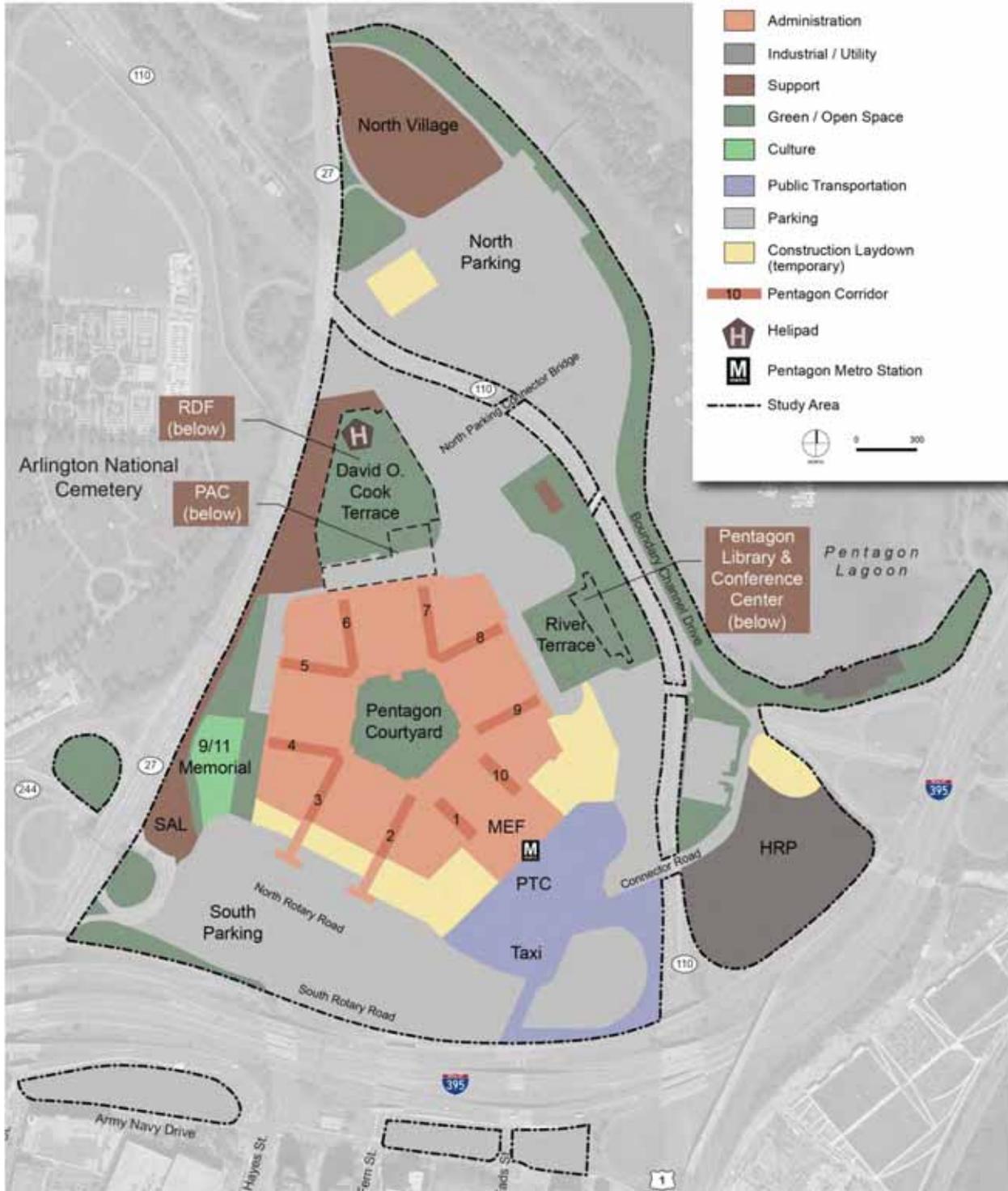


Figure 3-1: Master Plan Study Area Land Use

## **Study Area**

Land uses within a mile of the site consist of a mix of open space, commercial, light industrial, governmental, and residential uses. Generally, the areas to the north, east, and northwest are open spaces with roadways traveling through them. The areas to the southwest and south are generally developed with commercial and residential structures and roadways.

The Boundary Channel, a waterway that connects to the Potomac River, is located to the east of the Master Plan Area. The Columbia Island Marina in the Pentagon Lagoon and the George Washington Memorial Parkway (GWMP) are also located to the east between the Boundary Channel and the Potomac River. North and northwest of the Master Plan Area, Arlington National Cemetery provides approximately 612 acres of open space. The Air Force Memorial is located to the west along with the former site of the FOB2 facility, which was demolished in 2013. The former FOB2 site will become predominately open space as it will be used by ANC, the existing Air Force Memorial, and a proposed Arlington Heritage Center.

Pentagon City is a commercial district located south of the Master Plan Area that includes high-density retail malls, high-rise apartment buildings, and commercial offices. The area is physically separated from the primary Master Plan Area by an elevated section of I-395 and the three smaller parcels of the Pentagon Reservation that serve as surface parking lots.

Southeast of the Master Plan Area is Roaches Run Waterfowl Sanctuary and a former industrial area that is being developed into Long Bridge Park. These parklands are also part of the flight path to Reagan National Airport.

### **3.1.2 Planning Control and Policies**

#### **2005 Pentagon Reservation Master Plan**

The 2005 Master Plan was prepared as the result of heightened security concerns arising from the terrorist attack of September 11, 2001 and numerous changes on and around the Pentagon Reservation since the preceding Master Plan completed in 1991. The objectives of the plan included the completion of permanent perimeter security and the implementation of enhanced sustainability strategies. Since the preparation of the plan, many projects have been undertaken. The current master planning effort serves as an update to the 2005 Master Plan.

#### **Arlington County General Land Use Plan and Zoning**

Arlington County's General Land Use Plan is one of nine separate elements of the County's Comprehensive Plan and is the primary policy guide for future development within the County. The plan establishes the overall character, extent, and location of various land uses and helps communicate the policy of the County Board to citizens, the business community, developers, and others involved in the development of the County. The Zoning Ordinance and Map, Capital Improvement Program, and Five-Year Consolidated Plan provide mechanisms for implementing the Comprehensive Plan and the General Land Use Plan.

The Master Plan Area is made up of Federal land and is not within a zoning district. Arlington County designates neighborhood conservation areas through its Neighborhood Conservation Program in order to help preserve and enhance older residential areas and help provide housing at a range of price levels

and densities. The site and the adjacent residential complex to the south (in Pentagon City) are not within a designated neighborhood conservation area.

### **Columbia Pike Initiative**

In an effort to develop strategies to revitalize Columbia Pike, Arlington County established the Columbia Pike Initiative in 1998. The plan, Columbia Pike Initiative – A Revitalization Plan, was adopted by the Arlington County Board in March 2002 and updated in 2005. The goal of the plan is to create a mixed-use district with a more traditional “Main Street” environment to be achieved through preservation, revitalization, and new development. It identifies the area west of the Master Plan Area as a potential ‘eastern gateway’ to the Columbia Pike Corridor that could include a transit stop for the proposed Columbia Pike Streetcar. In 2012 the County Board adopted the Columbia Pike Neighborhoods Area Plan as a second major phase of the Columbia Pike Initiative, outlining specific tools for implementation of the 2005 Revitalization Plan.

### **Comprehensive Plan for the National Capital, Federal Elements**

The *Comprehensive Plan for the National Capital, Federal Elements* (2004) is the principal planning document adopted by the National Capital Planning Commission (NCPC) for the planning of Federal lands in the National Capital Region (including the Master Plan Area). The Plan is comprised of goals, objectives, and policies intended to guide growth and development in the Nation’s Capital. The Plan has policies under the Federal Workplace, Transportation, Parks and Open Space, Federal Environment, and Preservation and Historic Features Elements are relevant to the Pentagon Reservation Master Plan Update. Specific policies are outlined below.

The Federal Workplace Element identifies the following policy that is relevant to the Pentagon Reservation Master Plan Update:

- “Utilize available federally owned land or space before purchasing or leasing additional land or building space.”
- “Guide the long-range development for all installations on which more than one principal building, structure, or activity is located or proposed through a master plan.”
- “Agencies should continuously monitor utilization rates of land and building space to ensure their efficient use.”
- “Minimize development of open space by selecting disturbed land or brownfields for new Federal workplaces or by reusing existing buildings or sites.”
- “Use innovative energy conserving techniques in the design and construction, operation, location, and orientation of Federal workplaces.”
- “Implement methods to reduce consumption of nonrenewable energy resources and to reduce the consumption of energy through energy efficient techniques as soon as practicable at all Federal workplaces or when planning these facilities.”
- “Design security elements to respond to site-specific conditions, such as vehicle approach speed and angles, in order to minimize the size of security elements when possible.”

- “Design security barriers and checkpoints at vehicular entry points on Federal installations to accommodate vehicular queuing on site and to avoid adverse effects on adjacent public roadway operations and safety.”

The Transportation Element identifies the following policy that is relevant to the Pentagon Reservation Master Plan Update:

- “Outside of the Central Employment Area, but within the Historic District of Columbia boundaries, the parking ratio should not exceed one space for every four employees.”
- “Prepare Transportation Management Plans (TMPs) to encourage employee commuting by modes other than the single-occupant vehicle.”
- “Develop TMPs that explore methods and strategies to meet prescribed parking ratios, and include a thorough rationale and technical analysis in support of all TMP findings.”
- “Encourage ridesharing, biking, walking, and other non-single-occupant vehicle modes of transportation for Federal commuters.”
- “Provide bicycle travel lanes, paths, or trails between campus entrance points and all buildings on the campus. Where bike lanes, paths, or trails exist outside of the campus, bicycle travel ways on campus should connect to those outside of the campus.”

The Parks and Open Space Element directly address the Pentagon Reservation. It recommends the following:

- “Restore forested buffers along waterways and stream valleys.”
- “Improve the quality of water in the Anacostia and Potomac Rivers to allow for both restored natural habitats and increased recreational use.”
- “Discourage large paved parking areas and other non-water-related development along the Anacostia and Potomac Rivers.... Existing large parking areas, such as the Pentagon’s north parking lot along Boundary Channel, should be removed as soon as feasible and restored to a landscaped condition with active or passive recreational uses.”

The Federal Environment Element identifies the following goals that are relevant to the Pentagon Reservation Master Plan Update:

- “Use pervious surfaces and retention ponds to reduce stormwater runoff and impacts on off-site water quality.”
- “Encourage the use of innovative and environmentally friendly *Best Management Practices* in site and building design and construction practice, such as green roofs, rain gardens, and permeable surface walkways, to reduce erosion and avoid pollution of surface waters.”
- “Encourage the natural recharge of groundwater and aquifers by limiting the creation of impervious surfaces, avoiding disturbance to wetlands and floodplains, and designing stormwater swales and collection basins on Federal installations.”
- “Incorporate new trees and vegetation to moderate temperatures, minimize energy consumption, and mitigate stormwater runoff.”

The Federal Historic Preservation Element identifies the following goals that are relevant to the Pentagon Reservation Master Plan Update:

- “Identify and protect both the significant historic design integrity and the use of historic landscapes and open space.”
- “Protect the settings of historic properties, including views to and from the sites where significant, as integral parts of the historic character of the property.”
- “Ensure that new construction is compatible with the qualities and character of historic buildings and their settings, in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties* and the *Guidelines for Rehabilitating Historic Buildings*.”

### **Executive Order 13508**

In May 2009, Executive Order 13508, *Chesapeake Bay Protection and Restoration*, was issued, directing all Federal agencies to lead the effort to protect and restore the Chesapeake Bay and contribute significantly to the health of the Chesapeake Bay. Goals that are particularly relevant to the Pentagon Master Plan Update include:

- Strengthen storm water management practices at Federal facilities and on Federal lands within the Chesapeake Bay watershed and develop storm water best practices guidance.
- Agencies with land, facilities, or installation management responsibilities affecting ten or more acres within the watershed of the Chesapeake Bay should, to the extent practical and permitted by law, implement land management practices to protect the Chesapeake Bay and its tributary waters consistent with the Executive Order and as described in guidance published by the EPA.

### **Executive Order 13514**

In October 2009, Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, was issued, directing all Federal agencies to strengthen their sustainable practices. The order expands upon the Energy Independence and Security Act, the Energy Policy Act of 2005, and Executive Order 13423 by requiring Federal agencies to implement strategies that measure, manage, and reduce greenhouse gas emissions, water consumption, and diversion of materials. The order mandates Federal agencies to meet various energy and environmental targets and defines requirements for sustainability in buildings and leases, sustainable acquisition, and electronic stewardship. Goals from Executive Orders 13423 and 13514 that are particularly relevant to the Pentagon Master Plan Update include:

- Reduce building energy intensity.
- Increase agency use of renewable energy and implementing renewable energy generation projects on agency property.
- Improve water use efficiency and management by:
  - Reducing potable water consumption intensity by 2 percent annually through fiscal year 2020; or 26 percent by the end of fiscal year 2020, relative to a baseline of the agency’s water consumption in fiscal year 2007;

- Reducing agency industrial, landscaping and agricultural water consumption by 2 percent annually or 20 percent by the end of fiscal year 2020 relative to a baseline of the agency's industrial, landscaping, and agricultural water consumption in fiscal year 2010;
- Identifying, promoting, and implementing water reuse strategies that reduce potable water consumption;
- Implementing and achieving objectives in EPA's Stormwater Management Guidance.
- Divert at least 50 percent of construction and demolition materials and debris by the end of fiscal year 2015;
- Implement high performance sustainable Federal building design, construction, operation and management, maintenance, and deconstruction by:
  - Beginning in 2020 and thereafter, ensuring that all new Federal buildings that enter the planning process are designed to achieve zero-net-energy by 2030;
  - Ensuring that all new construction, major renovation, or repair and alteration of Federal buildings complies with the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* (Guiding Principles);
  - Pursuing cost-effective, innovative strategies, such as highly reflective and vegetated roofs, to minimize consumption of energy, water, and materials;
  - Managing existing building systems to reduce the consumption of energy, water, and materials, and identifying alternatives to renovation that reduce existing assets' deferred maintenance costs.

### **Installation Master Planning Unified Facilities Criteria**

The Installation Master Planning Unified Facilities Criteria (UFC) provides guidance for master planning at all military installations. It was developed to guide master planning efforts that encourage effective long-term development and management of DoD resources and lead to the preparation of master plans that incorporate today's needs and mission requirements and sustainably accommodate future change. The UFC includes strategies and general requirements to support the DoD-wide overarching installation planning philosophy. It also defines the master planning process and products and identifies key performance indicators.

### **3.1.3 Demographics and Environmental Justice**

The 2008-2012 American Community Survey provides the basis for analyzing the demographic composition of the area around the project site. Population, household, and income data from the American Community Survey provides a wealth of demographic information. Executive Order 12898 requires Federal agencies to: 1) identify any disproportionately high and adverse effects on human health or human environment of minority and/or low-income populations resulting from Federal programs, policies, and activities, and 2) identify alternatives that may mitigate these impacts.

In the American Community Survey, persons are self-identified into one or more racial subgroups: White; Black or African-American; American Indian and Alaska Native; Asian; Native Hawaiian or Other Pacific Islander; or Some Other Race. The American Community Survey also enumerates persons of Hispanic or Latino origin, who may be of any race. While race data does not imply specific behavior patterns, it is useful in understanding the demographic setting and in identifying environmental justice communities

of concern. Characterization of a group of persons as a potentially “affected community” requires the fulfillment of one of three criteria, as follows:

- a minority population of the affected area that exceeds 50 percent;
- a low-income population based on the Bureau of Census Current Population reports; or
- a minority population meaningfully greater than the minority population percentage in the general population, or other appropriate unit of geographic analysis.

Certain cultural, social, occupational, historical, or economic characteristics of an affected community may amplify the environmental effects of an action; a population may be more sensitive to and less resilient in adapting to the effects of an action than other communities. The distribution of the effects within a study area is important. Affected communities that would disproportionately bear the burdens compared to other nearby communities would be considered to experience high and adverse impacts related to the action.

### **Master Plan Area**

The Master Plan Area does not have any resident population, households, or housing units.

### **Study Area**

Adjacent to the Master Plan Area, the areas to the immediate west (ANC), north (ANC) and east (Boundary Channel and GWMP) do not have a resident population. The area to the south contains the Pentagon City neighborhood as well as portions of the Crystal City and Aurora Highlands neighborhoods. The analysis examines four census tracts (1034.02, 1035.01, 1035.02, and 1035.03) that border the Pentagon Reservation to the south and southeast:

- Census Tract 1034.02 is bound by I-395, the CSX Railroad, Four Mile Run and Jefferson Davis Highway
- Census Tract 1035.01 extends south and east from I-395 to 16th Street west of S. Joyce Street
- Census Tract 1035.02 extends from Army Navy Drive to 18th Street between S. Ives Street and S. Fern Street, to 16th Street west of S. Ives Street, and to 15th Street east of S. Fern Street
- Census Tract 1035.03 extends from Army Navy Drive to 18th Street between Jefferson Davis Highway and S. Eads Street (north of 15th Street) and S. Fern Street (south of 15th Street)

Census Tract 1034.02 doesn't reflect the presence of affected communities. In Census Tract 1035.02 the percentage of population with incomes below the poverty level is greater than the County. However, the area under Census Tract 1035.02 consists of a mix of commercial and residential uses where the residential uses are predominantly luxury rental apartments. No affected communities are identified within this area (see *Table 3-1, Table 3-2 and Table 3-3*).

**Table 3-1: Populations and Households in the Study Area**

Category	Census Tract 1034.02	Census Tract 1035.01	Census Tract 1035.02	Census Tract 1035.03	Arlington County
Total Population	4,695	2,682	3,108	3,532	221,045
Total Households	2,751	1,869	1,719	2,159	92,992
Average Household Size	1.71	1.43	1.69	1.64	2.22

Source: 2008-2012 American Community Survey

**Table 3-2: Ethnic Minorities in the Study Area**

Category	Census Tract 1034.02	Census Tract 1035.01	Census Tract 1035.02	Census Tract 1035.03	Arlington County
Total Population	4,695	2,682	3,108	3,532	221,045
Racial Minority <sup>1</sup>	29.1%	14.1%	15.4%	16.8%	22.7%
Hispanic or Latino <sup>2</sup>	3.4%	8.1%	13.0%	9.1%	15.4%

Source: 2008-2012 American Community Survey

<sup>1</sup>Defined for the purposes of this study as persons who categorized themselves as: Black or African American alone; American Indian and Alaskan Native alone; Asian alone; Native Hawaiian and Other Pacific Islander alone; some other race alone; or two or more races in the 2008-2012 American Community Survey.

<sup>2</sup>Hispanic or Latino of any Race, according to the 2008-2012 American Community Survey.

**Table 3-3: Income and Poverty in the Study Area**

Category	Census Tract 1034.02	Census Tract 1035.01	Census Tract 1035.02	Census Tract 1035.03	Arlington County
Total Population	4,695	2,682	3,108	3,532	221,045
Per Capita Income	\$80,026	\$69,074	\$71,981	\$69,328	\$61,312
Poverty Status	4.7%	4.5%	13.8%	3.1%	7.2%

Source: 2008-2012 American Community Survey

## Arlington County

The 2008-2012 American Community Survey indicates that, in 2012, the population of Arlington County was 221,045. According to the U.S. Census, the aggregate population of Arlington County increased by 9.6 percent between 2000 and 2010. Arlington's population continues to be diverse; according to the American Community Survey approximately nine percent of County residents are African-American and approximately ten percent are Asian. Additionally, over 15 percent of County residents are Hispanic.

Arlington County's population is among the most highly educated in the nation. Approximately 90 percent of Arlington County's high school graduates go to college. Arlington County also has the highest percentage of people with bachelor's or graduate/professional degrees in the Washington, D.C. area. More than a dozen colleges and universities have established campuses and programs in Arlington County (CPHD 2011).

## 3.2 Cultural Resources

### 3.2.1 Historic and Archaeological Resources

The National Register of Historic Places, established in 1966 and managed by the National Park Service, is the official list of buildings, structures, sites, objects, and districts that embody the historical and cultural foundations of the United States. More than 80,000 historic properties are listed in the National Register, including over 2,700 properties in Virginia. Properties that qualify for listing must possess historic integrity, as defined by the following seven aspects: location, design, setting, materials, workmanship, feeling, and association.

National Historic Landmarks (NHLs) are nationally significant historic properties designated by the Secretary of the Interior because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States. Today, fewer than 2,500 historic places in the United States bear this distinction.

Historic resources can also be designated through state and local listings. The Virginia Landmarks Register, also established in 1966, is the state's official list of properties important to Virginia's history and is based on the same criteria as the National Register. Likewise, the Arlington County Historic Affairs and Landmark Review Board evaluates historic properties and recommends to the Arlington County Board that they be designated as historic districts and landmarks.

For purposes of this discussion, the term "archaeological resources" refers to prehistoric or historical subsurface sites. "Historic resources" or "historic properties" refer to buildings, structures, or objects, including historic districts and cemeteries.

#### **Area of Potential Effects**

The Area of Potential Effects, or APE, is the geographic area within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.

It was determined that the only impacts to archaeological resources would occur as a result of ground disturbing activities. Thus, the APE for archaeological resources includes the Master Plan Area within the Pentagon Reservation (*Figure 3-2*).

The APE for historic resources encompasses the project area as well as adjacent areas in which views of the project could have an effect on historic resources. Therefore, the APE for historic resources includes the area bound on the east by the Potomac River, to the south by I-395, and the parcel formerly containing FOB2 to the southwest. The boundary of the APE turns to the north at the west end of the site of FOB2, encompassing the farthest edge of the topography along the slope up into ANC (beyond the viewshed in which the Pentagon Reservation can be seen). The APE boundary extends to include the Tomb of the Unknowns within ANC and continues north to include Arlington House. It then extends east to the Potomac River, following a line of convenience which generally encompasses the farthest point along the topography from which the Pentagon Reservation can be seen; then turns south and follows the Potomac River western bank south to I-395 (*Figure 3-2*).

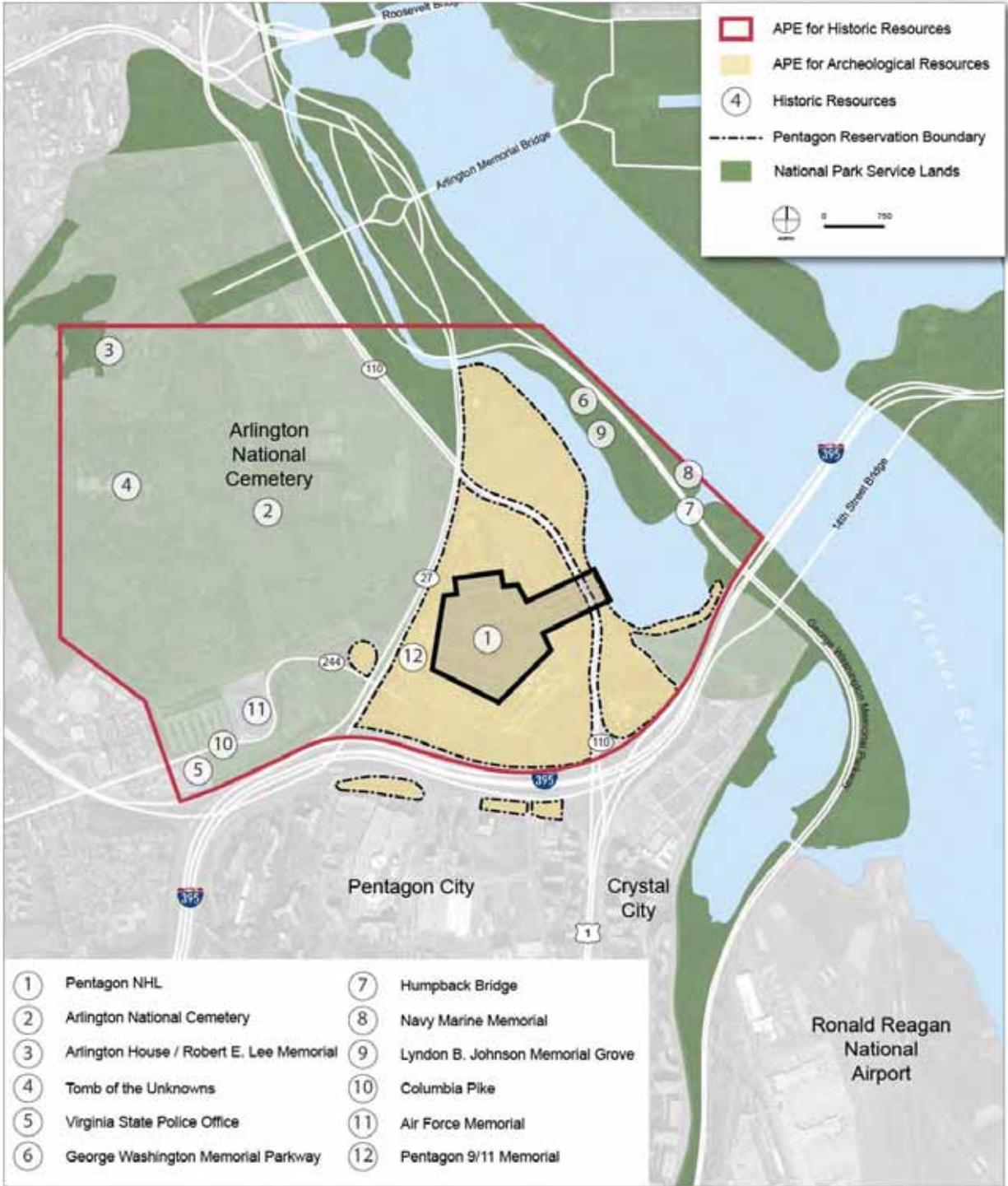


Figure 3-2: Areas of Potential Effects for Historic Resources and Archeological Resources, showing locations of historic resources

While the massive outline of the Pentagon building is detectable from some areas along the Washington-DC waterfront, the building is largely obscured by trees and distance and the surrounding Reservation and details of the facade are not visible. Because of the distance across the Potomac River, as well as vegetation cover and surrounding non-historic development, the new facilities proposed in the Master Plan Update would not be noticeable in views across the Potomac. Therefore, the proposed action has no potential to affect historic properties along the DC waterfront.

### **Archaeological Resources within the APE**

Archaeological research from the region indicates that the Pentagon Reservation and its surrounding areas have been an attractive location for human occupation since prehistoric times. The proximity to the Potomac River, adjacent high ground, and the presence of streams and marshes (such as Roaches Run that existed on the site) would have been a good location for Native American sites. An 1889 survey located a site near the Pentagon Reservation that may have been a village (Nameroughquena) previously identified on Captain John Smith's map of the area (made following his 1608 trip along the river). Most of the Pentagon Reservation was constructed on fill upon what was once the marshy Potomac River edge, forming a level area of land and the adjacent Pentagon Lagoon, constructed within the historic period. Construction of both the Pentagon complex and the surrounding highways has also caused substantial landform change and ground disturbance.

During the historic period (subsequent to European settlement), the Pentagon Reservation and surrounding vicinity saw several developments. These included:

- The Alexandria Canal opened in 1843, extending from Alexandria to Georgetown, where it connected to the C&O Canal. According to historic mapping, the Canal traversed the vicinity of the South Parking Lot, the Pentagon Building, and the Mall Terrace (ISEFMS 2008: 8).
- During the Civil War several Union forts that were part of the ring of defenses for the City of Washington stood in the vicinity of what is now the Pentagon Reservation, including Fort Runyon, Fort Jackson and Fort Albany, all visible on an 1861 coastal survey map (ISEFMS 2008: 8).
- "Jackson City" was a neighborhood in the mid- to late 1800s near what is now the east boundary of the Pentagon Reservation near the 14<sup>th</sup> Street Bridge. It featured saloons, betting parlors and a racetrack, had a bad reputation, and was essentially closed down by the Commonwealth of Virginia (ISEFMS 2008: 8).
- Freedman's Village, located adjacent to the Pentagon Reservation just west of the former site of FOB2, was established during the Civil War as a community of escaped slaves. This horseshoe-shaped village included about one hundred homes, two churches, a hospital, a school, and farmland. Freedman's Village was vacated in 1887 to allow for expansion of ANC (ISEFMS 2008: 9).
- The Arlington Experimental Farm was established after an act of Congress in 1900 transferred the property from the War Department to the Department of Agriculture. About 400 acres to the north and west of the Pentagon served as an experimental farm, testing such topics as naturalization of foreign plants and new methods of breeding corn. The site was transferred back to the War Department in September 1940, as WWII loomed (ISEFMS 2008: 9).

- “Queen City” was an area to the north of Columbia Pike and west of the Pentagon Reservation. This African-American community was founded by evicted residents from Freedman’s Village. About one hundred families lived in modest frame houses, many working at the nearby brickyards. Queen City was razed in 1942 for a highway and interchange near the Pentagon’s South Parking Lot (ISEFMS 2008: 9).
- The West Brothers Brick Yard and Appleman and Brothers Brickworks, along with approximately two dozen residences, were identified within the Reservation on an 1878 map. At that time a railroad track, belonging to the Pennsylvania Railroad, also crossed the Reservation east of where the Pentagon stands today (ISEFMS 2008: 8).
- Residences and commercial buildings lined Columbia Pike on what is now the Pentagon Reservation, as illustrated on a 1913 map.
- Washington-Hoover Airport operated on the Reservation in the 1920s and 1930s. Its runways were where the North Parking lot exists today, and aviation buildings were in the southeast corner of the Reservation (ISEFMS 2008: 9).
- Two residential subdivisions, called East Arlington and R.E. Lee, with approximately 300 homes were located along the southern edge of the Pentagon Reservation in the 1930s (ISEFMS 2008: 10).
- A portion of Arlington Cantonments associated with Fort Myer including barracks, mess halls and utility shops, was located at what is now the Mall Terrace Parking Lot (near the current RDF) (ISEFMS 2008: 10).

Only one archaeological resource in the APE is on file at the Virginia Department of Historic Resources (VDHR) related to these historical developments. The site, the Alexandria Canal (VDHR #44AX0028), follows the trace of the canal that existed from 1843 to 1886 noted above for approximately 3.5 miles. The site file identifies its condition as “Unknown portion of site destroyed.” There are no known remains of the canal section in the Master Plan Area; land in this area has been heavily modified through cut, fill, and construction since the canal went out of use. If remains exist, they would be capped below fill today.

A site identified in the VDHR Architectural files as the alignment of the Washington, Arlington and Falls Church Electric Railway (029-5470) is shown in GIS data as running along the southern edge of the Master Plan Area near I-395. This resource appears to be missing in this area, but there may be a possibility of subsurface archaeological remnants capped by fill. No additional information is provided in the file.

It is possible that archaeological resources remain from other past features within the APE. However, few archeological surveys and studies appear to have occurred on the Pentagon Reservation and, due to site conditions and modification over time, any existing remains would likely have been capped by fill or built over.

## Historic Resources Within the APE

Known and potential historic properties within the APE (*Figure 3-2*) include the following:

- *The Pentagon Building Complex* (VDHR # 000-0072): The Pentagon was designated a NHL in 1992, and has been listed in the National Register since 1989 (*Figure 3-3 and Figure 3-4*). It is also in the Virginia Landmarks Register. The Pentagon is significant for its architecture and engineering, association with important events, and association with important persons. The Pentagon's period of significance as identified in the NHL nomination extends from its construction in 1941-1943 to the present day. The Pentagon's contributing historic features include: the distinctive, five-sided design; its five exterior facades; the central courtyard and interior facades; the Mall Terrace; and the River Terrace.

Completed in 1943, the Pentagon is associated with events and people that have shaped America's geopolitical role in the post-World War II period. The Pentagon is an internationally recognized symbol of the United States' emergence as a military superpower and is a keystone of the Nation's defense system. It was built in the "Stripped Classical" architectural style, retaining Classical elements such as columns and moldings, but presenting them in a simplified, Modern style. This was a popular style for Federal architecture during the 1930s and 1940s. A major renovation and modernization of the building, known as PenRen, lasted for more than two decades, and was completed in 2011. The Pentagon is the largest low-rise office building in the world.



Figure 3-3: Pentagon National Historic Landmark boundary



Figure 3-4: The Pentagon Building

- *Arlington National Cemetery* (VDHR #000-042): The southern and eastern portion of ANC falls within the APE (Figure 3-5). ANC is the principal shrine honoring the men and women who have served in the United States Armed Forces. More than 260,000 are buried at ANC, including veterans from all the nation's wars from the American Revolution through the current day. Over the years, it has become the site of major memorial events, as well as an attraction for visitors to the Nation's capital. The entire ANC is considered eligible for listing in the National Register; and NPS has indicated that the Cemetery is eligible for listing as an NHL. Listing is underway.

- *The Arlington House/Robert E. Lee Memorial* (VDHR #000-001) was listed in the National Register in 1966 together with adjacent Section 29, which lies to the west of the house, outside the APE (*Figure 3-6*). Originally owned by the Custis family, the house was home to Confederate General Robert E. Lee; the house and surrounding land were appropriated by the Union during the Civil War to use as a military cemetery, which remains the site's use today. The house is operated by the National Park Service, while the surrounding cemetery is managed by the Army. Numerous studies of Arlington House have taken place over time, both specific to the house itself and also as part of planning processes for the surrounding Cemetery.
- *The Tomb of the Unknowns*: The Tomb of the Unknowns, including the Tomb Monument, is considered eligible for individual listing as an NHL due to its national commemorative significance, as well as its design and workmanship (*Figure 3-7*). Also within the APE is the John F. Kennedy gravesite, which may also be eligible for status as an individually listed NHL, based on a letter from June 1991 in the VDHR file.
- *Columbia Pike*: A portion of the alignment of the Columbia Pike falls within the APE, although it is not on file as a historic resource at VDHR. In 1808, the Columbia Turnpike Company was chartered to construct the Columbia Turnpike to join the Little River Turnpike in Fairfax County. This early turnpike connected the Washington and Alexandria Turnpike, today's U.S. Route I, to a turnpike that ran from Mason's Ferry landing through the Arlington Estate to the Alexandria-Washington Road. The Columbia Pike is considered non-eligible, as the majority of adjacent features are less than fifty years old (History Matters, 2005).
- *The Virginia State Police Office* (VDHR #000-046) is a circa-1920 Italian Renaissance Revival style building that was originally a residence on the Columbia Pike (*Figure 3-8*). It is located across the Pike from the former FOB2 site and is now part of a VDOT complex. The building is identified by VDHR as historic, but noted in the VDHR file as not eligible for listing in the National Register.
- *George Washington Memorial Parkway* (VDHR # 029-0218): The Parkway links important sites associated with the life and activities of President George Washington and connects historic and cultural sites associated with the development of the Federal City. The Capper-Cramton Act of 1930, as amended, provided for the acquisition, establishment, and development of this scenic roadway along the Potomac River from Mount Vernon to Great Falls. The Parkway was listed on the National Register of Historic Places in 1995. The National Park Service maintains the Parkway lands. A portion of the parkway on the Lady Bird Johnson Memorial Park (Columbia Island) falls within the APE for historic resources. This area includes some of the Parkway, the Humpback Bridge (*Figure 3-9*), the Columbia Island Marina, the Lyndon Baines Johnson Memorial (*Figure 3-10*) (VDHR# 000-1243) and the Navy Marine Memorial (VDHR #000-1234) (*Figure 3-11*).

There are two recently constructed memorials in the Pentagon Reservation's vicinity that may be eligible for listing in the National Register due to their national commemorative significance, even though they are currently less than 50 years old, under National Register Criteria Consideration G.

- *Air Force Memorial*: Located adjacent to FOB2, the Air Force Memorial was constructed in 2006 to honor the service of United States Air Force personnel (*Figure 3-12*). Construction of the memorial required demolition of Wing 8 of FOB2.

- *Pentagon 9/11 Memorial*: On September 11, 2001, the Pentagon acquired new symbolic meaning when a jetliner piloted by terrorists was driven into the west wall, killing 184 civilians and causing substantial damage. A memorial to the victims of the attack was constructed adjacent to the western side of the Pentagon Building (*Figure 3-13*).



Figure 3-5: View within Arlington National Cemetery



Figure 3-6: Arlington House/Robert E. Lee Memorial



Figure 3-7: Tomb of the Unknowns, Arlington National Cemetery



Figure 3-8: Virginia State Police Office on Columbia Pike



Figure 3-9: George Washington Memorial Parkway – Humpback Bridge



Figure 3-10: Lyndon Baines Johnson Memorial along the George Washington Memorial Parkway



Figure 3-11: Navy Marine Memorial along the George Washington Memorial Parkway



Figure 3-12: Air Force Memorial



Figure 3-13: Pentagon 9-11 Memorial

### 3.2.2 Visual Resources

This section documents the existing visual character of the Master Plan Area and surrounding areas. The study area for visual resources was determined by estimating the visibility of the proposed improvements from public places and adjacent historic resources. Due to the topography, existing vegetation and relatively low profile of the buildings on the Reservation, the study area is hidden from distant views, including the base of the Washington Monument, the steps of the U.S. Capitol Building, the steps of the Lincoln and Jefferson Memorials, and the Tomb of the Unknowns. More distant views are possible from Washington, DC to the east but they are mostly obscured by the tree canopy along the Potomac River and Pentagon Lagoon shorelines. The Reservation is visible, however, from Arlington House to the west of the Master Plan Area within ANC. It is also visible from the top of Washington Monument.

#### Master Plan Area

The Master Plan Area encompasses approximately 238 acres on the west side of the Potomac River. The focal point is the Pentagon Building itself, a massive five-story pentagonal building (*Figure 3-14*). Designed in the Stripped Classical style, the exterior facades of the building are sheathed in limestone punctuated by regularly-spaced windows. Colonnades frame each of the entrances, and a large landscaped courtyard lies at the center of the building. A series of low security buildings have been appended to the central colonnade on the southeast face of the Pentagon Building.

Key features of the building's design include elevated terraces that project from the east and north faces of the building. On the east side, the River Entrance Terrace extends 900 feet to the Pentagon Lagoon and is divided into three sections. The upper terrace closest to the building contains a rectangular lawn panel bordered by walkways and low walls. At the east end of the upper terrace, wide staircases provide access to the middle level, which contains another rectangular lawn panel. The middle terrace and lower terrace are divided by Boundary Channel Drive. The lower terrace contains a third landscape panel flanked by monumental staircases and flagpoles. The River Terrace's orientation to the east provides views of the Monumental Core across the river.

The Mall Entrance Terrace is on the north face of the Pentagon Building, and, like the River Terrace, is elevated above grade. A broad paved lot is located closest to the building. Beyond the parking area, a series of five grass panels project north. These panels serve as a parking area for helicopters. A helipad lies beyond the grassy area further to the north. The grass parcels and the associated helipad lie atop the RDF. From its elevated position, the Mall Terrace provides views north towards Georgetown and the National Cathedral and east to the Monumental Core.



**Figure 3-14: Aerial Photograph of the Pentagon Building**

The Pentagon Building lies within the Pentagon Reservation, a roughly triangular parcel bound to the south by the elevated portion of I-395, to the west by Route 27 (Washington Boulevard), and to the east by the Pentagon Lagoon. The Pentagon Metrorail Station is sited directly southeast of the Pentagon Building. A series of utility and industrial buildings (the HRP) are clustered at the southeast corner of the Reservation (*Figure 3-15*). The Pentagon 9/11 Memorial, a plaza punctuated by low sculptural benches and dotted by trees, lies west of the building (*Figure 3-16*). The balance of the Reservation is dominated by surface parking (*Figure 3-17*) and bisected by roadways; greenspace within the Reservation is limited, with the exception of the River and Mall Terraces, and open space areas on the periphery of the Reservation. Two roadways, Jefferson Davis Highway (Route 110) and Boundary Channel Drive, divide the east side of the Master Plan Area. Boundary Channel Drive follows the western edge of the Boundary Channel/Pentagon Lagoon, while Jefferson Davis Highway divides the Pentagon Building from the North Parking Lot and from the industrial buildings in the east. Each roadway provides views of the Pentagon Building and the surrounding Reservation.



Figure 3-15: Industrial Buildings at the Southeast End of the Reservation



Figure 3-16: View within the Pentagon 9/11 Memorial



Figure 3-17: View of the northeast face of the Pentagon Across the North Parking Lot

## Surrounding Context

The Master Plan Area is bordered to the west and northwest by Route 27 (Washington Boulevard), a six-lane divided thoroughfare. A stone wall partially obstructs views of the Pentagon Building from Route 27. West of the roadway, ANC covers the hillside up to Arlington Ridge. Encompassing more than 600 acres of open space, ANC is characterized by gently sloping grassy terrain dotted with headstones and monuments. Curving roads wind through the property. Directly west of the Master Plan Area, trees are clustered along the roadways, defining open parcels of mown lawn. Moving west up the hill, tree cover increases substantially, obscuring views back towards the Pentagon Reservation from the majority of the cemetery. The Tomb of the Unknowns and Arlington House both stand atop the ridge, affording views east to the Monumental Core across the Potomac River. The upper stories of the Pentagon Building are visible in the foreground of the view from the Arlington House (*Figure 3-18*); however much of the Master Plan Area is blocked from view by vegetation. South of ANC, and west of the Master Plan Area, the parcel that housed the now demolished FOB2 and its associated parking stands on a high point between I-395 and the southern portion of ANC. It is being converted into open space for use by ANC. The Air Force Memorial, a focal point in the landscape, rises approximately 270 feet from a paved plaza just west of Columbia Pike and South Joyce Street intersection (*Figure 3-19*).

An elevated portion of I-395 borders the south side of the Master Plan Area (*Figure 3-19*). The massive concrete infrastructure of the interstate divides the Master Plan Area both physically and visually from the neighborhood to the south; only the upper stories of some high-rise buildings at Pentagon City can be discerned over the highway. Several small pedestrian and vehicular tunnels run under the highway, although they do not serve to visually connect the Pentagon Reservation with Pentagon City. The southbound lanes of I-395 afford commanding views of the Pentagon Reservation with ANC in the distance. Traveling northbound on I-395, the Master Plan Area is visible to the left across the southbound lanes of the highway before motorists reach the 14<sup>th</sup> Street Bridge.



Figure 3-18: View from Arlington House



Figure 3-19: View from Air Force Memorial



Figure 3-20: The elevated section of I-395 with Pentagon City in the distance

The Boundary Channel/Pentagon Lagoon lies directly east of the Master Plan Area. The constructed water body is bordered by trees, except at the River Terrace where views are open (*Figure 3-21*). The Columbia Island Marina on the east bank of the lagoon is composed of eleven docks, a building, and a parking area. The marina building and parking area are generally screened from view by deciduous tree plantings during the spring and summer months. East of the marina is the GWMP, a four-lane divided thoroughfare that roughly follows the edge of the Potomac River. In the stretch of the parkway that lies within the area of visual influence, dense trees alternate with open grassy areas. North of the marina, between the parkway and lagoon, the Lyndon Baines Johnson Memorial Grove is composed of an obelisk of pink granite standing within a grove of pines, visually isolated from the adjacent lagoon to the west and the parkway and Potomac River to the east (*Figure 3-22*). A small bridge connects the Memorial with the Master Plan Area across the lagoon. Views of the Master Plan Area are afforded from the elevated Humpback Bridge along the GWMP (*Figure 3-23*). During the summer months the view is tightly defined by deciduous trees, however it is more open during the fall and winter when there are no leaves.



Figure 3-21: View of Pentagon from Marina



Figure 3-22: The Lyndon Baines Johnson Memorial Grove



Figure 3-23: View West from Humpback Bridge

## 3.3 Circulation Systems

### 3.3.1 Roadways and Traffic

The roadway system surrounding and within the Master Plan Area includes limited access highways, principal arterials/secondary roads, and collector roads, all of which facilitate ingress and egress into the Pentagon Reservation (*Figure 3-24*).

#### Principal Roadways

The Pentagon Master Plan Area is located in the vicinity of several major regional roadways that provide access to Washington D.C., Northern Virginia, and Southern Maryland, among them: Interstate 395 (I-395), Virginia Route 27 (Washington Boulevard), Jefferson Davis Highway (Virginia Route 110), and George Washington Memorial Parkway (GWMP).

- *I-395* is the single largest roadway entering Washington D.C. and is comprised of four to five lanes in each direction with additional feeder lanes between the interchange ramps and two high occupancy vehicle (HOV) lanes. It provides regional north-south access and connects the Capital Beltway (I-495) and I-95 with I-295 in Washington D.C. Locally, I-395 transects the southern extent of the Master Plan Area.

Exit ramps from I-395 provide direct access to the South Parking Lot (via Eads Street and Fern Street), the North Parking Lot and the HRP via Boundary Channel Drive, and Hayes Street, which connects to Army Navy Drive.

- *Virginia Route 27* (Washington Boulevard) is a six lane, divided, limited access highway along the western border of the Master Plan Area that provides north-south access between I-395 and the GWMP. Washington Boulevard provides access to the South Parking Lot, the RDF at the interchange with Columbia Pike, and the North Parking Lot via an exit ramp located adjacent to the North Village.
- *Jefferson Davis Highway* (Virginia Route 110) extends north-south through the eastern portion of the Pentagon Reservation with three lanes in each direction connecting I-66 to I-395. The North Parking Lot is directly accessible to northbound traffic while southbound traffic may enter and exit the northern Master Plan Area in the vicinity of the RDF. Southbound traffic on Jefferson Davis Highway accesses the southern Master Plan Area via an exit ramp to the Connector Road.
- *George Washington Memorial Parkway* (GWMP) is a major regional roadway extending north-south from I-495 along the Potomac River through the Master Plan Area to Alexandria and Mount Vernon. The GWMP is a four lane, divided roadway that provides indirect access to the Master Plan Area.
- *Columbia Pike* (Virginia Route 244) is a four lane divided roadway that extends west from the South Parking Lot and provides direct access to Washington Boulevard and FOB2.



Figure 3-24: Regional Circulation

## Secondary Roadways

- *Army Navy Drive* is located along the southern perimeter of the Master Plan Area between the Route 110/I-395 interchange and Joyce Street, parallel to I-395. Army Navy Drive has three lanes in each direction and provides access to the Eads Street, Fern Street, and Hayes Street parking lots, which are located south of I-395 and serve the Pentagon Reservation. Army Navy Drive connects Eads, Fern and Hayes Streets, which extend north to the Pentagon's South Parking Lot.
- *Eads Street* is a north-south urban collector that provides direct local access to the South Parking Lot from Army Navy Drive and serves as the primary transit route to the Pentagon Transportation Center (PTC). Eads Street has one lane in each direction between the south parking lot and Army Navy Drive. During the peak AM and PM periods, Eads Street is restricted to HOV and bus traffic only. An interchange on Eads Street also provides direct access to the I-395 HOV lanes.
- *Fern Street* is a four lane divided, north-south urban collector that provides direct local access to the South Parking Lot from Army Navy Drive and is the primary route utilized by non-HOV commuters.
- *Hayes Street* is a four lane, north-south urban collector that provides direct local access between Army Navy Drive and South Rotary Road. Hayes Street also provides direct access to a southbound I-395 on-ramp.
- *North and South Rotary Road* are collector roads within the Master Plan Area that form the northern and southern perimeter of the South Parking Lot. South Rotary Road provides access to the Reservation from the Washington Boulevard/Columbia Pike interchange to the east. North Rotary Road is located within the security stand-off zone that was established following the terrorist attack of September 11, 2001 and is restricted to authorized vehicles only.
- *Connector Road* extends from Eads Street and North Rotary Road across Jefferson Davis Highway to Boundary Channel Drive. Connector Road is a three lane road that provides access to Jefferson Davis Highway, the HRP, and the Boundary Channel Parking Lot.
- *Boundary Channel Drive* – is an urban collector located along the eastern margin of the Master Plan Area and provides access to the North Parking Lot from I-395 and Washington Boulevard.

## Roadway Traffic

Roadways surrounding the Master Plan Area are used by Pentagon employees/DoD personnel, tourists, the general public, and bus traffic (*Figure 3-25*), while traffic within the Master Plan Area is a function of the weekday commuter schedule. In addition, deliveries of materials to the RDF and solid waste collections occur regularly within the Master Plan Area and the surrounding vicinity.

The Virginia Department of Transportation (VDOT), in cooperation with the U.S. Department of Transportation, Federal Highway Administration (FHWA), prepared daily traffic volume estimates for the roadways in Arlington County that provide access to the Master Plan Area. The traffic volumes were provided as Annual Average Daily Traffic (AADT) estimates and published in 2012 (*Table 3-4*).

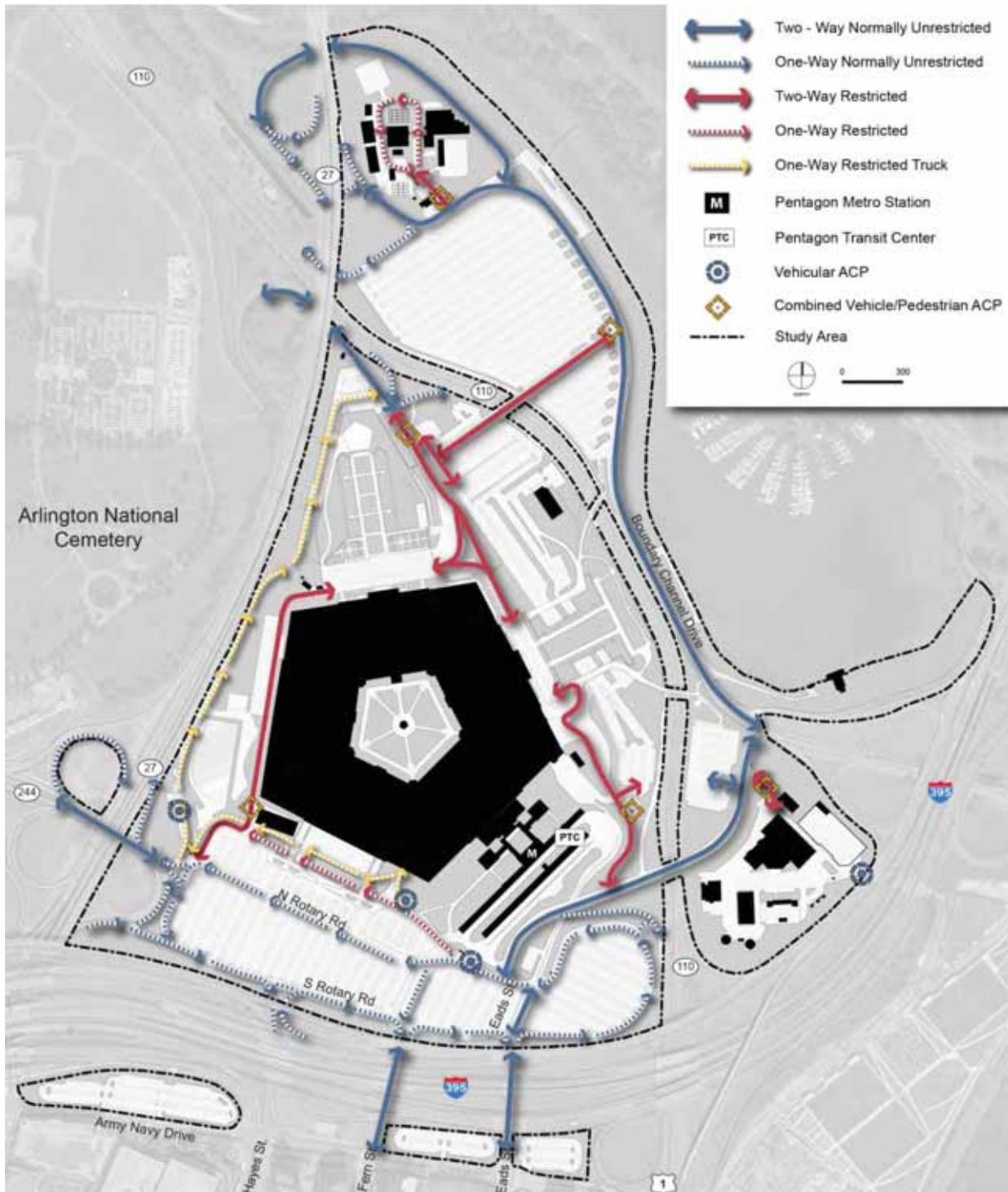


Figure 3-25: Vehicular Circulation

**Table 3-4: 2012 Average Annual Daily Traffic Volumes in the Vicinity of the Pentagon**

Roadway	2012 AADT Volume
I-395 (from Washington Boulevard to the District of Columbia)	149,000-181,000
Jefferson Davis Highway (from Washington Boulevard to U.S. Route 1)	66,000
Washington Boulevard (from Columbia Pike to Boundary Channel Drive)	55,000-57,000
GWMP (NCL Alexandria to Spout Run Parkway)	62,000
Boundary Channel Drive	11,000*
Army Navy Drive (east of Hayes Street)	7,700
Fern Street (south of Army Navy Drive)	4,900
Eads Street (south of I-395)	11,000
Hayes Street (south of I-395)	12,000
Joyce Street (from Army-Navy Drive to Columbia Pike)	14,000

Source: Virginia Department of Transportation (2012)\* Reflects 2002 data from 2005 EA

Based on current and anticipated trends, traffic volumes are anticipated to remain the same.

The traffic data listed above apply to public roadways extending across or outside of the Pentagon Master Plan Area. As a result, these roadways have the ability to affect the flow of traffic around and within the Master Plan Area; traffic within this area is largely influenced by security restrictions and the types and activities of vehicles occupying the roadways.

Pentagon commuter traffic within the Master Plan Area is divided into two major zones that are centered around the North and South Parking Lots. Independent of Pentagon commuter traffic patterns are vehicle trips associated with the RDF, HRP, and the North Village.

While Pentagon commuter traffic contributes to the level of congestion on the regional roadways in the vicinity of the Master Plan Area, Pentagon traffic is not the sole source of congestion. Accordingly, while the Pentagon population is reliant upon the regional roadways, DoD has limited control in how the roadways are managed and operated.

The effectiveness of transportation infrastructure is measured by the roadway Level-of-Service (LOS). Roadway LOS is a function of design capacity and traffic volume with a ranking that describes the operational conditions by assigning an associated letter grade of "A" (best) to "F" (worst). Generally, LOS rankings are worse during the weekday AM and PM traffic periods. Roadways with a grade designation of "E" or "F" are considered problematic, or failing, with a breakdown in vehicular flow. LOS data collected for existing Master Plan Area intersections is summarized in *Table 3-5*.

**Table 3-5: LOS for Existing Master Plan Area Intersections**

<b>Roadway</b>	<b>Peak Period LOS</b>	
	<b>AM</b>	<b>PM</b>
Ramp to northbound Washington Boulevard from Boundary Channel Drive	<b>F</b>	B
Ramps from Washington Boulevard to Boundary Channel Drive	D	B
Boundary Channel Drive and Entry Control Point 14	B	C
Jefferson Davis Highway ramps and Entry Control Point 17	A	A
Boundary Channel Drive and Connector Road		C
Connector Road and Eads Street	B	B
North Rotary Road and Connector Road	No LOS provided	
South Rotary Road and Eads Street	No LOS provided	
South Rotary Road and Fern Street	B	B
North Rotary Road and Fern Street	B	C
South Rotary Road and Hayes Street	A	A
Columbia Pike and Rotary Road	D	C
Army Navy Drive and Eads Street	C	D
Army Navy Drive and Fern Street	B	B
Army Navy Drive and Hayes Street	C	<b>E</b>
Army Navy Drive and Joyce Street	B	C
Columbia Pike and Joyce Street	B	D
North Rotary Road and Eads Street	D	D

*Source: 2014 Pentagon Transportation Management Plan*

### **Master Plan Area Access and Traffic Circulation**

Vehicles that access the Master Plan Area are generally classified into the following groups:

- Pentagon employees (parking)
- Ride-share participants
- Buses bound for the Pentagon Transit Center (PTC)
- Deliveries

The proximity of the Pentagon ride-share areas to the South Rotary Road/Fern Street intersection disrupts traffic flow. Currently, vehicles entering the Master Plan Area from Fern Street must weave across three lanes of traffic over a short segment of South Rotary Road to access the ride-share areas. Vehicles exiting the ride-share lane must then immediately cross three lanes of South Rotary Road to access the I-395 HOV ramp. In addition, vehicles waiting for ride-share individuals routinely occupy two of the three lanes, which interferes with exiting traffic and adds to the congestion.

Currently, the PTC can only be accessed from Eads Street (which serves buses from the I-395 HOV lanes and the South Parking Lot) or from Connector Road (which serves buses from Boundary Channel Drive and Route 110). Eads Street is the only exit route for the buses departing the PTC; therefore, during peak traffic periods, Eads Street is heavily congested, particularly during the morning commute.

Deliveries enter and exit the Reservation and are directed to an inspection facility before entering the RDF for loading/unloading. The Washington Boulevard/Columbia Pike interchange was reconfigured during the construction of the RDF strictly for the purpose of separating delivery trucks from the congestion associated with the commuter parking lots and directing them to an inspection facility.

The HRP is easily accessed from the I-395/Boundary Channel Drive interchange and from an under pass beneath I-395 from Long Bridge Drive. The existing North Village, located north of the North Parking Lot, is easily accessed from Washington Boulevard and Boundary Channel Drive. Vehicles using the North Parking Lot tend to remain parked within the Master Plan Area for an extended period of time (i.e. throughout the day).

Generally, traffic operations within the Master Plan Area flow smoothly except for the specific locations identified in Table 3-5 and described below:

- South Rotary Road/Eads Street Intersection: This intersection is a bottleneck as a result of heavy traffic volumes associated with the I-395 HOV lanes during the AM and PM peaks. During the PM peak, spillback from this intersection significantly impacts South Rotary Road.
- North Rotary Road: Since the terrorist attack on September 11, 2001, this roadway has been modified with only a limited section open to DoD buses and parking lot circulation. The lack of access to North Rotary Road contributes to congestion on South Rotary Road.
- Columbia Pike and the RDF Intersection: During the AM peak period, the truck arrival rate to the RDF is high which results in congestion at the Columbia Pike/South Rotary Road intersection.
- Boundary Channel Drive and Washington Boulevard (Turning Ramps): The stop signs at the terminus of the ramp from Northbound Washington Boulevard to Boundary Channel Drive can become congested during the AM Peak.
- Boundary Channel Drive and the Connector Road (Overpass Drive): The northbound Boundary Channel Drive to westbound on the Connector Road movement is over capacity during the AM peak.
- Columbia Pike at Joyce Street: Southbound traffic is heavy during the PM peak.
- Army-Navy Drive at Hayes Street: Eastbound and northbound traffic are heavy during the PM peak.

According to the 2005 Pentagon Master Plan, the guiding factors for future traffic volumes in the Master Plan Area are: 1) the number of Pentagon employees and 2) available parking resources. The 2014 TMP indicates that neither of these factors is expected to significantly change in the immediate future; therefore, traffic volume and parking resources within the Master Plan Area are expected to remain relatively constant. In addition, the road network within the Master Plan Area is also expected to remain constant in the foreseeable future, with few changes.

### 3.3.2 Parking

Parking resources within the Master Plan Area are primarily divided into the North Parking Lot and the South Parking Lot, with a number of smaller parking areas located within the Reservation. The parking resources in the Master Plan Area are grouped by zones geographically in *Figure 3-26*. All Pentagon parking areas are surface lots. According to the 2014 Parking Map, the Pentagon Reservation maintains approximately 8,494 employee parking spaces creating a 2.7:1 ratio of employees to parking spaces (based on an approximate Pentagon employee population of 23,000).

The two main employee parking lots are the North and South Parking Lots. Both lots are restricted to individuals with Pentagon parking permits.

A reduced number of parking spaces is expected within the Master Plan Area with the implementation of the 2014 Master Plan Update.

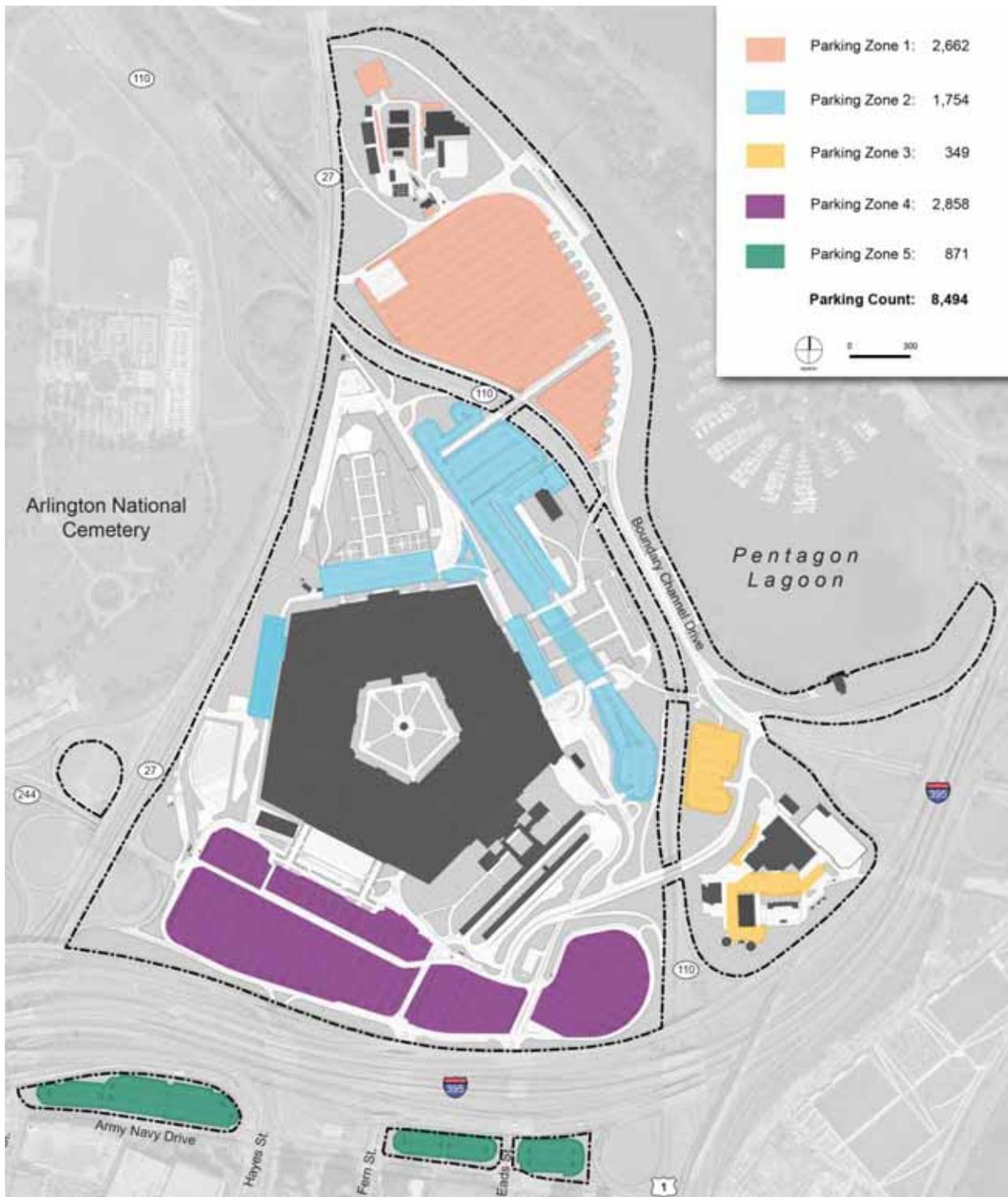


Figure 3-26: Pentagon Reservation Parking Spaces

### 3.3.3 Public Transportation

The Pentagon Reservation serves as a major regional intermodal transfer point through the Pentagon Transit Center (PTC), which is located outside of Pentagon Building Corridors 1 and 10 on the southeastern side of the Pentagon. The PTC consists of upper and lower bus bays that accommodate regional bus services throughout the metropolitan region. In addition, the PTC provides access to the Washington Metropolitan Area Transit Authority's (WMATA) Metrorail (Metro) Yellow and Blue lines.

#### Bus Service

The PTC serves as a major intermodal transfer point for six regional bus services including:

- WMATA Metrobus
- Fairfax Connector
- Alexandria Transit (DASH)
- Potomac and Rappahannock Transit Company (PRTC)/OmniRide
- Arlington County Transit (ART)
- Loudoun County Transit

Additional transit services operating through the PTC include DoD shuttles, the Pentagon Circulator, and Martz buses (private shuttle). Average daily operations accommodate approximately 850 buses through the PTC which includes nearly 170 each during the AM and PM peak hours.

According to data collected in 2010 for the Pentagon TMP, over 19,000 peak period (6:00 am-9:00 am and 3:00 pm-6:00 pm) bus passengers pass through the PTC daily, of which over 7,700 passengers occur during the peak AM and PM hours (7:45 am-8:45 am and 4:00 pm-5 pm).

Since the terrorist attack of September 11, 2001, bus traffic enters and exits the PTC from Eads Street. The bus layover lane at the PTC enables bus traffic to avoid waiting at the loading bays during their scheduled recovery time.

The Pentagon Circulator provides shuttle service every twenty minutes from 6:00 am to 6:00 pm for all Pentagon personnel. The Circulator loads/unloads at the PTC and stops at five locations including: three in the North Parking Lot, the Pentagon Library and Conference Center, and Connector Road (Boundary Channel Parking Lot). All other bus services travel to destinations outside of the Master Plan Area.

Public tours of the Pentagon are offered and commonly conducted for large groups that use a charter tour bus service as a means of transportation to/from the Pentagon. Furthermore, the Pentagon 9/11 Memorial attracts tourists that visit the Reservation through a charter tour bus service. Charter tour buses are not allowed access to the PTC for loading/unloading, but rather currently have designated parking near the intersection of South Rotary Road and Eads Street. Up to 6 tour buses can be accommodated, and the number of buses using the area may vary seasonally.

## **Ride Sharing**

Formal ride-sharing consists of designated vanpools and/or carpools for Pentagon employees. Informal ride-sharing consists of Pentagon employees arbitrarily picking up fellow employees and/or members of the public who require transportation (i.e., “slugging”) in order to have enough passengers in the vehicle to use high occupancy vehicle (HOV) lanes. Dedicated ride-share pick-up and drop-off areas are located at the north side of the South Parking Lot and on Fern Street between North Rotary Road and South Rotary Road. Drivers primarily drop off and pick up ride-share riders during the weekday HOV restriction periods of 6:00 am to 9:00 am and 3:30 pm to 6:00 pm.

In addition to ride-sharing, commercial taxicabs provide transport to and from the Pentagon. A taxi stand is located in the South Parking Lot on Eads Street north of Rotary Road.

## **Metrorail**

According to 2013 data prepared by WMATA, approximately 16,000 people use the Pentagon Metrorail Station on an average weekday with over 200 stops collectively occurring between the Yellow and Blue Lines during the peak periods of 5:00 am to 9:30 am and 3:00 pm to 7:00 pm. Within this timeframe, historical data indicate the peak ridership hours are 7:30-8:30 am and 5:00-6:00 pm.

Beginning in January 2011, WMATA launched the first phase of the Blue/Yellow Line Service Realignment with the intention of: 1) addressing peak period crowding and service reliability at the Rosslyn Metrorail Station, 2) realigning service to better match the changing ridership market, and 3) transitioning to include the future Dulles Rail expansion. Phase two was implemented in the Spring of 2012, after which activation of the realignment plan (phase three) occurred in the Summer of 2012. As a result, the potential impact to Pentagon Metrorail Station users included an increase in travel time of up to six minutes; however, a larger percentage of customers on connecting routes have experienced a decrease in travel time with a synchronous decrease in the number of passengers per car, as projected by previous WMATA studies.

### **3.3.4 Pedestrian/Bicycle Circulation**

#### **Pedestrian Circulation**

Whether commuting by automobile, public transit, or ridesharing, all Pentagon employees are pedestrians at some time of their morning or afternoon/evening commute. Pedestrian movement within the Master Plan Area is concentrated around the PTC and South Parking Lot, with North Parking Lot pedestrians accessing the Pentagon by the North Parking Connector Bridge over Jefferson Davis Highway (which is shared with vehicular traffic) and Boundary Channel Parking Lot pedestrians accessing the River Entrance using the pedestrian bridge over Jefferson Davis Highway. The main pedestrian entrances to the Pentagon are located on the east side (River Entrance), southeast side (Metro Entrance), and southwest side (South Parking Entrance) (*Figure 3-26*).

Pedestrian movement into the Master Plan Area is limited by I-395, Washington Boulevard, Boundary Channel and the Pentagon Lagoon; however, pedestrian access to the Master Plan Area can be gained from sidewalks at specific points along the northern, eastern and southern boundaries. The main pedestrian corridors within the Master Plan Area include:

- To/from North Rotary Road
- Along North Rotary Road between Fern Avenue and Eads Street
- To/from south parking area across Eads Street
- To/from North Parking to Corridor 8
- Along Boundary Channel Drive
- Pedestrian tunnel to/from Army-Navy Drive
- To/from the North Parking Lot across the North Parking Connector Bridge
- Fern Avenue to/from Army-Navy Drive
- Eads Street to/from Army-Navy Drive

Joggers also utilize the pedestrian circulation routes, particularly the pathway from the Pentagon to the North Parking Lot that links to a jogging trail crossing the Columbia Island footbridge.

### **Bicycle Circulation**

Bicycle circulation is limited to the periphery of the Pentagon Reservation. Pentagon employees arriving by bicycle in the Master Plan Area must walk their bicycles to designated storage areas located outside of the Pentagon Building.

Bicyclists can access the northern region of the Master Plan Area by crossing the Columbia Island footbridge to the North Parking Lot area. From the south, bicyclists can access the Master Plan Area from any of the roadways utilized by vehicular traffic in addition to the pedestrian tunnel that extends beneath I-395 from the Hayes Street Parking Lot (*Figure 3-27*).

The primary means of bicycle approach to the Pentagon Reservation is by way of Washington Boulevard, Old Jefferson Davis Highway, and the Mount Vernon Trail, which connect to the surrounding area by a network of shared use trails, signed on-street bicycle routes, designated bicycle lanes, and other recommended on-street routes. Beyond Washington Boulevard and Old Jefferson Davis Highway, a complex network of bicycle-friendly routes allow for bicycle circulation in the general vicinity of the Master Plan Area. Shared use trails that connect to the three (3) bridges adjacent to the Pentagon Reservation (Theodore Roosevelt Memorial Bridge, Arlington Memorial Bridge, and George Mason Memorial Bridge) allow for access from the opposite shore of the Potomac River. A number of crossings designated by Arlington County are present in the vicinity of the bridges (excepting the Theodore Roosevelt Memorial Bridge and the George Mason Memorial Bridge) but require rider discretion for proper traffic safety. An informal path from the paved multi-use trail extending from the Humpback Bridge along the Pentagon Lagoon extends from the end of the paved path to Boundary Channel Drive.

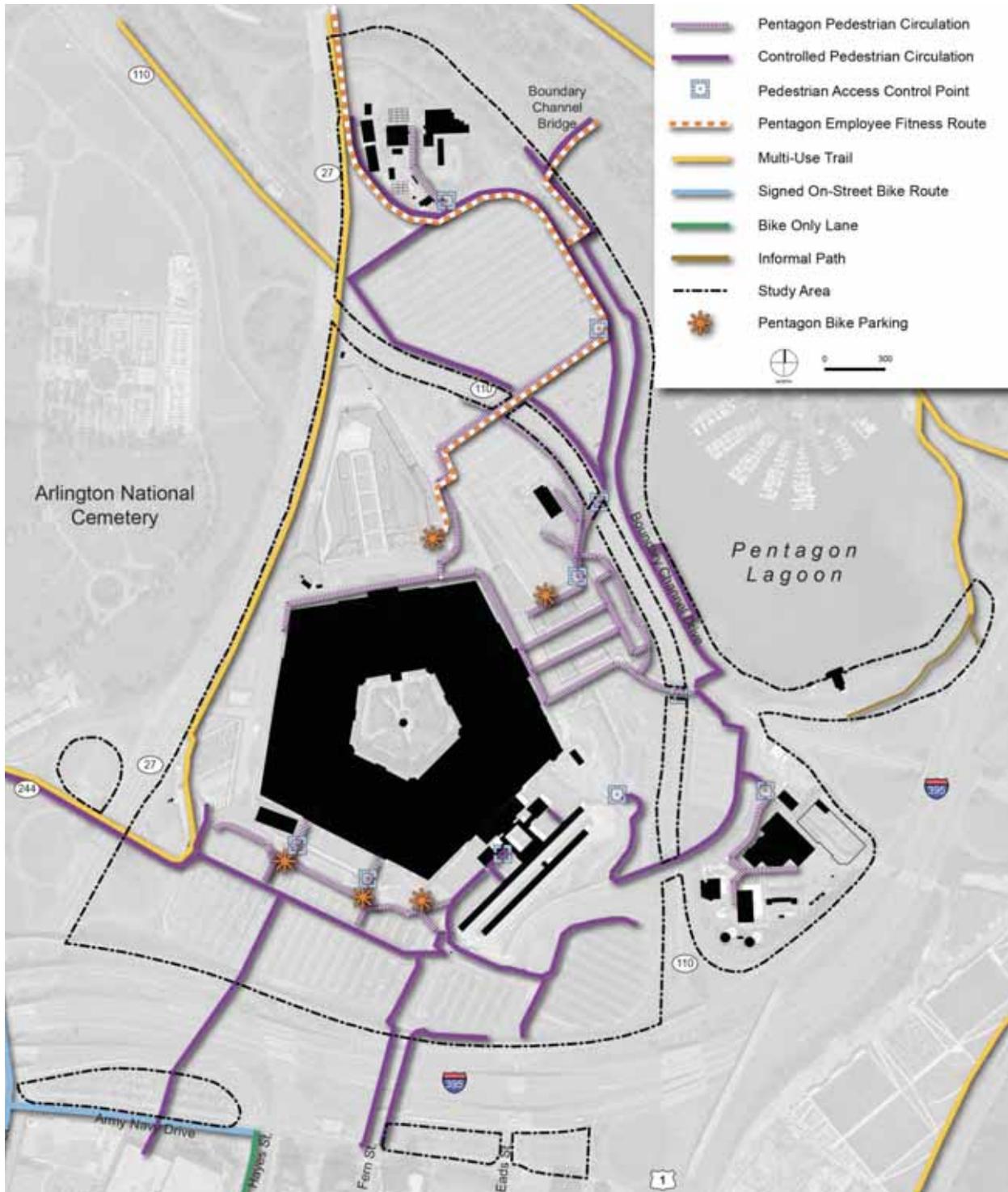


Figure 3-27: Pedestrian & Bicycle Circulation

### **3.3.5 Air Transportation**

The Pentagon helipad accommodates helicopters that provide senior-level DoD personnel with secure, expedited transportation between the Pentagon Reservation and other secure area DoD facilities, as well as emergency evacuation services. The helipad, which moved from the west side of the Pentagon following the terrorist attack on the Pentagon on September 11, 2001, is located on the David O. Cooke Terrace along the northwestern border of the Master Plan Area near Route 27.

Operations at the helipad are supported by a small air traffic control tower and fire station, which are located approximately 700 feet southwest of the helipad. These facilities were built after the September 11, 2001 attack and were intended to be temporary structures until permanent facilities could be built. After 12 years of service the tower and fire station have outlived their useful operational life. In addition, although the location of the fire station satisfies the required one-minute response time to the helipad, other operational deficiencies such as inadequate interior space are present at the facilities.

The Master Plan Area is located 2,800 feet north of Ronald Reagan National Airport's Runway 15/33 and 3,800 feet north of Runway 19/01. Helipad control and helicopter pilots communicate with the FAA Control Tower at Reagan National Airport to coordinate operations.

## 3.4 Physical and Biological Resources

### 3.4.1 Geology, Topography and Soils

#### Geology

The Master Plan Area is located within the Coastal Plain Physiographic Province approximately three miles east of the Fall Line, which is the boundary separating the Coastal Plain from the westward Piedmont Physiographic Province. The underlying geology includes the Quaternary sedimentary units of the Shirley Formation and the Cretaceous sedimentary units of the Potomac Formation. Both formations are overlain by up to 27 feet of recent alluvial deposits that are in turn overlain by an additional 15 to 25 feet of man-made fill material. As a result, studies have shown that depth to consolidated bedrock varies from 30 feet below the ground surface in the northern region of the Master Plan Area to 40 feet below the ground surface in the southeastern region to over 50 feet below the ground surface toward the center of the Master Plan Area (Darton 1950). No significant geologic features are evident or have been identified within the Pentagon Reservation.

#### Topography

The Master Plan Area is located within a topographic bowl that is defined by the Arlington Hills, the Florida Avenue Escarpment, the Anacostia Hills and the Potomac River Plains. The general landforms of the Master Plan Area have been identified as lowlands, which are nearly level floodplains and valley bottoms. The topography of the Master Plan Area has been previously altered from its natural state, especially during the construction of the Pentagon from 1941 to 1943, when the entire site was built-up with fill material. Overall, the landform of the Master Plan Area gently slopes toward the east to the Potomac River. Topography extends from approximately 40 feet above mean sea level at the western boundary of the Master Plan Area to mean sea level at the Boundary Channel/Pentagon Lagoon.

#### Soils

As described in the 2005 Master Plan EA (WHS 2005) and additional resource data, the soils of the Master Plan Area are a mixture of alluvium from Potomac River flooding and various fill material, including river bottom sediments dredged from the Potomac River. The native alluvial layer was covered by approximately 15-25 feet of fill material during construction of the Pentagon. Subsequently, the site was extensively disturbed during the construction of the Metrorail subway system in the 1970's.

Approximately 67 percent of the soils within the Master Plan Area are currently covered by structures or pavement. The soils not covered by impervious surfaces are well vegetated by landscape grasses, shrubs and trees, making them less susceptible to erosion. None of the soils of the Master Plan Area are classified as prime or unique farmland (*Figure 3-28*).

The Soil Survey of Arlington County (USDA-NRCS 2007) characterizes the soils beneath the Pentagon as a complex of Urban Land-Udorthents with two to fifteen percent slopes. Urban Land consists of areas covered by impervious material such as roads, commercial/industrial buildings, schools, parking lots, streets and/or shopping centers. Udorthents are disturbed, deep to very deep, well drained or somewhat excessively drained, nearly level to very steep, loamy and clayey soils that mainly occur on the summits and side slopes of upland areas. Udorthents commonly consist of soil material that was cut and filled during road or building construction. Because of their variability, onsite investigation is needed to determine suitability for specific uses.

Geotechnical investigations (Brown 2009) produced site specific data for the Boundary Channel Parking Lot and the North Parking Lot. The subsurface materials encountered included fill material mixed with previously disturbed soils that collectively cover a broad range of textures and densities and are occasionally mixed with crushed concrete. The underlying fill material was determined to vary in thickness to a maximum depth of 27.5 feet below surface grade where measureable; however, geotechnical drilling operations were not able to be completed as refusals (obstacles) were encountered in 50 percent of the boreholes. The report concluded that lightly-loaded structures could be supported with reinforced concrete footings bearing on the underlying fill material. However, the report further concluded that soft or loose soils could be encountered at the footing depth(s), which would require removal and replacement with well- compacted fill material.

### **3.4.2 Water Resources**

Because of the Pentagon Reservation's proximity to the Potomac River (*Figure 3-28*), it is subject to a variety of water-related regulations ranging from erosion control to coastal zone management. The Pentagon Reservation's surface waters, stormwater, floodplains, wetlands, groundwater, and coastal zone are discussed in the following subsections.

#### **Surface Water and Stormwater**

##### **Regulatory Overview**

The principal Federal laws protecting water quality are the Clean Water Act and the Safe Drinking Water Act. Congress also passed the Water Quality Act of 1987 to address the excessive levels of toxic pollutants still found in some waters. The Clean Water Act, originally known as the Federal Water Pollution Control Act Amendment of 1972, was amended in 1977 and became commonly known as the Clean Water Act. The Clean Water Act protects surface water quality and preserves wetlands, discussed separately below. Section 402 of the Clean Water Act establishes the National Pollutant Discharge Elimination System (NPDES) permit program, which gives the U.S. Environmental Protection Agency (USEPA) the authority to limit the discharge of pollutants into navigable waters of the United States through a combination of requirements, including technology-based and water-quality-based effluent limitations.

Section 303(d) of the Clean Water Act requires that states develop lists of impaired waters – waters that do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The act requires that the states establish priority rankings for waters on the lists and develop total maximum daily loads (TMDLs) for these waters. A TMDL specifies the maximum amount of the pollutant that the water body can receive and still meet water quality standards, and allocates pollutant loadings among point and nonpoint pollutant sources. The USEPA must approve or disapprove the TMDL.

Stormwater runoff for Federal facilities is regulated in part by Section 438 of the Energy Independence and Security Act of 2007 (EISA). Section 438 requires any Federal projects with a footprint of 5,000 SF or greater to maintain or restore the predevelopment hydrology of the property (which can include the whole Pentagon Reservation) to the maximum extent technically feasible. The Unified Facilities Criteria (UFC) 3-210-10, *Low Impact Development*, directs DoD components to implement Section 438 using LID techniques.

Additional requirements for stormwater quantity, quality, and erosion and sediment control at the Pentagon Reservation are established through the Virginia Department of Environmental Quality (VDEQ) and Arlington County. VDEQ is responsible for implementing permit programs to uphold requirements established by the NPDES and the Virginia Stormwater Management Act. The Virginia Stormwater Management Program, administered by the VDEQ, is intended to protect properties and aquatic resources from damages caused by increased volume, frequency, peak rate, and water quality of stormwater runoff from developed areas through permit requirements for stormwater discharges from small municipal separate storm sewer systems and construction activities (VDEQ 2014b). The Virginia Stormwater Management Program General Permit for the Discharge of Stormwater from Small MS4s requires the implementation and enforcement of a program that controls the discharge of pollutants through the use of best management practices (BMPs). The General Permit for Discharges from Construction Activities requires the creation and implementation of a stormwater pollution prevention plan that aims to reduce pollutants in stormwater via erosion and sediment control and stormwater management measures.

The Virginia Chesapeake Bay Preservation Act requires tidewater local governments (including Arlington County) to designate and protect Chesapeake Bay Preservation Areas, which consist of resource protection areas (RPAs) and resource management areas (RMAs). RPAs are sensitive lands within a 100-foot buffer zone adjacent to streams, rivers, lakes, and wetlands. RMAs are lands that, if improperly used or developed, have a potential for causing significant water quality degradation or for diminishing the functional value of the RPA. Because of Arlington's proximity to the Potomac River, a major Bay tributary, the entire County has been designated as a Chesapeake Bay Protection Area, with lands either designated as RPAs or RMAs. RPAs include tidal and non-tidal wetlands, tidal shores, a 100-foot buffer adjacent to these wetlands and shores, and other lands determined by the Arlington County Board. Most of the Pentagon Reservation is designated as an RMA, but an RPA is designated along the Boundary Channel/Pentagon Lagoon (*Figure 3-28*).

Arlington County implements several regulatory programs that address the impacts of new development and redevelopment on water quality in accordance with the Virginia Stormwater Management Law and Regulations, including the Stormwater Detention Ordinance, the Erosion and Sediment Control Ordinance, and the Chesapeake Bay Preservation Ordinance. These programs are intended to prevent water pollution, stream channel erosion, depletion of groundwater resources, and localized flooding to protect property value and natural resources. The Stormwater Detention Ordinance requires that the peak runoff rate from new development and redevelopment be maintained close to predevelopment levels, unless a waiver is granted. The Erosion and Sediment Control Ordinance is primarily intended to minimize sediment runoff to surface waters during construction, when exposed soil is easily transported during storms. Under this ordinance, an erosion and sediment control plan must be submitted to the County prior to execution of any land-disturbing activities exceeding 2,500 SF in the RMA.

The Chesapeake Bay Preservation Ordinance of Arlington County was enacted to meet the requirements of the Virginia Chesapeake Bay Preservation Act. Development projects that propose to disturb more than 2,500 SF of land in the RMA and any land in the RPA are subject to the stormwater requirements in Section 61-10(f) of the ordinance and must submit a plan of development in accordance with Section 61-13. The plan of development must include a landscape conservation plan, a stormwater management plan, and an erosion and sediment control plan.

The Chesapeake Bay Program is a multi-governmental, interstate partnership that includes the states of Virginia, Pennsylvania, Maryland; the District of Columbia; the Chesapeake Bay Commission, a tri-state legislative body; and the USEPA, representing the Federal government; and participating advisory groups. The Chesapeake Agreements resulting from this partnership set stringent nutrient removal goals, with particular regard to nitrogen and phosphorus loading, to ensure the Bay's restoration and protection for the present and near future. Executive Order 13508, *Chesapeake Bay Protection and Restoration* (12 May 2009), directs Federal facilities to lead the effort to restore and protect the Chesapeake Bay by strengthening stormwater management practices on Federal lands within the Chesapeake Bay watershed and to develop stormwater management best practices guidelines.

Under requirements set forth in Executive Order 13508, USEPA established the Chesapeake Bay TMDL in December 2010. The TMDL "pollution diet" sets Bay watershed limits, or allocations, on three criteria pollutants – nitrogen, phosphorous, and sediment – and is designed to ensure that all pollution control measures needed to fully restore the bay and its tidal rivers are in place by 2025, with at least 60 percent of the actions completed by 2017.

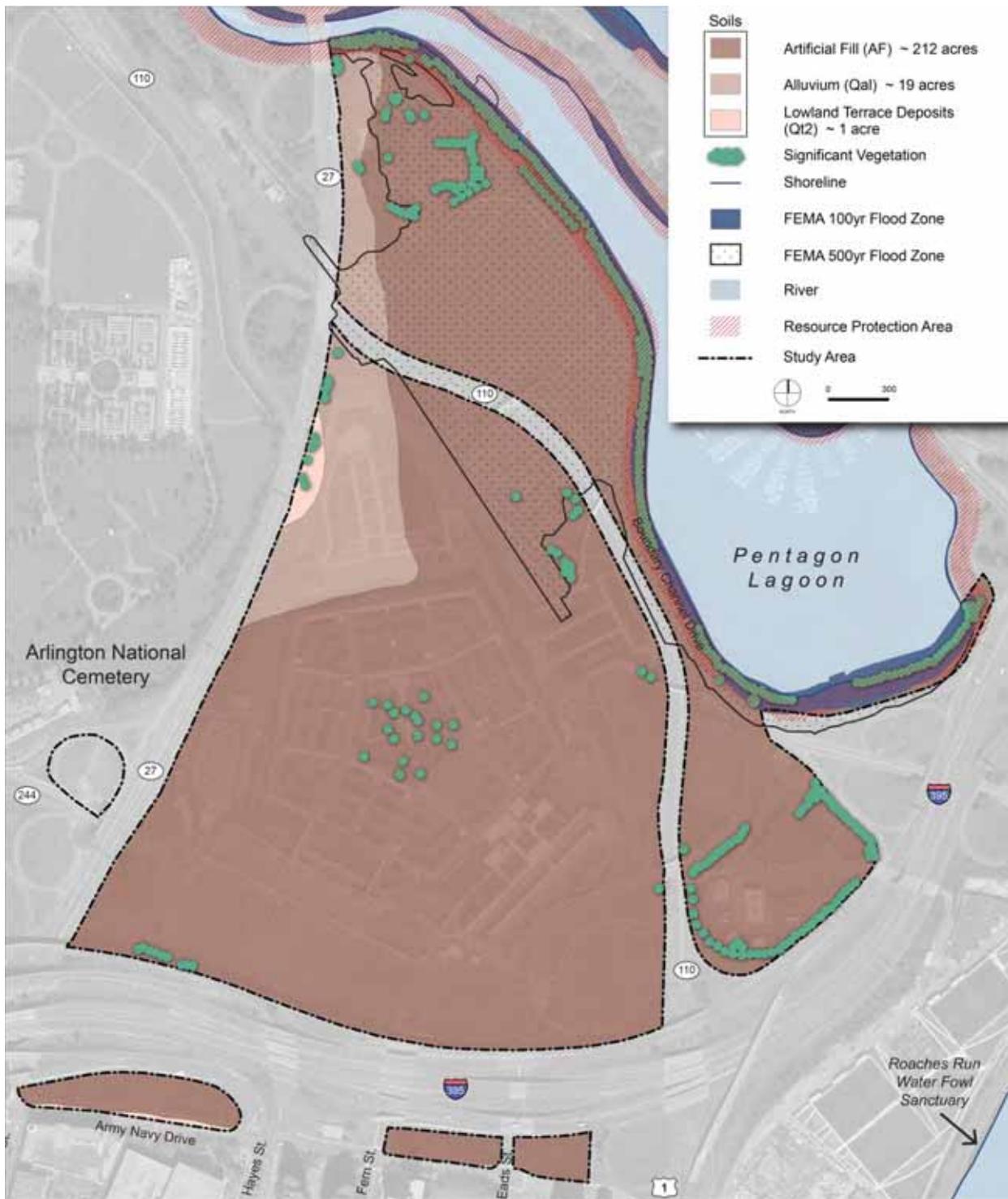


Figure 3-28: Soils and Water Resources\*

\*Note that all areas outside of the Resource Protection Area are within the Resource Management Area.

## Surface Water

While there are no permanent natural or artificial surface water bodies within the Master Plan Area, surface waters – the Boundary Channel and Pentagon Lagoon (*Figure 3-28*) – form the eastern and northeastern boundaries of the Pentagon Reservation. Columbia Island (now Lady Bird Johnson Memorial Park) was created in 1924 when the U.S. Army Corps of Engineers dredged the Potomac River navigational channel and side-cast the spoils to the west. What became known as the Pentagon Lagoon and the Boundary Channel were formed by the creation of Columbia Island. During the construction of the Pentagon, the Boundary Channel/Pentagon Lagoon was enlarged as a result of dredging, and Roaches Run and another stream were filled.

Together, the Pentagon Lagoon to the south and the Boundary Channel to the north form a contiguous water body encompassing approximately 57 acres; they are under the jurisdiction of the National Park Service as part of the George Washington Memorial Parkway park system. They are connected to the Potomac River by narrow inlets at the northern and southern ends of Columbia Island; otherwise, the island effectively serves as a barrier between the Potomac River and the Boundary Channel/Pentagon Lagoon. Water is drawn from the Boundary Channel/Pentagon Lagoon to irrigate some of the Pentagon Reservation's vegetated areas, although not for use as potable water.

A portion of Arlington County's designated RPA adjacent to the Boundary Channel/Pentagon Lagoon is included in the Master Plan Area. It extends from the bridge carrying Washington Boulevard over the Boundary Channel, near the Master Plan Area's northern extent, to the entrance ramp from the GWMP onto I-395, southeast of the Pentagon Lagoon (*Figure 3-28*). This portion of the RPA totals 21 acres.

The Potomac River is located generally east of the Master Plan Area, separated from the Pentagon Reservation by the Boundary Channel/Pentagon Lagoon, and Columbia Island. The Potomac flows into the Chesapeake Bay at Point Lookout, Maryland, approximately 105 nautical miles downriver from the Pentagon Reservation. The river flows in a northwest to southeast direction in the vicinity of the Pentagon Reservation and is slightly less than 0.5 mile wide between the Virginia and District of Columbia shores. This reach of the river is within the Potomac's 33-nautical mile-long tidal fresh segment. Upstream of the tidal reach, the river is used as a source of fresh water for the District of Columbia and portions of Maryland and Virginia (including Arlington County and the Pentagon).

Throughout the tidal fresh river segment, from Little Falls near Chain Bridge, past the Boundary Channel/Pentagon Lagoon to Quantico, Virginia, the water is fresh – salinity less than 0.5 parts per thousand (ppt) – except in extremely dry years with low discharge, and the net flow is seaward at all depths. The river channel is deep, and is bordered by wide, shallow margins and several shallow embayments.

The Potomac River is a major river running through the Washington, D.C. Metropolitan Area. It has been designated as an American Heritage River by the American Heritage Rivers Initiative created under Executive Order 13061, *Federal Support of Community Efforts Along American Heritage Rivers*. Any development that may affect an American Heritage River must comply with the Community Action Plan for that river. The Plan for the Potomac River has three goals: continued improvement of water quality, promotion of the region's historical heritage and recreational opportunities, and public involvement at the local levels. There are no national- or state-designated wild and scenic rivers in the vicinity of the Master Plan Area.

The Potomac River in the vicinity of the Pentagon is under the jurisdiction of the District of Columbia. The tidal segment of the Potomac River is affected by many sources of pollution, principally from non-point source runoff and municipal wastewater treatment plants, particularly plants in the District of Columbia, Virginia, and Maryland. The Potomac River is influenced by high fecal coliform bacteria levels (District of Columbia Department of the Environment 2008). In addition, surveys in the Potomac reveal toxics – including chlordane and polychlorinated biphenyls – in sediments and fish tissue (the manufacture and use of chlordane and polychlorinated biphenyls are prohibited, but the substances may continue to persist in the environment). Potential sources of the contaminants include active and abandoned mines and industrial facilities, urban stormwater runoff, combined sewer overflow events, and boats. However, the implementation of secondary and advanced wastewater treatment in the region has resulted in substantial improvements in water quality in the Potomac estuary.

In the District of Columbia, water quality standards are developed under the authority of the Federal Clean Water Act and the District of Columbia Water Pollution Control Act of 1984. Under the District of Columbia Water Quality Standards for Surface Waters (21 District of Columbia Municipal Regulations 11), the District has designated the following as the beneficial uses of the Potomac River in the vicinity of the Pentagon Reservation:

- Class A – Primary contact recreation.
- Class B – Secondary contact recreation and aesthetic enjoyment.
- Class C – Protection and propagation of fish, shellfish, and wildlife.
- Class D – Protection of human health related to consumption of fish and shellfish.
- Class E – Navigation.

The designated uses are protected by the application of the District's numerical and narrative water quality criteria. The Water Quality Division of the District of Columbia Department of the Environment administers the Clean Water Act and implements regulatory and planning programs to reduce the input of pollutants to the waters of the District. The long-term goal of these programs, in part, is to ensure that all streams and rivers support their designated uses.

The District of Columbia Department of the Environment (2012) has designated the Potomac River in the immediate vicinity of the Pentagon Reservation as not supporting the protection and propagation of fish, shellfish, and wildlife (Class C), and protection of human health related to consumption of fish and shellfish (Class D). Insufficient information was available to determine the river's suitability for primary contact recreation (use Class A). The cause of the river's unsuitability to support these uses is primarily attributed to elevated *E. coli* levels resulting from combined sewer overflows, discharges from municipal separate storm sewer systems, municipal point source discharges, and additional unknown sources. According to the District of Columbia Water Quality Assessment for 2012 (DDOE 2012), although water quality in the Potomac River remains impaired, combined sewer overflow improvements, and implementation of improvements and biological nutrient removal at Blue Plains Advanced Wastewater Treatment Plant – downriver from the Pentagon Reservation – have improved the water quality of the river.

## Stormwater

This section primarily addresses the regulatory requirements pertaining to the Pentagon's stormwater management system. See Section 3.5.4 for a more detailed discussion of stormwater management infrastructure on the Pentagon Reservation.

During and following rainstorms, on-site stormwater ponds on impervious surfaces and flows down-gradient as runoff towards the Boundary Channel/Pentagon Lagoon. There are no stormwater retention or detention facilities employed on-site (WHS 2005). Impervious surfaces on site include building roofs and parking lots. Of the approximately 238 acres of the Master Plan Area, 159 acres, or 67%, are impervious surfaces. The remaining 79 acres of permeable surfaces provide some stormwater absorption and assimilation, although the filled soils on site are compacted and do not drain as effectively as non-compacted soils. Similarly, saturated soils may act like impervious surfaces during high storm events because their capacity to drain is greatly reduced. In addition, the majority of vegetation types on the Reservation are not sufficient to evapotranspire.

The constituents of stormwater typically include sediment and soluble and insoluble materials from the impervious surfaces. For vehicle roadway and parking surfaces, such as those of the Pentagon Reservation, stormwater runoff would primarily include sediments; leaking fluids from vehicles such as fuel, oil, lubricants, and grease; and during the winter months, de-icing and snow removal chemicals. In the Master Plan Area, stormwater runoff is collected via a system of curbs and gutters, storm drains, and culverts. The runoff is then transported by gravity flow from catchment basins via pipeline mains to outfall pipes and is discharged directly into the Boundary Channel/Pentagon Lagoon (see Section 3.5.4). Stormwater discharges to the Channel/Lagoon drain to the Potomac River and eventually the Chesapeake Bay.

Under provisions of the Virginia Stormwater Management Act, the Pentagon Reservation's stormwater management system is considered a small, or Phase II, municipal separate storm sewer system (MS4). As defined by VDEQ, Phase II MS4s are conveyance systems operated by cities, counties, towns, and Federal, DoD, or state facilities that are not part of a publicly-owned treatment works system or combined sewer systems. Because they discharge stormwater into the "Waters of the United States," they are considered point source discharges under the Clean Water Act and the Virginia Stormwater Management Act. As such, the Pentagon Reservation's stormwater management system is regulated by the Virginia Stormwater Management Program and is operated under General Permit No. VAR040103, which was issued by VDEQ on July 1, 2013.

Under Phase II permit requirements, the Pentagon develops, implements, and enforces a program that includes the following "six minimum control measures" (VDEQ 2014a):

- Public education and outreach on stormwater impacts.
- Public involvement and participation.
- Illicit discharge detection and elimination.
- Construction site stormwater runoff control.
- Post-construction stormwater management in new development and redevelopment.
- Pollution prevention/good housekeeping for municipal operations.

Phase II MS4 programs are required to be designed and implemented to control the discharge of pollutants from their storm sewer system to the maximum extent practicable in a manner that protects the water quality in nearby streams, rivers, wetlands, and bays (VDEQ 2014a). Permitted MS4 operators may select and implement a wide variety of BMPs in order to improve the quality of stormwater discharge.

Under the conditions of its Phase II MS4 permit, the Pentagon is required to implement BMPs to achieve nutrient and sediment reductions that equate to an average reduction of 9 percent nitrogen loads, 16 percent of phosphorous loads, and 20 percent of sediment loads from impervious regulated acres, as well as 6 percent of nitrogen loads, 7.25 percent of phosphorous loads and 8.75 percent sediment loads beyond 2009 progress loads for pervious regulated acreage. These reduction levels are based on 2009 baseline quantities. As outlined in its permit, the Pentagon has three full five-year permit cycles (15 years) to implement the necessary reductions. Within 24 months of the issuance of its Phase II MS4 permit, the Pentagon is required to prepare and submit to VDEQ a Chesapeake Bay TMDL Action Plan that includes an estimate of nutrient and sediment loads discharged from existing sources; a determination of the total pollutant load reductions necessary to reduce the annual nutrient and sediment loads; and the methods (i.e., BMPs) that will be implemented to achieve the reductions. The Pentagon's Chesapeake Bay TMDL Action Plan is currently under development.

The Pentagon is authorized under its Phase II MS4 permit to review and approve development plans for projects occurring within the boundaries of its MS4. Consistent with the Pentagon's location in a Tidewater jurisdiction (Arlington County), as defined in VAC § 10.1-2101, erosion and sediment control plans must be prepared and implemented for projects involving 2,500 square feet or more of land disturbance to minimize discharges of pollutants to the MS4 during construction activities. Further, the Pentagon is authorized to inspect construction activities for compliance with these requirements and enforce corrective actions when they are not met.

### **Floodplains**

To protect important floodplain characteristics and minimize future flood damage, the National Flood Insurance Act of 1968, the Flood Disaster Act of 1973, and, in furtherance of these acts, Executive Order 11988 restrict development within the 100-year floodplain. A 100-year floodplain is defined as an area that is subject to a 1 percent or greater chance of flooding in any given year. Under Executive Order 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.

The Potomac River is subject to flooding both from freshwater flows coming downstream and tidal flows going upstream. Storm surges caused by a combination of high tides, low barometric pressure, and wind from hurricanes and major storms have historically caused more extensive flooding than downstream flows. The base flood elevation – the water surface elevation of the 1 percent annual chance flood – is 12 ft in elevation above mean sea level along the Potomac River in the vicinity of the Pentagon Reservation (FEMA 2013a and b).

FEMA's 2013 Flood Insurance Rate Maps for Arlington County indicate that the majority of the Master Plan Area, including the Pentagon Building and South Parking Lot, is located in Zone X, which is outside the 0.2 percent annual chance floodplain (the 500-year floodplain) (FEMA 2013b). Construction of the

Pentagon in 1941 resulted in the placement of fill material, which raised the elevation of the site. As a result of the raised elevation, much of the Master Plan Area is not subject to flooding.

A narrow band east of Boundary Channel Drive and adjacent to the Boundary Channel/Pentagon Lagoon is located in Flood Zone AE, which is defined by FEMA as a Special Flood Hazard Area (SFHA) "...subject to inundation by the 1 percent annual chance flood. The 1 percent annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1 percent chance of being equaled or exceeded in any given year (*Figure 3-28*). The SFHA is the area subject to flooding by the 1 percent annual chance flood" (FEMA 2013b). No development is proposed in Flood Zone AE.

The North Parking Lot, the North Village, and some areas adjacent to Flood Zone AE are located in Flood Zone X, which FEMA defines as "Areas of 0.2 percent chance annual flood (500-year flood); areas of 1 percent annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from the 1 percent chance annual flood" (FEMA 2013a).

With the exception of Flood Zone AE adjacent to the Boundary Channel/Pentagon Lagoon, which is subject to 1 percent annual chance floods, most of the Pentagon Reservation is elevated above the 1 percent annual chance flood level. Therefore, the likelihood of flooding for most of the Pentagon Reservation is very low – 0.2 percent annual chance (500-year flood) or less.

## **Wetlands**

The U.S. Environmental Protection Agency defines wetlands as areas that are inundated and saturated by surface water or groundwater frequently and long enough to support, and under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands provide important plant and wildlife habitat and serve as buffers and filters essential for maintaining the water quality of surface waters. Section 404 of the Clean Water Act establishes a permit program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands, through a combination of requirements, including technology-based and water-quality-based effluent limitations.

Wetlands exist at the edge of the Master Plan Area as lacustrine (lake) un-vegetated shore and vegetated wetlands along the western bank of the Boundary Channel/Pentagon Lagoon. The upland boundary of these wetlands has not been delineated. Wetlands are not present where the Master Plan Area is elevated behind a retaining wall along the shoreline of the Channel/Lagoon. A majority of the Channel/Lagoon banks have artificial erosion protection.

Roaches Run Waterfowl Sanctuary is a substantial wetland area encompassing 66 acres located approximately 0.25 mile southeast of the Master Plan Area. Roaches Run was created during the construction of the Mount Vernon Memorial Highway in the 1920s. The water body is bordered by commercial railroad tracks to the west, the GWMP and Gravelly Point Park to the north and east, and a wooded area to the south. A 100-foot RPA totaling approximately 21 acres surrounds Roaches Run. As part of the GWMP park system, Roaches Run Waterfowl Sanctuary is under the jurisdiction of the National Park Service (NPS 2011). Because of the risk of bird strikes by aircraft departing from and arriving at Reagan Washington National Airport, located immediately to the south, formal maintenance of Roaches Run as a waterfowl sanctuary has been discontinued.

A study of Roaches Run was conducted as part of a county-wide natural heritage resource inventory of Arlington County prepared in 2007. While the study was limited, it concluded that Roaches Run possessed a unique set of natural resources with both rare plants and rare plant communities present. The study further noted that there is a high probability that undocumented rare species remain within the wetlands. In addition, during the preparation of the study, several trees were documented and subsequently accepted as State Champion specimens (Arlington County 2007).

### **Groundwater**

In the Master Plan Area, groundwater aquifer systems exist in unconsolidated coastal plain sediments below the earth's surface. The average depth to groundwater within the area is estimated at approximately 30 feet based on previous projects on the site. Locally, underground utility tunnels and pipelines, and Metrorail tunnels under the Pentagon Reservation often act as barriers to groundwater migration within the aquifer systems, causing a rise in the water table on the up-gradient side and a lowering on the down-gradient side. This can cause a variation in the local depth to groundwater. Additionally, groundwater levels typically fluctuate with seasonal temperatures, humidity, and major rainfall events.

Groundwater recharge may potentially occur in the Master Plan Area where stormwater infiltrates permeable areas of the site, particularly within vegetated areas. Vegetated areas on the Reservation are treated with fertilizers and herbicides, and also contain rodenticide-filled bait boxes. However, impervious cover and poor soil conditions impede groundwater infiltration throughout much of the Master Plan Area.

There are no known septic tanks or associated effluent drainage fields located in the project area. There is no known existing groundwater contamination from failing sewer systems, previous pollutant spills (e.g., fuels, oils, lubricants, pesticides), or contaminated imported fill.

No withdrawals of groundwater for potable or non-potable uses occur on the Pentagon Reservation.

### 3.4.3 Coastal Zone Management

The Coastal Zone Management Act (CZMA) of 1972 (16 USC § 1451, *et seq.*, as amended) provides assistance to the states, in cooperation with Federal and local agencies, for developing land and water use programs in coastal zones. Section 307 of the CZMA stipulates that Federal projects that affect land uses, water uses, or the resources of a state's coastal zone must be consistent to the maximum extent practicable with the enforceable policies of that state's federally-approved coastal management plan.

The Virginia Coastal Zone Management Program is a network of state agencies and local governments that administers enforceable laws, regulations and policies that protect coastal resources and foster sustainable development. As the lead agency for Virginia's networked program, VDEQ helps agencies and localities develop and implement coordinated coastal policies and solve coastal management problems. The overarching goal is to protect the state's coastal resources and strengthen the coastal economy. The Virginia Coastal Zone Management Program's federally-approved enforceable policies consist of:

- **Fisheries Management:** The program stresses the conservation and enhancement of finfish and shellfish resources and the promotion of commercial and recreational fisheries to maximize food production and recreational opportunities. This program is administered by the Virginia Marine Resources Commission (VMRC) (Virginia Code §28.2-200 through §28.2-713) and the Virginia Department of Game and Inland Fisheries (VDGIF) (Virginia Code §29.1-100 through §29.1-570).
- **Subaqueous Lands Management:** The program stresses the conservation and enhancement of finfish and shellfish resources and the promotion of commercial and recreational fisheries to maximize food production and recreational opportunities. This program is administered by VMRC (Virginia Code §28.2-200 through §28.2-713) and VDGIF (Virginia Code §29.1-100 through §29.1-570).
- **Tidal and Non-tidal Wetlands Management:** The purpose of the wetlands management program is to preserve tidal wetlands, prevent their despoliation, and accommodate economic development in a manner consistent with wetlands preservation. The tidal wetlands program is administered by VMRC (Virginia Code §28.2-1301 through §28.2-1320). The Virginia Water Protection Permit program administered by VDEQ includes protection of wetlands -- both tidal and non-tidal. This program is authorized by Virginia Code §62.1-44.15.20 and §62.1-44.15-21 and the Water Quality Certification requirements of §401 of the Clean Water Act of 1972.
- **Dunes Management:** Dune protection is carried out pursuant to the Coastal Primary Sand Dune Protection Act and is intended to prevent destruction or alteration of primary dunes. This program is administered by VMRC (Virginia Code §28.2-1400 through §28.2-1420).
- **Nonpoint Source Pollution Control:** Virginia's Erosion and Sediment Control Law requires soil-disturbing projects to be designed to reduce soil erosion and to decrease inputs of chemical nutrients and sediments to the Chesapeake Bay, its tributaries, and other rivers and waters of the Commonwealth. This program is administered by VDEQ (Virginia Code §62.1-44.15:51 *et seq.*).
- **Point Source Pollution Control:** The point source program is administered by the State Water Control Board pursuant to Virginia Code §62.1-44.15. Point source pollution control is accomplished through the implementation of the National Pollutant Discharge Elimination System (NPDES) permit program established pursuant to §402 of the federal Clean Water Act

and administered in Virginia as the VPDES permit program. The Water Quality Certification requirements of §401 of the Clean Water Act of 1972 is administered under the Virginia Water Protection Permit program.

- **Shoreline Sanitation:** The purpose of this program is to regulate the installation of septic tanks, set standards concerning soil types suitable for septic tanks, and specify minimum distances that tanks must be placed away from streams, rivers, and other waters of the Commonwealth. This program is administered by the Virginia Department of Health (Virginia Code §32.1-164 through §32.1-165).
- **Air Pollution Control:** The program implements the federal Clean Air Act to provide a legally enforceable State Implementation Plan for the attainment and maintenance of the National Ambient Air Quality Standards. This program is administered by the Virginia State Air Pollution Control Board (Virginia Code §10.1-1300 through 10.1-1320).
- **Coastal Lands Management:** Coastal Lands Management is a state-local cooperative program administered by VDEQ's Water Division and 84 localities in Tidewater, Virginia established pursuant to the Chesapeake Bay Preservation Act (Virginia Code §§ 62.1-44.15:67 through 62.1-44.15:79) and Chesapeake Bay Preservation Area Designation and Management Regulations (Virginia Administrative Code 9 VAC 25-830-10 et seq.).

Virginia's designated Coastal Zone includes Arlington County. As a Federal property, the Pentagon Reservation is statutorily excluded from the CZMA's definition of the Commonwealth of Virginia's "coastal zone" (16 USC § 1453 [1]). If, however, the proposed actions would affect coastal resources or uses beyond the boundaries of the Federal property, the CZMA Section 307 Federal consistency requirement applies.

### 3.4.4 Vegetation, Wildlife, and Protected Species

#### Vegetation

The Pentagon Reservation is an urbanized area where much of the land has been disturbed and developed. A majority of the Pentagon Reservation surface (159 of 238 acres, or 67 percent) is covered by impervious surfaces, including the Pentagon Building and other structures, parking lots, and roadways. Permeable surfaces, including "green" vegetated roofs for the terraced parade/ceremonial grounds, vegetation, and other permeable surfaces cover the 79 acres of the site not covered by structures and pavement.

Most of the vegetation on the Pentagon Reservation consists of landscape plantings of tall fescue turf grass, groundcovers, and urban trees planted during the development of the Pentagon and ensuing projects. Plantings of flowering perennials and ornamental grasses border the Pentagon Memorial, which is dotted with crape myrtles – *Lagerstroemia* species. The compacted soils on the Pentagon Reservation – the result of clay and silt fill used to elevate the site – coupled with the "heat island effect" from all of the pavement and structures, make it a difficult environment for many plants to thrive. Crape myrtles, tolerant of the heat, drought, and compacted soils at the Pentagon Memorial, replaced the lacebark Maple (*Acer griseum*) varieties that were originally planted and did not fare well in this environment.

Vegetation on the Pentagon Reservation is increasingly being managed using best management practices and natural resource conservation principles to enhance the quality and health of the work environment,

benefit wildlife, reduce stormwater, and conserve water and energy. *Executive Order 13514, Federal Leadership in Environmental, Energy and Economic Performance*, mandates that agencies reduce landscaping water consumption by two percent annually. DoD Instruction 4715.3 and *Presidential Memorandum: Environmentally and Economically Beneficial Practices on Federal Grounds* reinforce the use of beneficial landscaping practices and the use of regionally native plants. Landscape BMPs include preserving historic and non-invasive trees; increasing urban and riparian tree canopy with suitable native species; increasing vegetative cover using suitable native plants; removing invasive, exotic species; restoring compacted soils by using organic matter as medium and mulch; using sustainable integrated pest management methods; using best cultural practices such as proper pruning and mowing techniques; decreasing mowed areas; decreasing shearing; allowing seed heads to remain on plants with wildlife value; restoring wetland and riparian lands, vegetation, and habitat; preserving existing habitat, including debris such as fallen trees and branches along the river; comply with all related instructions, executive orders, and laws and require contractors to do so as well.

In contrast to the landscaped nature of most of the Pentagon Reservation, a narrow band of natural vegetation winds along the shoreline of the Boundary Channel/Pentagon Lagoon. Invasive as well as native species typical of riverbanks, floodplains, and tidal hardwood swamps, are found there. Native trees present include green ash (*Fraxinus pennsylvanica*), boxelder (*Acer negundo*), silver maple (*Acer saccharinum*), red maple (*Acer rubrum*), sycamore (*Platanus occidentalis*), cottonwood (*Populus deltoides*), black gum (*Nyssa sylvatica*), and slippery elm (*Ulmus rubra*). Carolina ponsyfoot (*Dichondra carolinensis*), which is identified in state records as a county-rare species, was observed on the Reservation during a survey of vascular flora conducted in 2012.

A Riparian Restoration Plan was partially implemented in 2010 aimed at enhancing the riparian (stream bank) vegetation along the Boundary Channel/Pentagon Lagoon. The goals were to: extend plantings to 100 feet in width from mean low tide to comply with RPA requirements in response to the Chesapeake Bay Act; restore ecological diversity and density of native species in compliance with DoD Instruction 4715.3; remove invasive species; and through the enhanced plantings, retard stormwater flows, reduce sediment, and prevent petroleum products and pesticides from entering the Pentagon Lagoon and Boundary Channel, and ultimately, the Potomac River.

### **Wildlife**

While the Pentagon Reservation effectively is surrounded on several sides by parks, it is also largely cut off from them, making it difficult for wildlife – with the exception of birds – to move freely back and forth among these green spaces. Park-like Arlington National Cemetery borders the Pentagon Reservation to the west and the GWMP borders the Boundary Channel/Pentagon Lagoon to the east, but these green spaces are separated from the Pentagon Reservation by fences and multi-lane, controlled access roadways – Routes 27 and 110, respectively. I-395 to the south and southeast of the Pentagon Reservation effectively separates the Pentagon Reservation from the Roaches Run Waterfowl Sanctuary's impoundment and fringe of native vegetation.

The combination of the separation from other green spaces enforced by security fences and highways, combined with the urbanized aspect of the Pentagon Reservation, which offers only scattered cover and limited food sources for wildlife, minimizes its value as wildlife habitat. Nevertheless, species adapted to landscaped, urbanized settings – especially along a river – such as Norway rats (*Rattus norvegicus*), gray

squirrels (*Sciurus carolinensis*), voles or meadow mice, English sparrows (*Passer domesticus*), starlings (*Sturnus vulgaris*), mourning doves (*Zenaidura macroura*), pigeons (*Columba livia*), mallard ducks (*Anas platyrhynchos*), sea gulls, and Canada geese (*Branta canadensis*), occur on the Pentagon Reservation (WHS 2010). Other species observed are red foxes (*Vulpes fulva*), cottontail rabbits (*Sylvilagus floridanus*), snakes, and insects (WHS 2011).

Because birds can fly freely among the Pentagon Reservation, ANC, GWMP, and Roaches Run Waterfowl Sanctuary, utilizing the resources of each, and because the natural vegetation along the Boundary Channel/Pentagon Lagoon affords shelter and food, a number of bird species are commonly observed on the Pentagon Reservation. Species observed on the Pentagon Reservation in addition to those noted above include: American kestrel (*Falco sparverius*); American black duck (*Anas rubripes*); American crow (*Corvus brachyrhynchos*); American robin (*Turdus migratorius*); American tree sparrow (*Spizella arborea*); black-crowned night heron (*Nycticorax nycticorax*); cedar waxwing (*Bombycilla cedrorum*); double-crested cormorant (*Phalacrocorax auritus*); northern gannet (*Morus bassanus*); great blue heron (*Ardea herodias*); killdeer (*Charadrius vociferous*); mallard duck (*Anas platyrhynchos*); northern cardinal (*Cardinalis cardinalis*); red-tailed hawk (*Buteo jamaicensis*); osprey (*Pandion haliaetus*); and a variety of warblers. During spring and fall migrations, more than sixty bird species have been observed on the Pentagon Reservation (WHS 2010).

### **Protected Species**

Some of the commonly observed bird species are included by VDGIF on their “List of Known or Likely Species Candidates for Conservation within Three Miles of the Pentagon” (VDGIF 2011a). State species of concern observed on the Pentagon Reservation include bald eagle (State Threatened, very high conservation need), American black duck (very high conservation need), black-crowned night heron (high conservation need), and gray catbird (*Dumetella carolinensis*; moderate conservation need) (Herbert-Hansen, 2011). The bald eagle is protected at the Federal level by the Bald and Golden Eagle Protection Act. However, no bald eagles nest on the Pentagon Reservation, and suitable habitat for them is limited. The Virginia Bald Eagle Nest Locator tool on the website of the Center for Conservation Biology identifies two bald eagle nests located approximately three miles upriver from the Pentagon (see Appendix E) (CCB 2014). These nests may be the sources of the eagles sighted from time to time flying over the Pentagon Reservation.

The Boundary Channel/Pentagon Lagoon and the Potomac River have been designated as Anadromous Fish Use Areas by VDGIF (VDGIF 2011b). Anadromous fish, such as shad and other herring species, spend most of the year in more saline waters, but ascend the Potomac River in the spring to spawn in fresher waters. A number of agencies and groups are working to restore anadromous fish in the Potomac River.

No species listed under the Federal Endangered Species Act (ESA) have been found on the Pentagon Reservation, and no critical habitat for ESA species has been designated. Coordination with the US Fish and Wildlife Service (USFWS) and the Virginia Department of Conservation and Recreation–Division of Natural Heritage with regard to the proposed action has been conducted (see Appendix E and Appendix F, respectively).

A search of USFWS’ database indicated that habitat for two ESA-listed species, sensitive-joint vetch (*Aeschynomene virginica*) and the Atlantic Sturgeon (*Acipenser oxyrinchus*), has the potential to be present

in the vicinity of the proposed action. Sensitive-joint vetch is an annual plant in the legume family found in fresh tidal wetlands inundated daily (VDCR-DNH 2014) and is listed as threatened. No sensitive-joint vetch has been observed along the Boundary Channel/Pentagon Lagoon, the only possible habitat for it on the Pentagon Reservation. The Atlantic Sturgeon, listed as endangered, is an anadromous fish that may live to 60 years of age and spends most of its life in brackish or salt water, migrating into freshwater to spawn (USFWS 2014). As the result of a reward program for fishermen, a total of 226 Atlantic sturgeon have been reported in the Potomac River, all of them over 20 miles south of the Pentagon Reservation. There are no records of Atlantic sturgeon spawning in the Potomac River (Navy 2013).

A project review package was submitted to VDCR-Division of Natural Heritage on February 4, 2014 (Appendix F). VDGIF no longer conducts project assessments. However, the agency does provide lists of federal- and state-listed species and wildlife resources of concern to be considered as part of the USFWS submission. In addition, VDGIF will have an opportunity to review the proposed action when it is submitted to VDEQ for the federal coastal consistency determination review.

### **3.4.4 Air Quality**

Air quality is defined by ambient air concentrations of specific pollutants of concern with respect to the health and welfare of the general public. Air quality is affected by air pollutants produced by mobile sources, such as vehicular traffic, aircraft, or equipment used for construction and operational activities. In addition, it can be influenced by fixed or immobile facilities, referred to as “stationary sources.” Stationary sources can include combustion and industrial stacks and exhaust vents. Potential air quality effects on the Pentagon Reservation would occur from both construction and operational activities associated with implementation of the Master Plan Upgrade.

#### **National Ambient Air Quality Standards**

The USEPA, under the requirements of the 1970 Clean Air Act (CAA) as amended in 1977 and 1990, has established National Ambient Air Quality Standards (NAAQS) for six contaminants, referred to as criteria pollutants (40 Code of Federal Regulations [CFR] 50). These are carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), particulate matter (PM<sub>10</sub>: particles with a diameter ≤ 10 micrometers, and PM<sub>2.5</sub>: diameter ≤ 2.5 micrometers), lead (Pb), and sulfur dioxide (SO<sub>2</sub>). The NAAQS include primary and secondary standards. The primary standards were established at levels sufficient to protect public health with an adequate margin of safety. The secondary standards were established to protect the public welfare from adverse effects associated with pollutants in the ambient air. *Table 3-6* shows the primary and secondary standards.

#### **National Ambient Air Quality Standard Attainment Status**

Areas that meet the NAAQS for every criterion pollutant are designated as being “in attainment.” Areas where a criterion pollutant level exceeds the NAAQS are designated as being “nonattainment” areas. Ozone nonattainment areas are categorized based on the severity of the pollution problem – marginal, moderate, serious, severe, or extreme. Carbon Monoxide and PM<sub>10</sub> nonattainment areas are categorized as being in either “moderate” or “serious” nonattainment. A maintenance area is one that has been re-designated from nonattainment status and has an approved maintenance plan under Section 175 of the CAA. Where insufficient data exist to determine an area’s attainment status, it is designated as “unclassifiable” or “in attainment.”

The Pentagon Reservation is in Arlington County, which is within a nonattainment area for PM<sub>2.5</sub>, a moderate nonattainment area for 8-hour ozone, a maintenance area for CO, and an attainment area for all other criteria pollutants.

### **State Implementation Plan**

The CAA, as amended in 1990, mandates that state agencies adopt state implementation plans (SIPs) that target the elimination of or reduction of the severity and number of violations of the NAAQS. SIPs set forth policies to expeditiously achieve and maintain attainment of the NAAQS. The SIP currently applicable to the Virginia nonattainment area (which includes the nonattainment area within which the Pentagon is located) is the *Plan to Improve Air Quality in the Washington, DC-MD-VA Region, State Implementation Plan for 8-Hour Ozone* (MWCOG, May 23, 2007). The plan aims to improve air quality in the Washington, DC region in order to meet the eight-hour O<sub>3</sub> standard by 2009. It includes a reasonable further progress plan for 2002-2008; an attainment plan; an analysis of reasonably available control measures; an attainment demonstration; contingency plans for attainment; and mobile source budgets for 2008, 2009, and 2010.

### **Clean Air Act Conformity**

The Clean Air Act Amendments (CAAA) of 1990 expands the scope and content of the act's conformity provisions in terms of their relationship to a SIP. Under Section 176(c) of CAAA, a project is in "conformity" if it corresponds to a SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving their expeditious attainment. Conformity further requires that such activities not:

- Cause or contribute to any new violations of any standards in any area.
- Increase the frequency or severity of any existing violation of any standards in any area.
- Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The USEPA published final rules on general conformity (40 CFR Parts 51 and 93) in the Federal Register on November 30, 1993 and further updated final rules on March 24, 2010. The rules apply to Federal actions in nonattainment or maintenance areas for any of the criteria pollutants. The rules specify *de minimis* emission levels by pollutant to determine the applicability of conformity requirements for a project. In this case, the project area is located in a moderate nonattainment area for the O<sub>3</sub> standard in an O<sub>3</sub> transport region, a nonattainment area for the PM<sub>2.5</sub> standard, and a maintenance area for the CO standard. The corresponding *de minimis* emission levels are 100 tons per year (tpy) (91 metric tpy) for NO<sub>x</sub>, CO, PM<sub>2.5</sub>, and SO<sub>2</sub>; and 50 tpy (45 metric tpy) for volatile organic compound (VOC). (SO<sub>2</sub> is a precursor of PM<sub>2.5</sub>; NO<sub>x</sub> and VOC are O<sub>3</sub> precursors.)

Table 3-6: National and Virginia Ambient Air Quality Standards

Pollutant and Averaging Time	Primary Standard		Secondary Standard	
	Micrograms per Cubic Meter (µg/m3)	Parts per million (ppm)	Mircograms per Cubic Meter (µg/m3)	Parts per million (ppm)
Carbon Monoxide				
8-hour concentration	10,000 <sup>1</sup>	9 <sup>1</sup>	NA	
1-hour concentration	40,000 <sup>1</sup>	35 <sup>1</sup>	NA	
Nitrogen Dioxide				
Annual arithmetic mean	100	0.053	Same as primary	
1-hour 98 percentile over 3 Years	188	0.100	NA	
Ozone				
8-hour concentration	157 <sup>2</sup>	0.075 <sup>2</sup>	Same as primary	
Particulate Matter				
PM2.5:				
Annual arithmetic mean	12 <sup>3</sup>	-	15 <sup>3</sup>	-
24-hour maximum	35 <sup>4</sup>	-	Same as primary	
PM10:				
24-hour concentration	150 <sup>5</sup>	-	Same as primary	
Lead				
Rolling 3 month average	0.15	-	Same as primary	
Sulfur Dioxide				
3-hour concentration	-	-	1300 <sup>1</sup>	0.50 <sup>1</sup>
1-hour 99 Percentile of 1-hour daily maximum over 3 years	196	0.075	Same as primary	

Source: 40 CFR Prt 50.

Notes:

<sup>1</sup>Not to be exceeded more than once per year.

<sup>2</sup>3-year average of the 4th highest 8-hour concentration may not exceed 0.08 ppm.

<sup>3</sup>Based on 3-year average of annual averages.

<sup>4</sup>Based on 3-year average of annual 98th percentile daily values.

<sup>5</sup>Not to exceed more than once per year on average over 3 years.

NA: not available

### Stationary Sources

The USEPA oversees the programs that grant stationary source operating permits (Title V of the Clean Air Act) and new or modified major stationary source construction and operation permits. The New Source Review program requires new major stationary sources or major modifications of existing major stationary sources of pollutants to obtain permits before initiating construction. The New Source Performance Standards apply to sources emitting criteria pollutants, while the National Emission Standards for hazardous air pollutants apply to sources emitting hazardous air pollutants.

Hazardous air pollutants, also known as toxic air pollutants, are chemicals that can cause adverse effects to human health or the environment. The USEPA established a list of 188 hazardous air pollutants. The list includes substances that cause cancer, neurological, respiratory, and reproductive effects.

The Title V major source thresholds for pollutant emissions are:

- 100 tons per year for any criteria pollutant
- 25 tons per year total hazardous air pollutants
- 10 tons per year for any one hazardous air pollutant

The Pentagon Reservation is not a major source and it has a number of permitted stationary combustion sources operating with emissions limits under the VDEQ permit registration (#70030). These permitted sources include:

- HRP100
- Pentagon Incinerator Plant
- Remote Delivery Facility (RDF) generators
- FOB2 generator
- FOB2 boilers

The existing permitted operational emissions limits are summarized in Table 3-7.

**Table 3-7: Existing Permitted Emissions Limits**

Emission Source	Pollutant (tons/year)					
	VOC	NO <sub>2</sub>	CO	Total PM	PM <sub>10</sub>	SO <sub>2</sub>
HRP Boilers	5.10	32.88	38.93	5.10	5.10	25.24
Incinerators	1.10	11.40	6.30	5.70	5.70	9.50
RDF Generators	0.50	21.60	1.40	0.40	0.40	7.30
FOB2 Generator	2.10	14.20	17.50	0.80	0.80	3.80
FOB2 Boilers	--	1.77	3.11	--	--	0.13
Total Combined	8.8	81.85	67.24	12.00	12.00	45.97

The most recent actual on-Pentagon annual emissions reported in 2012 are summarized in Table 3-8. The actual emissions levels are well below the permitted emissions limits and therefore the existing stationary source operations are in compliance with the air permit emissions regulations.

**Table 3-8: Existing Permitted Emissions Limits**

Emission Source	Pollutant (tons/year)					
	VOC	NO <sub>2</sub>	CO	Total PM	PM <sub>10</sub>	SO <sub>2</sub>
Combined Sources	1.17	11.17	14.30	2.52	2.52	2.31

## Mobile Sources

The emissions from mobile sources are regulated under Title II of the Clean Air Act, which establishes emission standards that manufacturers must achieve. Therefore, unlike stationary sources, no permitting requirements exist for operating mobile sources.

## Greenhouse Gas Emissions

Greenhouse gases (GHGs) are compounds that contribute to the greenhouse effect, which is a natural phenomenon where gases trap heat within the surface-troposphere (lowest portion of the earth's atmosphere) system, causing heating at the surface of the earth. The primary long-lived GHGs directly emitted by human activities are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>).

The heating effect from these gases is considered the probable cause of the global warming observed over the last 50 years (USEPA December 7, 2009). Global warming and climate change can affect many aspects of the environment. The USEPA Administrator has recognized potential risks to public health or welfare and signed an endangerment finding regarding GHGs under Section 202(a) of the CAA (USEPA December 15, 2009), which finds that the current and projected concentrations of the six key well-mixed GHGs – CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, and SF<sub>6</sub> – in the atmosphere threaten the public health and welfare of current and future generations. To estimate global warming potential (GWP), all GWPs are expressed relative to a reference gas, CO<sub>2</sub>, which is assigned a GWP equal to 1. All six GHGs are multiplied by their GWP and the results are added to calculate the total equivalent emissions of CO<sub>2</sub> (CO<sub>2</sub>e).

The dominant GHG gas emitted is CO<sub>2</sub>, mostly from fossil fuel combustion (85.4 percent) (USEPA April 15, 2009). Weighted by GWP, CH<sub>4</sub> is the second largest component of emissions, followed by N<sub>2</sub>O. GWP-weighted emissions are presented in terms of equivalent emissions of CO<sub>2</sub> (i.e., CO<sub>2</sub>e). Furthermore, among the primary long-lived GHGs directly emitted by human activities, only CH<sub>4</sub> and N<sub>2</sub>O have the potential to be produced from fossil fuel combustion sources (USEPA April 15, 2009).

Although the USEPA final rule on Mandatory Reporting of Greenhouse Gases (October 30, 2009) provides various methodologies to estimate CO<sub>2</sub> equivalencies based on fuel test and consumption data, this rule is essentially designed for specific stationary facility reporting purposes and cannot be directly implemented in this EA to address the emissions from Master Plan Update-associated construction activities in the future. Most of the USEPA tools that are widely used for NEPA study purposes (e.g., the NONROAD emission factor model) do not provide emission factors for CO<sub>2</sub>e other than for CO<sub>2</sub>. Therefore, given the lack of regulatory tools to provide reasonable estimates of CO<sub>2</sub>e, the EA utilizes the inventory ratios among CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O summarized in the most recent USEPA inventory report (USEPA, April 15, 2009). In the inventory, it shows that the GHG contribution from CH<sub>4</sub> and N<sub>2</sub>O is less than one percent of the total CO<sub>2</sub>e for fossil fuel combustion sources. Given such small contributions from other GHG equivalents compared to the CO<sub>2</sub>, the EA predicts CO<sub>2</sub>e levels in terms of CO<sub>2</sub> levels.

This EA follows the *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas* issued by the Council of Environmental Quality (CEQ) (CEQ February 2010). The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. In keeping with CEQ guidance, the focus of the cumulative air quality GHG analysis is on GHG emissions that are affected by

the proposed action. The impact of proposed GHG emissions as they pertain to climate change is discussed in the context of the combined impacts as compared to the total amount of GHG emissions that the U.S. produces.

### 3.4.5 Noise

Noise is unwanted or objectionable sound, generally the result of a combination of loudness, pitch, and/or duration. Noise levels are usually measured and expressed in decibels (dB), which represent the amount of acoustical energy present. The A-weighted decibel scale (dBA), ranging from 0 to 180, is a logarithmic scale generally used to measure noise levels because it accounts for the sensitivity of the human ear across the frequency spectrum.

Noise is regulated legislatively and administratively at the Federal level in the following ways:

- Noise Control Act (the Act) – Congress passed the Act in 1972 because it believed that inadequately controlled noise presents a growing danger to the health and welfare of the nation's population, particularly in urban areas. The Act states "it should be the policy of the U.S. to promote an environment for all Americans free from noise that jeopardizes their health or welfare." The Act: 1) coordinated Federal research and activities in noise control, 2) authorized the establishment of Federal noise emissions standards for products distributed in commerce, and 3) provided information to the public about the noise emissions and noise reduction characteristics of such products.
- Occupational Safety and Health Administration (OSHA) – OSHA regulates workplace noise with standards for two different types of noise: constant (such as vehicular traffic) and impulsive (such as pile driving). The limit for constant noise is 90 dBA for 8 hours (29 CFR Part 1910.95). The maximum sound level for impulse noise is 140 dBA (29 CFR Part 1910.95).
- DoD Hearing Conservation Program (DoD Instruction 6055.12): This is the principal document for noise control within the DoD. This instruction aims to protect all DoD personnel from hearing loss resulting from operational and occupational noise exposure and reduce operational noise exposure to personnel to facilitate mission readiness, communication, and safety. DoD Instruction 6055.12 provides procedures, noise limitations, implementation plans, and noise protection guidelines that promote responsible and effective hearing conservation practices (DoD 2010).

Arlington County's Noise Control Ordinance (the Ordinance) establishes regulations for permissible noise sources and levels during daytime and nighttime hours for the various zoning districts throughout the county. The Ordinance also regulates mobile and stationary sources of continuous and impulsive noise. Noise generated by construction associated with implementation of the Master Plan Update would be subject to regulation under the Ordinance.

Regulations pertaining to construction-generated noise are set forth in Section 15-6(f) of the Arlington County Code (Arlington County 2011a):

- Construction activities which produce noise levels which exceed the maximum permissible noise levels for a particular zoning district shall be permitted only during the daytime. All feasible procedures shall be undertaken to minimize noise generated by construction activities.

- Noise levels from construction activities shall not exceed 90 dBA in any zoning district.
- Measurements of noise generated by construction equipment are to be taken at a minimum distance of 50 feet from the noise source.

Maximum permissible noise levels are determined by the zoning district classification of the receiving property. The Pentagon Reservation is located in the S-3A zoning district. No maximum permissible levels, as measured in dBA, are established for either continuous or impulsive noise in S-3A districts under the Ordinance (Arlington County 2011b).

When compared to ambient noise levels at a typical military administrative facility, Pentagon Reservation background noise levels are high – the result of surrounding land uses. The main contributors to the high background noise levels include:

- Aircraft taking off from and landing at Ronald Reagan Washington National Airport. Aircraft operating in the area contribute to frequent, short-term increases in ambient noise levels on the Pentagon Reservation. Reagan National Airport's main runways (Runways 1-19, oriented north-south and 15-33, oriented northwest-southeast) are located 2,800 to 3,800 feet south of the Pentagon Reservation. Planes arriving and departing to/from the north are required to follow the Potomac River corridor in the vicinity of the Pentagon. Therefore, aircraft from Reagan National Airport take off from and fly at low altitudes over or near the Pentagon, often every two minutes. Noise levels projected for 2009 over the southeastern part of the Pentagon Reservation as part of a Noise Compatibility Program for Reagan National Airport (Ricondo & Associates, 2004) averaged an acceptable, but loud, 65-70 dBA. However, individual aircraft take-offs, particularly by larger aircraft, can be considerably louder than this average.
- Military helicopters, which regularly land at, take off from, and fly over the Pentagon Reservation. Helicopters operate in the airspace over the Pentagon Reservation at very low altitudes to avoid conflicts with Reagan National Airport air traffic.
- Vehicles operating on the multi-lane highways surrounding the Pentagon Reservation – I-395 and Routes 27 and 100. Major roadways can generate noise levels up to 80-90 dBA measured within 35 feet of the roadway during peak traffic periods (by comparison, the noise level in a typical office is 50 dBA).
- Bus transit operations, particularly in the vicinity of the Pentagon Transit Center. Bus traffic contributes to locally-elevated noise levels on the southeast side of the Pentagon, especially during the morning and evening peak periods.
- To a minor extent, traffic circulating around the Pentagon Reservation, particularly during peak commuting periods.

Sensitive noise receptors are land uses and activities that experience disturbance or disruption to normal operations and functions as the result of unusually high levels of noise. Examples of sensitive noise receptors include human activities such as sleeping, convalescing, and studying, and land uses including hospitals, nursing homes, libraries, educational facilities, hotels, and motels. Wildlife habitat, especially breeding or nesting areas for noise-sensitive animal species, may also be considered a sensitive noise receptor. Commercial, industrial, and office (such as the Pentagon Building) land uses are not considered to be sensitive noise receptors.

As a place commemorating a solemn and historic event, the Pentagon 9/11 Memorial represents the only sensitive noise receptor within the Master Plan Area. Noise levels at the site are influenced by the adjacent Route 27; a noise wall reduces but does not eliminate traffic noise.

The Pentagon Reservation is primarily occupied by office and parking uses with a small amount of light-industrial use. There is no habitat for noise-sensitive wildlife on the Pentagon Reservation; species particularly sensitive to disturbance from excess noise are not present in the Master Plan Area.

Potential sensitive noise receptors in the vicinity of the Master Plan area consist of medium- and high-density residential uses located south of I-395 in the Pentagon City area of Arlington County, and Arlington National Cemetery. Other sensitive uses that could be affected temporarily by activities resulting from implementation of the Master Plan Update include residences, schools, libraries, hospitals, nursing homes, and similar uses along roads that could experience increased volumes of construction-generated vehicular traffic.

## 3.5 Utilities and Infrastructure

### 3.5.1 Potable Water

The Potomac River is the source of potable water for the Pentagon Reservation, including the Master Plan Area. Water is drawn from the Potomac River at Great Falls and directed to the Dalecarlia Water Treatment Plant (WTP), located north of the Pentagon near the District of Columbia-Maryland boundary line. A 30-inch diameter primary water main connects the WTP with the Pentagon; this water main was constructed by the U.S. Army Corps of Engineers (USACE) in 1941 during the construction of the Pentagon and is separate from the Arlington County water supply system. The 30-inch diameter main splits into a 24-inch diameter main that trends along the western edge of the Pentagon Reservation and a 16-inch diameter main that extends along the eastern face of the Pentagon. The water mains reconnect in the South Parking Lot and feed a 24-inch diameter main that continues southward to serve Ronald Reagan National Airport with a 16-inch diameter main.

The potable water distribution system for the Pentagon Reservation continues to be maintained and operated by the USACE.

### 3.5.2 Energy Systems

The Master Plan Area is served by a system of underground and aboveground utilities including natural gas, electricity, diesel fuel, steam, chilled water, and condenser water.

#### **Natural Gas**

The Pentagon Reservation receives natural gas from Washington Gas Company through a 12-inch diameter high-pressure force main located along Columbia Pike. The gas main extends along the south side of the Pentagon Reservation and crosses I-395 at the Fern Street underpass near the HRP. A 12-inch diameter service line extends from the gas main to the HRP, which utilizes natural gas as the primary fuel to produce saturated steam. A 2-inch diameter service line likewise extends to the Incinerator Building.

#### **Electricity**

The Pentagon Reservation receives electrical power from Dominion Virginia Power Company through a subgrade high voltage service feed encased in a duct bank that extends across the North Parking Lot to the HRP. Two substations are located in the southeastern corner of the Pentagon Reservation near the HRP. From the HRP, both overhead and underground service lines extend across the Master Plan Area with service mains extending parallel to the main roads. Emergency electrical power is currently supplied to Pentagon facilities by a series of diesel-powered generators located across the Pentagon Reservation.

#### **Steam and Chilled Water**

The Pentagon receives steam and chilled water for heating and cooling purposes from the HRP, which is located in the southeastern corner of the Master Plan Area. Steam and condensate return and chilled water piping connect the HRP to the Pentagon through an underground tunnel that extends across the southeastern area of the Pentagon Reservation.

## Condenser Water

The Pentagon HRP receives condenser water from a network of underground piping from a raw water intake/lift station structure at the Pentagon Lagoon. Water is returned to the Pentagon Lagoon in a piping network from the HRP.

### 3.5.3 Telecommunications Systems

The Pentagon has a complex telecommunications system consisting of approximately 20,000 circuits. An underground trunk line containing these circuits enters the eastern side of the Pentagon from the east.

### 3.5.4 Stormwater Management System

#### Stormwater Management

The Pentagon is considered a small, or Phase II, MS4, and is authorized to discharge stormwater under General Permit No. VAR 040103, which was issued by the VDEQ on July 1, 2013. A discussion of the MS4 permit's regulatory requirements is included in Section 3.4.2. The following paragraphs describe the physical stormwater management system on the Pentagon Reservation.

The surficial drainage patterns of the Master Plan Area were altered from their natural state with the development of the Pentagon Reservation. The Master Plan Area encompasses approximately 238 acres, of which approximately 67 percent is covered by impervious surfaces, including parking lots, structures, roadways and sidewalks.

Within the Master Plan Area, stormwater runoff from impervious surfaces, and on occasion from saturated soils under heavy storm conditions, occurs as overland sheet flow that drains via gravity to stormwater catchment areas. Drop inlets located within the stormwater catchment areas drain into subgrade storm sewer piping that collects, directs and discharges untreated stormwater runoff into the Boundary Channel/Pentagon Lagoon. Stormwater from two significant drainage areas east of the Pentagon Reservation (westward drainage portions of the adjacent ANC and the adjacent property formerly housing the FOB2 along Columbia Pike) are conveyed in a network of stormwater piping that is combined with Pentagon Reservation drainage prior to offsite discharge into receiving streams.

Stormwater management occurs across four primary drainage areas located either on or in immediate proximity to the Pentagon Reservation. Each area is referenced by its outfall point as detailed below:

- Outfall # 1 - This drainage area collects stormwater from the northern portion of the North Parking Lot, the Mall Terrace area, and the North Village area and drains into a pipeline that discharges into Boundary Channel near the pedestrian bridge to Lady Bird Johnson Park.
- Outfall # 2 - This drainage area conveys ANC off-site drainage and collects runoff from the Mall Terrace Parking Lot, the garden area over the Pentagon Athletic complex, the southern portion of the North Parking Lot, and the northern and western sides of the Pentagon with discharge into the Pentagon Lagoon.
- Outfall # 3 - This drainage area conveys the former FOB2 off-site drainage areas and collects drainage from the, Pentagon 9/11 Memorial area, South Parking Lot, PTC, HRP, and the River Terrace Area with discharge into the Pentagon Lagoon.

- Outfall # 4 – This drainage receives the condenser water from the HRP and discharges into Roaches Run Waterfowl Sanctuary.

The maximum capacity of the Pentagon Reservation stormwater management system is not fully realized because of the low relative topographic gradients of the Master Plan Area, which does not promote complete runoff. In addition, the capacity of the storm sewer system is not fully realized because the outfalls directly discharge to either the Boundary Channel/Pentagon Lagoon or the Roaches Run Waterfowl Sanctuary, with no retention/detention.

### **3.5.5 Sanitary Sewer System**

Wastewater from the Pentagon is collected and transported by gravity flow through a subgrade sanitary sewer system to either the West Sewage Lift Station (located in the RDF parking lot or the East Sewage Lift Station located in the North Parking Lot. Sewage is pumped from the West Sewage Lift Station to the East Sewage Lift Station. All sewage from the Pentagon is pumped from the East Sewage Lift Station to Arlington County Department of Environmental Services (DES) located on Long Bridge Drive just south of the HRP. The Pentagon previously treated its wastewater on-site, but the system is presently inoperable with the exception of a holding tank that is used extremely infrequently in the event of extraordinarily high wastewater volume. Wastewater from the Arlington County DES lift station is treated to advanced secondary limits after which the treated effluent is discharged into Four Mile Run, which drains into the Potomac River and eventually the Chesapeake Bay. The Arlington County treatment plant has sufficient capacity to treat wastewater from the Pentagon Reservation and other local municipalities.

No combined storm and wastewater sewers are located within the Master Plan Area.

### **3.5.6 Solid Waste**

Solid waste is generated from the use of non-hazardous materials as a result of facility operations within the Master Plan Area. The Pentagon Reservation promotes the affirmative procurement of environmentally-preferable and energy efficient products and services which have a lesser and reduced effect on human health and the environment than their alternatives. This program likewise promotes pollution prevention through waste reduction, waste prevention, reuse, recycling, and energy efficiency in support of an energy conservation program resulting in the disposal of less material in landfills.

Custodial contractors are required to submit an environmental stewardship plan that includes a low environmental impact disposal policy (e.g., paper products containing 100 percent recovered materials and 50 percent post-consumer product). Custodial contractors are additionally required to collect and transport recycled materials to the RDF and are offered incentives for achieving recycling goals. Materials are properly sorted and transported to area recycling centers.

### **3.5.7 Hazardous Substances**

No hazardous waste sites have been identified in the Master Plan Area that require restoration under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, the Superfund Amendments and Reauthorization Act (SARA) of 1986 to CERCLA, the Resource Conservation and Recovery Act (RCRA) of 1976, or the Toxic Substances Control Act (TSCA) of 1978. Fertilizers and herbicides are applied to vegetated areas on the Reservation, and rodenticide-filled bait

boxes are used to control pest populations. Hazardous materials used on the Pentagon Reservation, such as petroleum products, pesticides, and hazardous wastes, such as used oil, are transported, stored, handled, and disposed of in accordance with state and Federal laws and regulations and DoD instructions.

The Pentagon Reservation was formerly the site of Hoover Airport and other land uses prior to construction of the Pentagon Building. Fill from the Potomac River and possibly other unknown sources was used to elevate the once-swampy site above flood level. Minute fragments of asphalt, cinders, bricks, and plastic were found in soil borings conducted for a proposed project on the Reservation in 2006 (Schnabel 2005a). For these reasons, it is possible that hazardous wastes may be encountered when soil excavation occurs on the Reservation.

## 4.0 ENVIRONMENTAL CONSEQUENCES

This chapter analyzes beneficial and adverse impacts that would result from implementing the alternatives considered in this EA. Impacts were considered for construction and the long-term operation of the proposed Master Plan Update facilities and improvements. Where the Master Plan Update alternative includes conceptual projects such as the Pentagon Memorial Visitor Education Center, site-specific information may not be available and the development is evaluated to the fullest extent possible. Further NEPA documentation and permitting will be developed as required for specific projects.

### 4.1 Socio-Economic Resources

#### 4.1.1 Land Use Patterns

##### **Alternative A – Master Plan Update Alternative**

Under Alternative A, the types of land uses within the Pentagon Reservation would not change from the existing conditions except for the elimination of the temporary construction laydown areas associated with the Pentagon renovations and replacement of temporary facilities located within compatible land use zones (such as the Helipad Control Tower/Fire Station), and new construction such as the PSOC would be accommodated within areas of similar land use. A slight increase in green space would occur due to converting some temporary construction laydown areas into green open space and by removing some surface parking. The public transportation land use would also be expanded within the Master Plan Area to provide a dedicated tour bus drop-off area with access via the I-395 pedestrian underpass. The West End Safety Upgrade would include the addition of cultural space through the installation of a pedestrian plaza to accommodate events related to the Pentagon 9/11 Memorial and to better accommodate visitors coming to see the Memorial.

There would be direct beneficial impacts on land use patterns within the Pentagon Reservation resulting from the implementation of the Master Plan. These would include: the addition of open space; the removal of some surface parking area; and the enhancement of vehicular, public transit, and pedestrian circulation.

The Master Plan Update would also have indirect positive impacts on land uses in the surrounding area. The proposed changes to the interchange at Columbia Pike would support regional land use changes and the realignment of Columbia Pike proposed by Arlington County. The realignment would allow for a contiguous land area at the new open space on the former FOB2 site.

The conversion from surface parking and temporary construction laydown space to open space along the western side of the Master Plan Area would extend the open space character established by Arlington National Cemetery into the Pentagon Reservation and surrounding the Pentagon 9/11 Memorial and proposed pedestrian plaza for the Memorial. In addition, the increase in green space within the Master Plan Area would improve the visual quality of the Reservation from surrounding land uses.

##### ***Mitigation***

No mitigation would be necessary.

## **Conclusion**

There would be beneficial impacts to land uses with the implementation of the Master Plan Update with actions to help extend open space and memorial areas within the Pentagon Reservation.

### **Alternative B – No Action Alternative**

Under the No Action Alternative, the Master Plan Update would not be implemented. As a result, there would be no impacts to land uses. The Master Plan Area would continue to be characterized by temporary facilities and surface parking areas; there would be no increase in open space.

## **4.1.2 Planning Control and Policies**

### **Alternative A – Master Plan Update Alternative**

The Master Plan Update Alternative is an update of the 2005 Master Plan. The 2005 plan addressed heightened security concerns arising from the terrorist attack of September 11, 2001, identified locations for various needed facilities, proposed sustainability strategies, and proposed improved traffic and pedestrian circulation within the Master Plan Area.

Alternative A would be generally consistent with the recommendations of NCPC's *Comprehensive Plan for the National Capital, Federal Elements*. Alternative A proposes reducing impervious surfaces within the Master Plan Area by eliminating some surface parking and utilizing LID measures to control stormwater runoff.

Alternative A would be consistent with portions of the Transportation Element. The proposed Master Plan Update includes a TMP. In the long-term, the TMP could help to increase the parking ratio from the existing ratio of 1 space per 2.7 employees to 1 space per 3.2 employees, as WHS tries to comply with NCP's 1 space per 4 employee ratio goal. The improvements to the pedestrian and bicycle circulation and the transit infrastructure under Alternative A, including the proposed Commuter Plaza and Pentagon South Pedestrian Safety Project, would also be consistent with the Transportation Element.

Since the Master Plan Update would occur on federal property, it is not subject to Arlington County's *General Land Use Plan and Zoning Policies*. Also, the Master Plan Area is not located in an area designated by the County as a Neighborhood Conservation Area. Therefore, the Master Plan Update would not have an adverse impact on the County's planning policies.

Alternative A is consistent with the Columbia Pike Initiative. The proposed realignment of Columbia Pike following demolition of the FOB2 facility was taken into consideration in the vehicular and pedestrian circulation improvements in the South Parking area recommended under Alternative A. The Pentagon Memorial Visitor Education Center is also being coordinated with the Columbia Pike Initiative.

Alternative A would reduce stormwater runoff and impacts to off-site water quality through the use of site design elements such as pervious surfaces, vegetated swales, vegetated riparian buffers and other LID measures. Therefore, Alternative A would comply with Executive Order 13508, *Chesapeake Bay Protection and Restoration*.

The proposed Master Plan Update in Alternative A would also comply with Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*. The proposed Master Plan Update

would include LEED certified buildings and water and energy efficiency techniques. Alternative A would reduce stormwater runoff through the removal of some surface parking area, the installation of pervious pavement, increased vegetation and green roofs, and other LID measures. The proposed Master Plan Update would also seek to improve pedestrian access and safety.

### ***Mitigation***

Stormwater management techniques, including a variety of LID measures, will be implemented as projects are developed to reduce stormwater runoff and impacts to off-site water quality as described in Sections 4.4.2 and 4.5.3 below, and as part of the Stormwater Quality Improvements to meet TMDL Action Plan project. By so doing, projects implemented under the Master Plan Update will comply to the maximum extent practicable with laws, regulations and guidance under the CWA, VDEQ's Stormwater Management Program, Section 438 of EISA, Executive Order 13508, *Chesapeake Bay Protection and Restoration* and Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*.

### ***Conclusion***

Overall, impacts to planning policies would be minor with beneficial impacts resulting from compliance with Executive Orders 13514 and 13508, policies contained in the *Federal Elements* that promote sustainability and non-single-occupant modes of travel, and consistency with the Columbia Pike Initiative.

### **Alternative B – No Action Alternative**

Under the No Action Alternative, the Master Plan Update would not be implemented; therefore, a TMP would not be implemented, water and energy efficiency practices would not be improved, and the proposed connection to the Columbia Pike realignment would not occur. Therefore, the No Action Alternative would not be consistent with guidelines in the plans, policies and initiatives referenced above resulting in long-term minor adverse impacts.

## **4.1.3 Demographics and Environmental Justice**

### **Alternative A – Master Plan Update Alternative**

Implementation of the Master Plan Update would not increase the residential population or directly affect demographics in the Master Plan Area. The implementation of the Master Plan Update would also not be expected to result in a substantial increase in personnel or visitors to the Pentagon Reservation. Since there are no affected communities in the study area, there would be no disproportionately high and adverse human health or environmental effects on minority or low-income populations as a result of the Master Plan Update.

### ***Mitigation***

No mitigation would be necessary.

### ***Conclusion***

There would be no impacts on environmental justice communities or residents.

**Alternative B – No Action Alternative**

Under the No Action Alternative, the Master Plan Update would not be implemented. Therefore, there would be no potential for impacts on surrounding communities.

## 4.2 Cultural Resources

### 4.2.1 Historic and Archaeological Resources

#### Methods and Assumption for Analyzing Impacts

Potential impacts to historic and archeological resources were identified and evaluated as part of the EA. As discussed in Chapter 1, a historic resources impact analysis is also being conducted separately in accordance with the Advisory Council of Historic Preservation's regulations implementing Section 106 of the National Historic Preservation Act (NHPA). The Section 106 consultation process will develop a Programmatic Agreement to establish historic preservation reviews for Master Plan projects during the design process and provide guidance on potential mitigation to avert or address any potential adverse effects to historic and archaeological resources that may arise during Master Plan implementation. For the EA, thresholds were defined to determine the intensity of impacts to historic and archaeological resources. These thresholds are as follows:

**Negligible impact** indicates that there would not be any noticeable changes to the historic or archaeological resource or its visual context.

**Minor adverse impact** indicates that there would be visible changes to the resource or its visual context, but that these changes would not diminish the property's integrity.

**Moderate adverse impact** indicates that there would be a change in one or more of the resource's character-defining features, but these changes would not diminish the property's integrity to the extent that its eligibility would be lost.

**Major adverse impact indicates** that there would be changes to character-defining features such that it could compromise the integrity of the resource to the extent that it would no longer be eligible for listing in the National Register.

In general, visual context is relevant only to above-ground historic resources. Archaeological sites are primarily impacted by ground disturbance. Once an impact occurs to an archaeological site, the effect is irreversible and permanent. Any effects to archaeological resources are assumed to have impacts only on the immediate resource and not a broader area, unless identified as otherwise in the analysis.

Both adverse and beneficial impacts may occur due to the proposed alternatives. Adverse impacts result from the disruption or loss of character-defining features or integrity for a historic resource; or for displacement of archaeological resources as a result of ground disturbing activities. Once they are identified, adverse impacts can generally be addressed and lessened through mitigation. Beneficial impacts are those that improve the condition of a historic or archaeological resource as a result of changes in patterns of use or management actions.

#### Alternative A – Master Plan Update Alternative

The first section below addresses impacts to the Pentagon National Historic Landmark (NHL) from the proposed changes associated with Alternative A; impacts to other historic resources and archaeological resources are addressed in subsequent sections.

#### *Pentagon NHL*

Exterior design standards (the *Exterior Standards Manual*) are in place that guide all future development on the Pentagon Reservation, providing a consistent, unified character for new additions that is in

keeping with the historic character of the Pentagon NHL (SBA 2009). The projects included in the Master Plan Update are expected to follow these standards. According to the Pentagon Building NHL nomination form, many features surrounding the Pentagon have “undergone extensive modification and improvement” since the period of significance; this includes circulation systems and parking, the HRP complex and wastewater treatment, former railroads, new Metrorail and transit stations, security and fencing, plantings and trees, and others (NHL Nomination 1986: 8-9). However, these incremental changes in the broader Pentagon Reservation landscape have not diminished the Pentagon’s significance.

Some of the proposed facility improvements (including the PSOC, North Village Modifications, and Helipad Control Tower/Fire Station) would be visible from within and outside of the Pentagon NHL boundary.

The Helipad Control Tower/Fire Station would replace a non-historic temporary helipad control tower and fire station with facilities that meet required standards. While the helipad would remain in the same location on the David O. Cooke Terrace deck on the RDF, the temporary control tower and fire station facilities would be replaced with a permanent building at the site of the existing temporary facility. Location and height of the facility are based on necessary requirements such as clear views of helicopter flight paths and fire response times. The control tower portion of the facility would be four stories tall, and the rest of the facility would be one story tall. While the helipad control tower/fire station location does not lie within the NHL boundary, due to its height and massing, the facility would be visible in the setting both from within and looking toward the NHL from the northwest, northeast and east, resulting in a minor adverse impact on the NHL that could potentially be mitigated through design.

The PSOC building is proposed to be located in the north end of the Pentagon Reservation at the North Village, formerly used for contractor operations, at the tip of the north parking lot, approximately 1,500 feet outside the Pentagon NHL boundary. The proposed facility would be a one-story, approximately 25,825 net square-foot building. An associated outdoor K9 area would be located south of the PSOC facility within the North Village, and would consist of three grass-surfaced fenced open spaces. . The PSOC facility would be low-scale and screened with vegetation. Due to the low profile and distance of the site from the Pentagon NHL, and the non-historic facilities already present in this location, impacts to the NHL of the PSOC and associated K9 area would be negligible.

The North Village, in addition to accommodating the PSOC and K9 area, would be reserved as an area for potential future building development past the current master planning horizon. Some existing non-historic facilities, including sewage settling tanks and temporary modular buildings would be removed and converted to open space. This would result in a minor beneficial impact to the Pentagon NHL with non-historic features removed from the setting and viewshed of the building.

The Pentagon Motor Pool would be unobtrusive as it is anticipated to use existing parking areas and would not include any new permanent structures within the APE. This project would have a negligible impact on the Pentagon NHL.

The Pentagon Electric Upgrade (East Utility Tunnel) project would install an electrical substation enclosure set partially inside an existing grassy hill at the Corridor 8 Bridge. The 10,000 SF, one-story structure would be approximately 26 feet in height. Depending on design details not yet determined, this project has the potential for moderate adverse impacts due to its adjacency to the Pentagon NHL boundary, although it is anticipated that impacts could be mitigated through the design process.

The Pentagon Power Security Upgrade project is planned to be sited at the East Loading Dock just east of the Pentagon NHL and would be underground or bermed and covered with a green roof, with a very low profile anticipated. Site specific design, size, and other appearance details have yet to be determined and would be addressed in the design process after completion of the Master Plan. Depending on design details not yet determined, this project has the potential for minor adverse impacts due to its adjacency to the Pentagon NHL boundary, although it is anticipated that impacts could be mitigated through the design process.

Two energy related Master Plan Update projects have not yet been designed, but could have an adverse impact on the Pentagon NHL depending on design development and the potential requirement to expand the footprint of the existing buildings due to potential visibility in views to or from the NHL. These utility improvements, the Cogeneration/Combined Heat and Power and Classified Waste Destruction projects, are intended to provide improved, sustainable power, heat, and classified waste disposal at the Pentagon Reservation. Neither of these facility improvements would include direct physical changes to historic resources inside the NHL. The Cogeneration/Combined Heat and Power and Classified Waste Destruction projects would be located within existing buildings in the HRP, where other existing utility functions are located. The decision to potentially expand the footprint of existing buildings would be determined during the detailed design process after completion of the Master Plan. It is anticipated that possible adverse impacts to historic resources could be addressed and mitigated during the design process.

The Pentagon Memorial Visitor Education Center project would educate visitors about the memorial and the events that took place on September 11, 2001, and is anticipated to be sited close to the Pentagon 9/11 Memorial, on the other side of Route 27. The Pentagon Memorial Fund foundation is currently raising funds for this project, and it has not yet been designed. Adverse impacts to historic resources could occur due to the planned site's visibility in views to and from the Pentagon NHL. It is anticipated that possible adverse impacts to historic resources could be addressed and mitigated during the design process.

Proposed circulation changes (South Parking Lot Reconfiguration, rideshare and transit improvements, North Parking Lot Improvements, tour bus parking, Relocate Impound Lot/MACC Trailers) would primarily involve changes within the existing footprint of paved road and parking areas, changing circulation patterns and reconfiguring parking spaces. In some areas, pedestrian circulation and safety improvements such as raised crosswalks would be added. Some circulation improvements, such as the addition of tour drop-off and pick-up in the Hayes Street Parking Lot south of I-395, would not be visible from the Pentagon NHL. Circulation improvements would not involve physical changes to historic resources. Although they would slightly alter the setting of the Pentagon Building, the Pentagon Reservation has been incrementally altered over time. Due to the small scale of the proposed changes and to the fact that the Pentagon Reservation's exterior circulation systems has changed substantially since the building's period of significance, impacts are anticipated to be negligible.

Security improvements (Sentry vehicular and pedestrian barrier/fences, controlled access points including gates, gatehouses, vehicular and pedestrian screening facilities) involve replacement of temporary security measures added after the September 11, 2001 attack and would not involve physical changes to historic resources. Some of these would be visible from the Pentagon NHL, but due to their small scale, they would have a negligible impact on historic resources.

Some site improvements may be visible from the NHL, including the Corridor 8 Exterior Bridge Canopy and Center Courtyard Stage. The scale and appearance of the canopy are not yet determined, but as it is

located outside the NHL boundary and would be designed to comply with the exterior standards; its impact on the NHL is anticipated to be negligible. The new stage in the Pentagon building courtyard would replace an existing stage and ceremonial area. Although the courtyard is a character-defining feature of the NHL, the new stage would be relatively small in scale and would replace an existing feature, supporting traditional ceremonial functions in the courtyard space. The impact of the new stage is anticipated to be negligible.

Other site improvements (Stormwater Quality Improvements, West End Safety Upgrade) involve stormwater management measures and the addition of a pedestrian plaza and other changes near the Pentagon 9/11 Memorial and other circulation-related projects. These would be visible from the Pentagon Building but would have a negligible impact due to the small scale of the proposed changes.

### ***Other Historic Resources***

Other resources in the APE could have distant views of some of the larger Master Plan Update projects. None would be physically impacted by any Master Plan Update project but there is potential for them to have distant views of the projects. None of the historic resources in the APE is defined by its views of the Pentagon, which itself was constructed in what would have been considered the historic viewsheds of resources such as Arlington House and ANC.

The PSOC and North Village Modifications would be visible from the GWMP and associated historic features such as the Humpback Bridge. These areas are already visible from the Parkway and include non-historic facilities. It is possible that these facilities and the Helipad Control Tower/Fire Station would be visible distantly from areas of Arlington National Cemetery, Arlington House, and the Air Force Memorial, although due to distance, surrounding non-historic development, and tree cover, the impact to these resources would be negligible. The Pentagon Memorial Visitor Education Center would also likely be visible from Arlington National Cemetery and the Air Force Memorial due to its adjacent location, but visibility and appearance for this facility is not yet known as it has not yet been designed. North Village modifications, which involve removal of non-historic facilities, would provide beneficial impacts due to the removal of these features from the viewshed and potential for more sensitively designed new facilities in the future.

None of the proposed new facilities would be visible from the Tomb of the Unknowns, the Virginia State Police Office (1426 Columbia Pike), or Columbia Pike.

The circulation changes and security improvements within the Pentagon Reservation would be small in scale and would not be noticeable from area historic resources except the Pentagon 9/11 Memorial and Pentagon NHL (as described above); the impact of these changes on the Pentagon 9/11 Memorial would be negligible, as the proposed changes would not alter the Memorial itself or substantially alter the character of its setting.

### ***Archaeological Resources***

The only identified archaeological resource within the Pentagon Reservation, the site of the Alexandria Canal, occupies a minimal, linear area of the APE that has already been heavily affected by cut, fill, and construction (ICRMP 2008: 20). Because the master plan is a planning-level document, utility plans and other construction details identifying specific areas of ground disturbance are not yet developed. Thus, precise identification of impacts is not possible at this time. However, given the known resources on the site, and the level of disturbance, substantial adverse impacts to archaeological resources are not anticipated and could likely be mitigated through construction monitoring.

### ***Mitigation***

Archaeological sites will be revisited as the project design is developed, and construction in these areas will be monitored by an archaeologist. A flexible, phased approach to the identification and evaluation of archaeological resources will be taken. All such work should follow the appropriate guidelines and procedures as identified in the 2008 ICRMP. In the event of an unanticipated archaeological discovery, VDHR will be notified to determine the level and type of recording or recovery, if warranted.

To the extent possible, proposed buildings and structures will be sited away from the facades of the Pentagon Building so as to minimize impacts to views of this historic structure.

All alterations at the Reservation will be undertaken in accordance with the Pentagon Reservation *Exterior Standards Manual* (SBA 2009). The height and mass of security features such as fencing and gates will be minimized in order to reduce impacts to the setting of the Pentagon and impacts to views from nearby historic resources.

Additional measures to avoid, minimize, or mitigate adverse impacts, as well as a design review process, will be identified through the on-going Section 106 process. Mitigation measures and consultation procedures for future detailed designs will be implemented in accordance with the Programmatic Agreement being developed as part of the Section 106 process.

### ***Conclusion***

Overall, the Master Plan Update's short-term and long-term impacts to historic resources are anticipated to be negligible, with a few projects (Helipad Control Tower/Fire Station, PSOC, Pentagon Power Security Upgrade) having the potential for minor adverse impacts to the Pentagon NHL. The short-term impacts of the North Village Modifications would be beneficial due to the removal of non-historic facilities, and the long-term impacts are anticipated to be negligible. The impacts to other historic and archaeological resources are anticipated to be negligible in the long- and short-term.

### **Alternative B – No Action Alternative**

Under the No Action Alternative, the Master Plan Update would not be implemented. Therefore, there would be no potential for impacts on historic or archaeological resources in the area.

## **4.2.2 Visual Resources**

### **Methods and Assumptions for Analyzing Impacts**

The study area for visual resources, as described in Section 3.2.2, provides the context for assessing visual impacts. Impacts to views and vistas are determined based on an analysis of the existing quality of the view, the sensitivity of the view (such as its relationship to important historic and cultural sites), and the relationship of the mass and scale of the proposed project to the existing visual environment.

Visual impacts in the analysis presented below are described in the following categories:

**Negligible visual impact** indicates that the proposed alterations would not result in any visual changes, or the changes would not be noticeable.

**Minor visual impact** indicates that the proposed alterations would be visible but would not interfere with views and would not change the character of existing views.

**Moderate visual impact** indicates that the proposed alterations would be visible and would interfere with existing views, but would not change the character of the existing views.

**Major visual impact** indicates that the proposed alterations would be visible as a contrasting or dominant element that interferes with views and substantially changes the character of the existing views.

**Beneficial visual impact** would occur when the proposed alterations improve a view or the visual appearance of an area.

### **Alternative A – Master Plan Update Alternative**

Under the Master Plan Update alternative, trees would be added within the north and south parking lots and along roadways, breaking up the expansive paved areas that currently exist. The green roof planned for the as-yet undesignated Pentagon Power Security Upgrade project would also maintain the vegetated area within the Reservation. The increase in vegetation on the site, and the reduction in paved areas, would result in beneficial visual impacts, as it would improve the site's visual character.

In addition to reducing the amount of paved space on the Reservation, the Master Plan would add several new buildings and structures, including the PSOC Building, the Helipad Control Tower/Fire Station, several security structures, the Pentagon Power Security Upgrade, the Pentagon Electric Upgrade, and the Cogeneration/Combined Heat and Power facility. The one-story PSOC Building is proposed for the North Village at the north end of the Reservation. In addition, the North Village Modifications would remove additional temporary structures and sewage settling tanks no longer being used in order to create open space and future developable land. This parcel is already developed with the low-scale temporary buildings and associated parking. The removal of the existing modular buildings, the construction of the PSOC building, and the potential future development sites would not substantially alter the character of the north end of the Reservation.

The Helipad Control Tower/Fire Station is proposed at the existing temporary fire station/control tower site near the northwest corner of the Pentagon Building. The tallest portion of the Helipad Control Tower/Fire Station would be approximately four stories tall, with the exact height to be determined during the design process. The tower structure would introduce a dominant visual element, partially obscuring a portion of the north façade of the Pentagon and altering views of the building from Route 27.

Additional alterations resulting from the implementation of the Master Plan would include circulation changes and the construction of perimeter fencing/barrier around the Pentagon Building, North Village, and HRP. While the circulation improvements would not appear as new dominant visual elements, the fencing/barrier would partially obscure views of the facades of the Pentagon Building from within the Reservation and diminish the open visual quality of the Reservation.

Overall, there would be moderate adverse impacts to views within the Reservation as a result of the implementation of the Master Plan Update, with beneficial impacts resulting from the reduction in paved area and increase in vegetation.

The implementation of the Master Plan would also alter views of the Reservation from adjacent roadways. Views from I-395 would include the new permanent security facilities and circulation improvements. However, these features would not obstruct views, nor would they alter the developed character of the south end of the Reservation. Although the new security fencing would be visible, it would be unlikely to interfere with views of the southern facades of the Pentagon Building due to the

elevation of the highway above the Reservation. The inclusion of trees within the South Parking lot would break up this expansive paved area. Overall, it is anticipated there would be minor adverse impacts to views from I-395 as a result of the new built features and fencing, with beneficial impacts resulting from the increased planting.

In views from Route 110 traveling south, the PSOC building would likely be partially visible through trees at the north end of the Reservation. The buildings would also be visible from Route 110 traveling north. However, this portion of the Reservation is already developed. The new perimeter fencing would obscure views of the lower portion of the Pentagon Building. However, the addition of street trees and LID measures within the North Parking Lot would serve to visually break up the expansive paved area, thereby improving views. Overall, it is anticipated that there would be minor adverse impacts to views from Route 110 due to the partial obstruction of the Pentagon Building, with beneficial impacts resulting from the increased vegetation.

With regard to views from Route 27, west of the site, the new PSOC building would be partially visible, although views from some portions of the road are blocked by a concrete wall and fencing. The Helipad Control Tower/Fire Station would appear as a vertical element from the corridor and would partially obstruct views of the Pentagon Building from Route 27. The SAL project would be visible from Route 27, but would serve as a replacement of the temporary truck canopy already in place at the site. The other improvements at the south end of the Reservation would not be visible due to the existing berms and wall along the edge of the roadway. The Pentagon Memorial Visitor Education Center is anticipated to be located near Route 27 and the Pentagon 9/11 Memorial. While it is not yet designed, it has the potential for adverse impacts to views depending on the design's appearance, scale, and massing when it is developed. Overall, impacts to views from Route 27 are anticipated to be moderate.

The implementation of the Master Plan also has the potential to impact views of the Pentagon from more distant public sites. Security fencing and the Pentagon Electric Upgrade project have the potential to be evident from the GWMP and Humpback Bridge, but would appear as low features and would not obstruct the view. Overall, it is anticipated that impacts to views from the Parkway would be minor.

In the view from Arlington House at ANC, the Pentagon Reservation is largely shielded by tree cover during the spring and summer months. Thus, the Master Plan elements are unlikely to impact this view at this time of the year. However, the PSOC building, North Village Modifications, and the Helipad Control Tower/Fire Station may be partially visible during the fall and winter months when the leaves are off the trees. However, it is not anticipated that these elements would obscure the view or would alter its character. Thus, impacts to the view from Arlington House during the fall and winter months are anticipated to be minor.

Because of its height and location, the Helipad Control Tower/Fire Station could potentially be visible from the Air Force Memorial. The facility would be partially visible from this vantage point but would have a negligible impact on the overall view of the Pentagon Building and Reservation grounds. The SAL project at the southwest corner of the Pentagon property would also be visible from the Air Force Memorial, but sensitive design of the project could allow for beneficial impacts as compared to the existing truck canopy already in place. The Pentagon Memorial Visitor Education Center has the potential for visibility from the Air Force Memorial depending on its scale, massing, and appearance, which are not yet developed.

### ***Mitigation***

All alterations at the Reservation will be undertaken in accordance with the Pentagon Reservation *Exterior Standards Manual* (SBA 2009). The height and mass of the fencing materials will be minimized in order to reduce impacts to views from adjacent roadways. To the extent possible, buildings and structures will be sited away from the facades of the Pentagon Building, so as to minimize impacts to views of this historic structure.

The choice of building materials will be of special concern for the Helipad Control Tower/Fire Station due to introduction of a new vertical element that would partially obscure views of the Pentagon Building from Route 27.

### ***Conclusion***

Overall, adverse impacts to views from within the Pentagon Reservation as a result of the implementation of the Master Plan Update would be moderate. Impacts to views from surrounding areas to the Pentagon Reservation would be minor to moderate. There would also be beneficial impacts to both views from within the Pentagon Reservation and from surrounding areas due to the increased vegetation and plantings, reduction in paved surfaces, and replacement of temporary structures with permanent structures in accordance with the *Exterior Standards Manual*.

### **Alternative B – No Action Alternative**

Under the No Action Alternative, the Master Plan would not be implemented and no impacts would occur as there would be no changes to the visual character of the Reservation or to views from surrounding areas.