FORT BELVOIR, VIRGINIA

REAL PROPERTY MASTER PLAN

INSTALLATION VISION AND DEVELOPMENT PLAN

May 2015

ATKINS

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Installation Management Command

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Preface i

Purpose

This Installation Vision and Development Plan (VDP), establishes the environmental baseline and planning framework for developing and managing real property on the Post in accordance with the Installation's mission and Real Property Vision, Goals and Objectives. It is the planning foundation for the other Master Plan documents. This VDP provides the long-term vision that ensures Fort Belvoir will remain a world-class Installation over the next century, while setting a new standard of excellence and sustainability for federal urban design and development.

The new Unified Facilities Criteria (UFC) 2-100-01 was officially signed in May 2012. Fort Belvoir's Master Plan update, based on the Army regulations (AR) 210-20, was already underway at this point. Stakeholders wanted the plan to comply with the new UFC, but also to maintain some of the elements included the AR 210-20. As such, significant portions of the new UFC have been integrated into Fort Belvoir's master plan. The chart below shows the process and products that result for the integration of UFC 2-100-01 and AR 210-20.

Figure i-1 - Installation Master Planning Process and Product Diagram

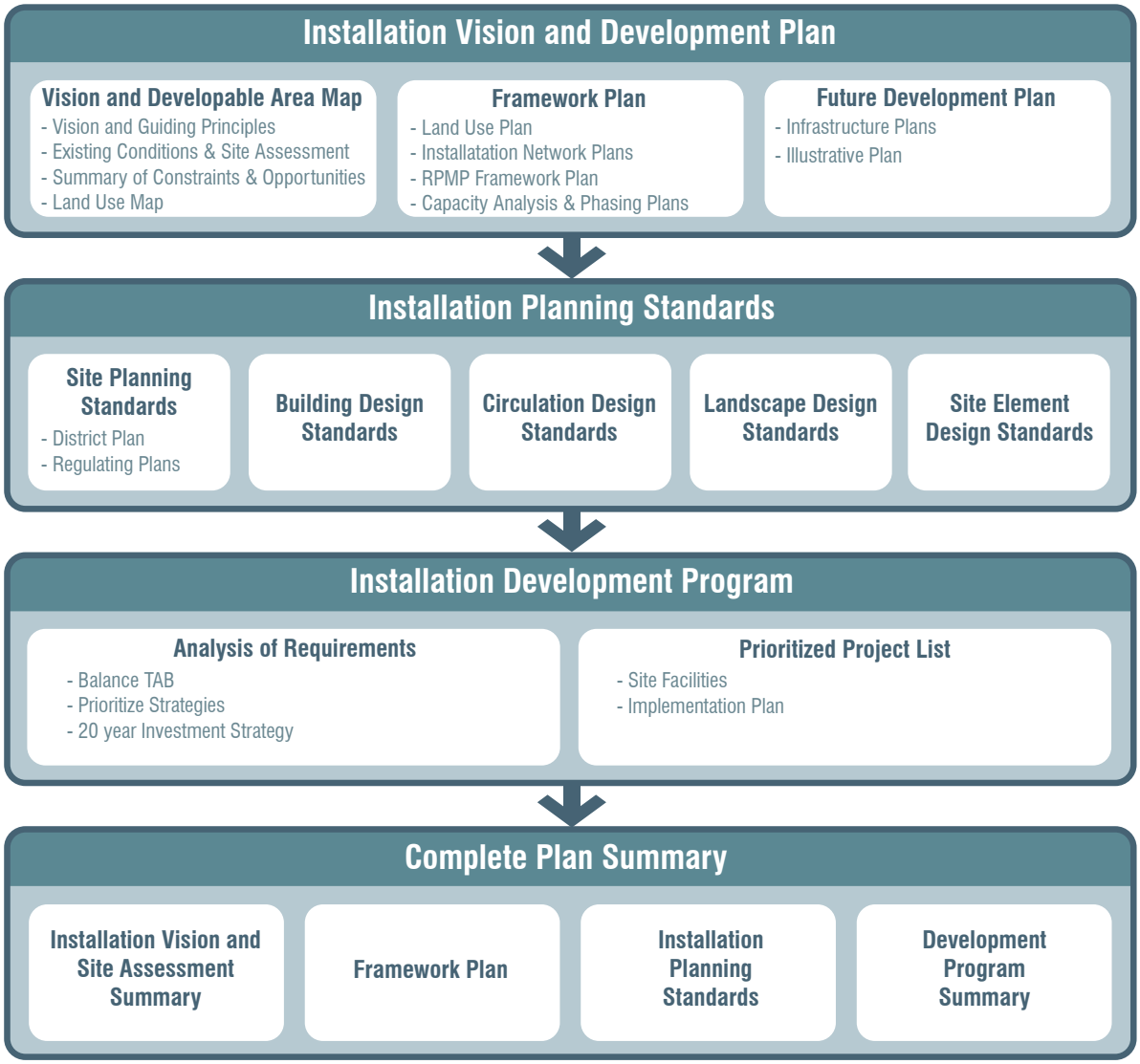


Figure i-2 - Fort Belvoir Main Post and Fort Belvoir North Area (FBNA)

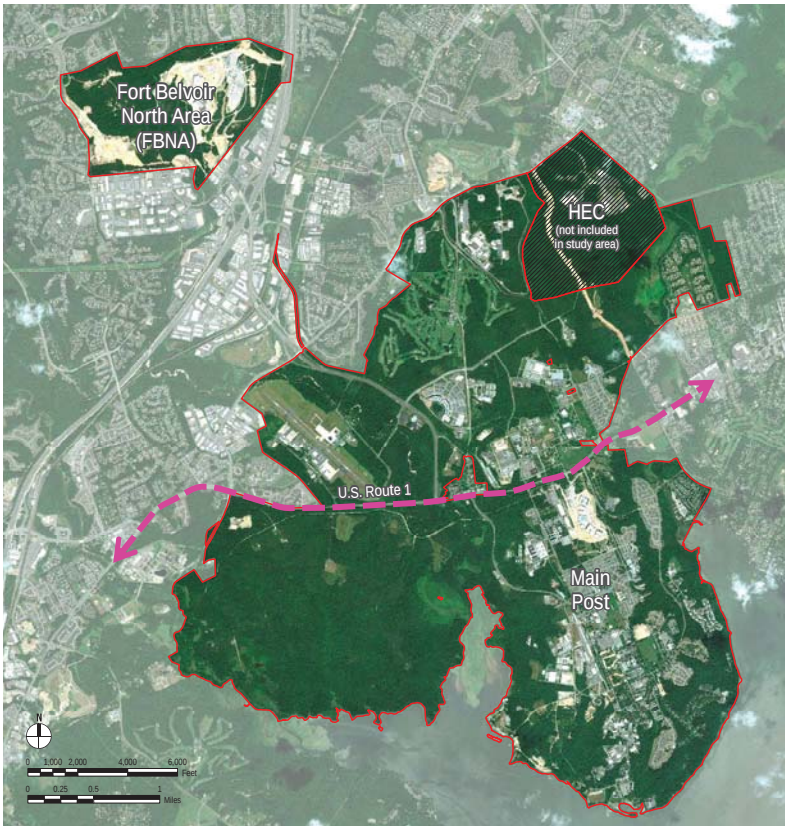
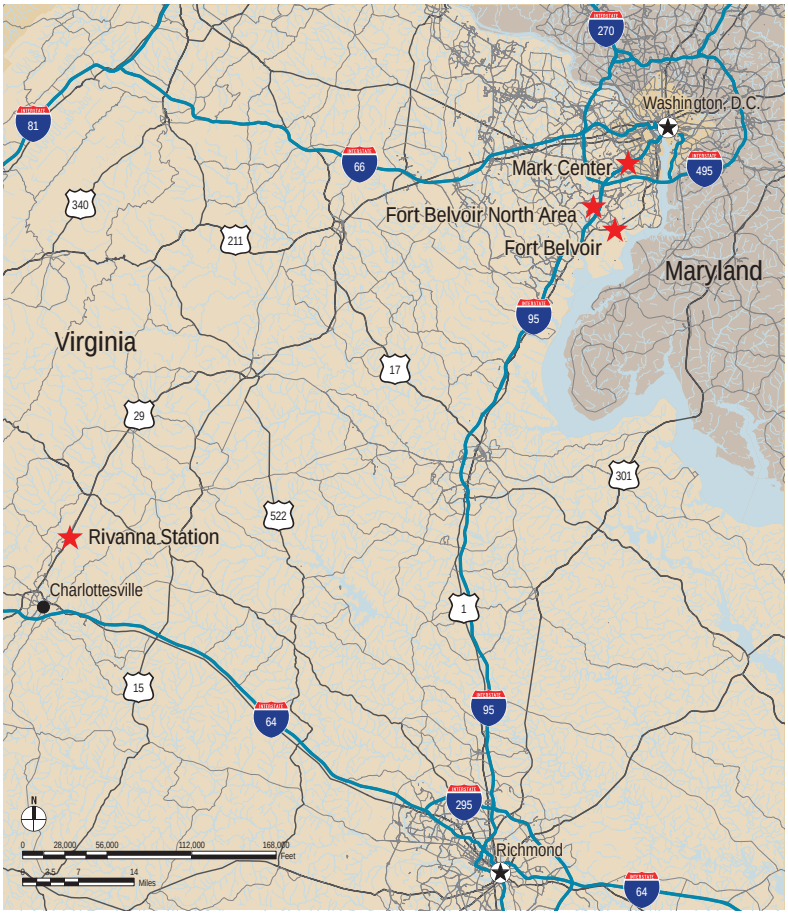


Figure i-3 - Fort Belvoir Properties Location



Scope

This master plan addresses approximately 8,500 acres including both the Main Post (7,700 acres) and Fort Belvoir North Area (FBNA) (800 acres) (see Figure i-2). FBNA was formerly known as the Engineer Proving Ground (EPG). This plan does not include the adjacent property of the Humphreys Engineer Center (HEC) (see Figure i-2) which is operated by the U.S. Army Corps of Engineers and considered a separate entity for land planning purposes. The Mark Center (see Figure i-3), a property Fort Belvoir acquired in 2008, has been developed to full capacity with the Washington Headquarters Services (WHS) project. This site is not included as part of this Master Plan. Also, this plan does not include Rivanna Station (see Figure i-3), because of its remote location in Charlottesville, Virginia.

The following planning assumptions, developed by the master planning team and Fort Belvoir, and in line with Fort Belvoir's mission, vision and planning principles, set the direction for this master plan:

- The post-BRAC population (2011) for Main Post and FBNA is a little over 39,000. Future growth projections for Main Post and FBNA show an approximate increase of almost 17,000 by 2030 for the employee population. This will give Fort Belvoir a 2030 projected employee population of approximately 56,000. This plan will direct the growth for 2030 as well as assess projected capacity of the Installation up to 2040.
- Fort Belvoir will provide more regional services in support of the National Capital Region (NCR). Examples of these expanding services include administrative support, health care, outdoor recreation, logistical support, and support to the retiree population.
- Fort Belvoir family housing assets were transferred to private ownership (Fort Belvoir Residential Communities LLC) under a 50-year lease in 2003. All of the Post's projected housing demand is being met within the current lease footprint.
- The National Museum of the United States Army is planned to be constructed on Fort Belvoir.
- The privatization of utilities on Post will entail a large amount of construction for upgrades and modernization to the systems. However, they do not pose a major development constraint as these systems can be integrated and planned for with future development.

Process

Producing the VDP was a process that involved the following steps: Visioning Workshop, Site Assessment, Land Use Plan, Framework Plan, and Infrastructure Plans (see Figure i.4).

Chapter 1 - Visioning Workshop

The Visioning Workshop (Chapter 1) began the entire master plan process. This involved engaging key Installation stakeholders in a series of discussions to disclose the current state of the Installation and describe the desired future state. During the workshop, Fort Belvior's existing Master Plan Vision Statement and Guiding Principles were revisited and adjusted as necessary; they provide guidance for the development of the plan and ultimately the Installation.

Chapter 2 - Site Assessment

The Site Assessment (Chapter 2) was the next step in the process. It involves an assessment of existing conditions to develop a baseline understanding of the planning issues that must be considered for future development. This assessment analyzes on- and off-Post conditions including: regional planning and demographics, history, facilities, land use, transportation, infrastructure/utilities, airfields, and environmental resources (natural, cultural and operational). The assessment concludes with a summary of the opportunities and constraints that show the most suitable development areas on the Post.

Chapter 3 - Land Use Plan

Developing the Land Use Plan (Chapter 3) was the third step; it lead to the optimal organization of the Installation's real property and a determination of how best to utilize land resources. This was done by examining land use functions and how they related to each other in spatial terms. The resulting land use plan helps the Installation utilize its limited land resources to satisfy the greatest needs for growth.

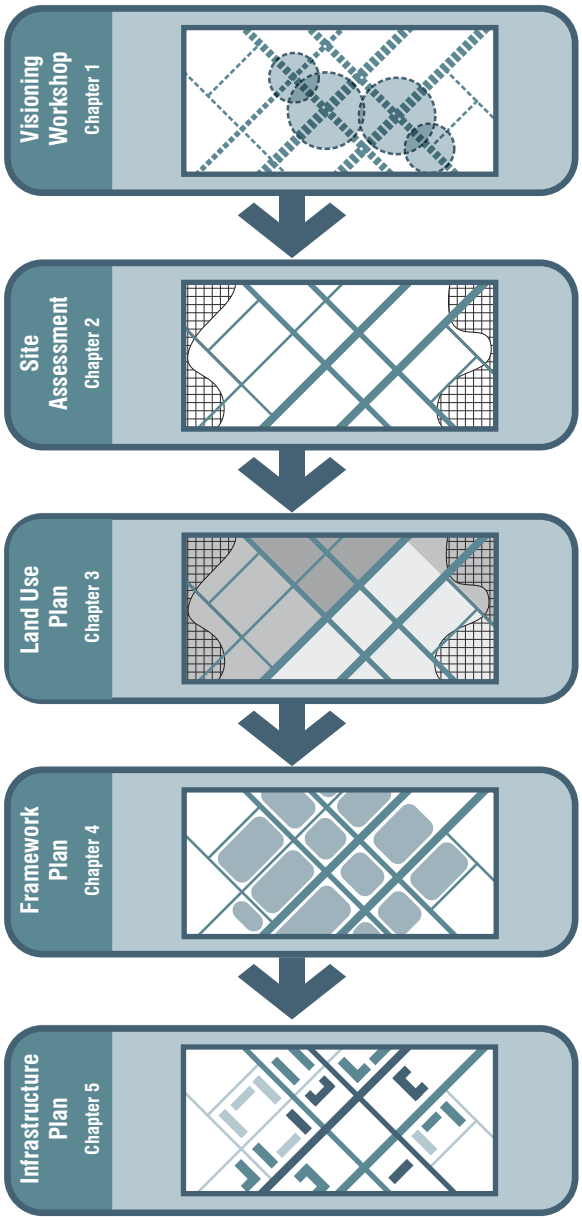
Chapter 4 - Framework Plan

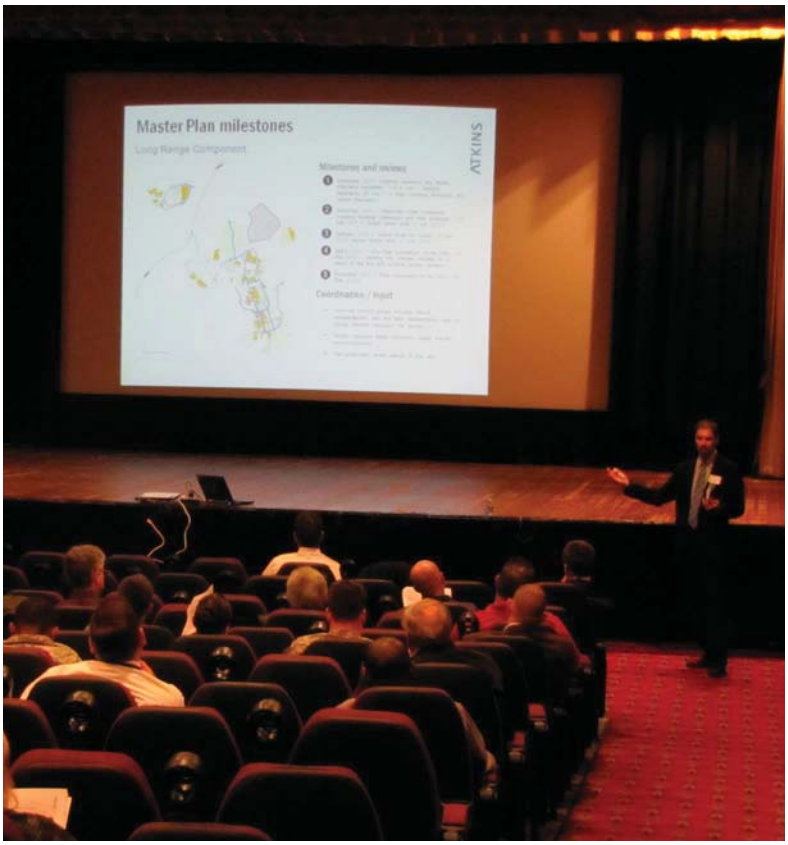
The Framework Plan (Chapter 4) provides the overall blueprint for large-scale development patterns on the Installation. The framework organizes road networks, development parcels, development hubs, multimodal transportation networks, and open spaces. The result is a plan that depicts how major systems will take shape and work together.

Chapter 5 - Infrastructure Plan

The final step was the Infrastructure Plan (Chapter 5); which includes an infrastructure (roads and utilities) assessment in relationship to the proposed plans for the Installation. Based on the assessment results, phased recommendations (expansion, improvements, or upgrades) to the systems are provided to ensure the infrastructure can support the proposed development plans.

Figure i-4 - The Development Plan Process Diagram





Stakeholder Involvement

Public Outreach and Stakeholder Involvement

Integral to the development of the RPMP was the outreach effort led by Fort Belvoir and the master planning team to engage with stakeholders (both on- and off-Post). This public outreach occurred over a two-year period beginning with the Visioning Workshop and included the Real Property Planning Board (RPPB) and Installation Planning Board (IPB) meetings; town hall meetings to discuss active and planned projects; meetings with transit providers and commuter fairs; meetings with the consulting parties to ensure future development will protect cultural resources; and a series of presentations to National Capital Planning Commission (NCPC) Staff and Fairfax County Staff to discuss the master plan with topics ranging from natural resources, transportation and land use.

Throughout the plan development process, Fort Belvoir has sought to communicate with key stakeholders, provide clarity on key issues and incorporate stakeholder comments into the documents. The collaborative efforts between stakeholders and the installation provides a broad consensus for guiding future growth at Fort Belvoir. This is reflected in the RPMP.

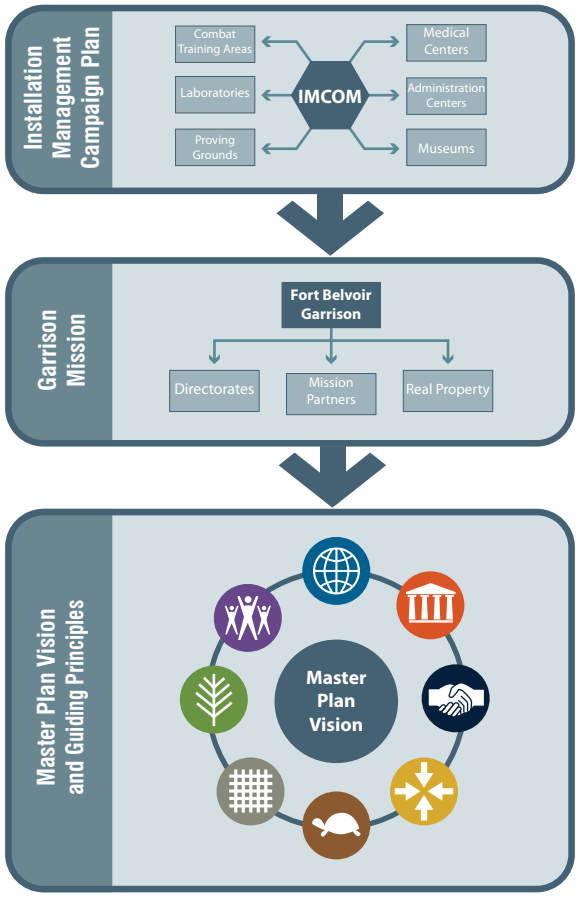
Approval

As specified in May 2012 UFC-2-100-01 and AR 210-20, the senior mission commander endorses the Master Plan and sends it to the Installation Management Command Region Office for review and approval by the region director.

Master Plan Vision

1

Figure 1.1 - Mission, Vision, and Guiding Principles Diagram



Introduction

This chapter summarizes elements from the Installation Management Campaign Plan and Fort Belvoir's Mission, and introduces the Master Plan vision and guiding principles. It briefly outlines the relationship between each component and how they support the future development of Fort Belvoir.

Any successful master plan must incorporate and support the overall mission of an Installation. For Fort Belvoir, the Installation Management Campaign Plan and the Garrison's Mission Statement provide the context within which the Installation strategies are formulated. Figure 1.1 diagrams the hierarchy of the strategic plans and missions in relation to the Master Plan vision and guiding principles.

The Master Plan vision and guiding principles support the Installation Management Campaign Plan and Garrison Mission Statement, but focus more on changes and improvements to facilities and real property. The Master Plan vision statement has a broad horizon, and looks beyond current circumstances to what is important for the future. It represents the ideal long-term future of the real property to the benefit of all those who live, work and train on Fort Belvoir.

The Master Plan guiding principles describe the character and feel of the Installation 20 to 30 years into the future. They briefly depict in words what the Installation seeks to become. They serve as a guide for all planning and programming needs.

Installation Management Campaign Plan

The Installation Management Campaign Plan (IMCP) reflects the Army leaders' shared vision and strategic imperatives – expressed in clear, measurable terms – for the activities which must occur on our installations to accomplish the Army mission.

Although the new fiscal reality means the Installation Management Community will have fewer means in the coming years to deliver our services and programs, the Army remains committed to providing Soldiers, Civilians and their Families with a quality of life commensurate with the quality of their service. The Army must find new "ways" to achieve the "ends" even while the "means" are being reduced.

The Installation Management Campaign Plan vision states: ***Army installations are the DoD standard for infrastructure quality and are the provider of consistent, quality services that are a force multiplier in supported organizations' mission accomplishment, and materially enhance Soldier and Family well-being and readiness.***

The IMCP lays out the Army's strategy, through Lines of Effort (LOE) and Keys to Success, and metrics to track progress. The LOE and keys to success are as follows:

- **LOE 1: Soldier, Family and Civilian Readiness —** Soldiers, Families and Civilians are able to meet the challenges of deployment and the ARFORGEN process through proper training, responsive services, and communities of excellence.
- **LOE 2: Soldier, Family and Civilian Well-Being —** Ensure Soldiers, Families and Civilians are being well cared for, and our programs and services enhance community life, foster readiness, promote mental and physical fitness, and deliver a quality working and living environment.
- **LOE 3: Leader and Workforce Development —** Sustain a multi-skilled Installation Management workforce with the knowledge, capabilities, skills and opportunities to successfully and innovatively deliver our products and services to Soldiers, Families and Civilians around the world.
- **LOE 4: Installation Readiness —** Installations are platforms of readiness supporting Senior Commanders' current and future requirements through regular modernization and new construction of standardized facilities to maintain efficient and sustainable operations and enable the provision of effective services to Soldiers, Families and Civilians.
- **LOE 5: Safety —** Commanders and leaders will lead the way in changing behavior to prevent accidents, and will empower Soldiers, Families and Civilians at all levels to speak up when they see someone ignoring safety rules or doing something risky. Safety is everyone's business, and it is our responsibility to ensure safe performance in all we do. Everyone will be held accountable for accident prevention.
- **LOE 6: Energy and Water Efficiency, and Security —** Create energy and water efficient installations by holding users accountable, modernizing facilities, installing new technologies, and leveraging partnerships that will provide Senior Commanders an increased level of energy and water security leading to sustainable and resilient infrastructure and mission assurance.

For further information and detail on the LOEs and Standards of Excellence Principles, refer to the Installation Management Campaign Plan, Version 4.0 - November 2011.

Garrison Mission Statement

Leaders in Excellence
Our military mission is global. As a strategic sustaining base for America's Army, the work we do is vital to the success of the goals and objectives of the nation's defense strategy.

A list of the organizations who call Fort Belvoir home reads like a "Who's Who" of the Department of Defense. No other Army installation in the world can compare to Fort Belvoir and its singular mission to provide logistical, intelligence and administrative support to such a diverse mix of commands, activities and agencies.

Fort Belvoir has changed in many ways over the past several years, but some things will always remain the same. As dedicated stewards of the environment, we will continue to work always to conserve the natural beauty of the land around us, and to preserve our standing as one of America's enduring installations. Belvoir will always mean "Beautiful To See."

Master Plan Vision Statement

On 29-30 November 2011, Fort Belvoir hosted a workshop to develop a Vision Statement and Guiding Principles for the Fort Belvoir Master Plan. Attendees were asked a series of questions that would provide feedback pertaining to the following:

- Assess the current state in four areas: work facilities, community/Soldier/family life, general infrastructure, and outdoors.
- Describe elements of a desired future state in four areas: work facilities, community/Soldier/family life, general infrastructure, and outdoors.

From the information gathered, common themes were identified that were refined into the overall Vision Statement and Guiding Principles for the Master Plan. The vision statement is the consensus of all the stakeholders present at the workshop.

Master Plan Vision Statement

Fort Belvoir is an outstanding place to work, train, and live that embraces a culture of diversity, innovation, and challenge while continuing its legacy as a "Beautiful to See" Installation.

The compilation of photos above reflects the ideal state that Fort Belvoir desires to achieve with the integration of the RPMP Vision and Guiding Principles.

Master Plan Guiding Principles

The Master Plan Guiding Principles were developed in consultation with Garrison staff and Fort Belvoir stakeholders at the Visioning workshop in November 2011. They were created from the common themes identified among the stakeholders for the future state of the Installation and revisions to the previous draft master plan Guiding Principles. A comparison of the previous draft master plan principles and the development of the current principles can be found in Appendix A.

The Guiding Principles provide a planning road map that will shape the future development of Fort Belvoir. These principles aim at creating a plan that: efficiently uses land, maximizes the use of previously developed areas, minimizes the impact on the environment, and ultimately creates a sustainable world-class Installation.

Create and sustain a world-class Installation:

- Support Fort Belvoir's mission.
- Become a model for development within the community, the region, and among other military Installations.
- Becomes an urban center that provides the federal workforce with safe, secure, premium support.
- Provide Soldiers with quality, cost effective military training capabilities.

Achieve environmental sustainability:

- Promote a green environment by maximizing design, technology, and best practices to create a resource-efficient and functional built environment in a manner that minimizes adverse environmental impacts.
- Advance the use of alternative modes of transportation.
- Expand our leadership role in water conservation best practices.
- Incorporate "watershed planning" principles into site planning.
- Select energy sources that promote renewable technologies and programs.
- Capitalize use of on-site power generation by servicing multiple buildings.

Support the natural habitat:

- Encourage development that is in concert with the natural environment.
- Preserve, protect and restore natural ecosystems and their functions.
- Recognize and preserve existing biodiversity.
- Enable connections between the regional and on-Post conservation areas.
- Maintain consistency with the Integrated Natural Resources Management Plan (INRMP) that follows the principles and practices of ecosystem management and biodiversity conservation.

Recognize that land is a valuable resource:

- Reserve large contiguous and buildable land areas for potential large future mission requirements.
- Promote compact redevelopment strategies that improve land utilization and reduce infrastructure investments.
- Concentrate projected growth around existing and planned transit opportunities.
- Phase out aging facilities and infrastructure with new sustainable/efficient replacements.

Improve multimodal connectivity:

- Expand on-Post transportation systems (shuttle, bicycle, pedestrians) and their connections to the regional public transit and trail systems.
- Ensure efficient connectivity between key on-Post destinations by shuttle and pedestrian networks.
- Strengthen circulation connections between North and South Post.
- Expand safety and way-finding for all circulation networks.

The Installation Planning Standards (IPS) Sustainable Design and Development Section provides examples and specific guidance to ensure that future development will adhere to Fort Belvoir's Guiding Principles.

Create a diverse and dynamic community:

- Concentrate uses and activities that promote a pedestrian friendly community.
- Enhance walkable, mixed-use Town Center on South Post and the Community Support Center on North Post with retail and community uses at the street level, and a mix of public spaces and recreation facilities.
- Create work places that encourage sharing of common facilities.
- Construct buildings that support multiple mission partners and uses to maximize land utilization and areas.
- Plan public spaces that can facilitate mobile retail and vendors (food carts, seasonal vendor stands, farmer's market).
- Take advantage of the unique waterfront resource for recreational and other public uses.

Respect the history of Fort Belvoir to ensure the continuation of its legacy:

- Recognize Fort Belvoir's advantageous location near our nation's capital.
- Emphasize design standards that are respectful of the historic nature of Fort Belvoir and the surrounding region.
- Explore the innovative reuse of historic facilities.
- Protect Fort Belvoir's and the surrounding region's cultural resources and natural setting.

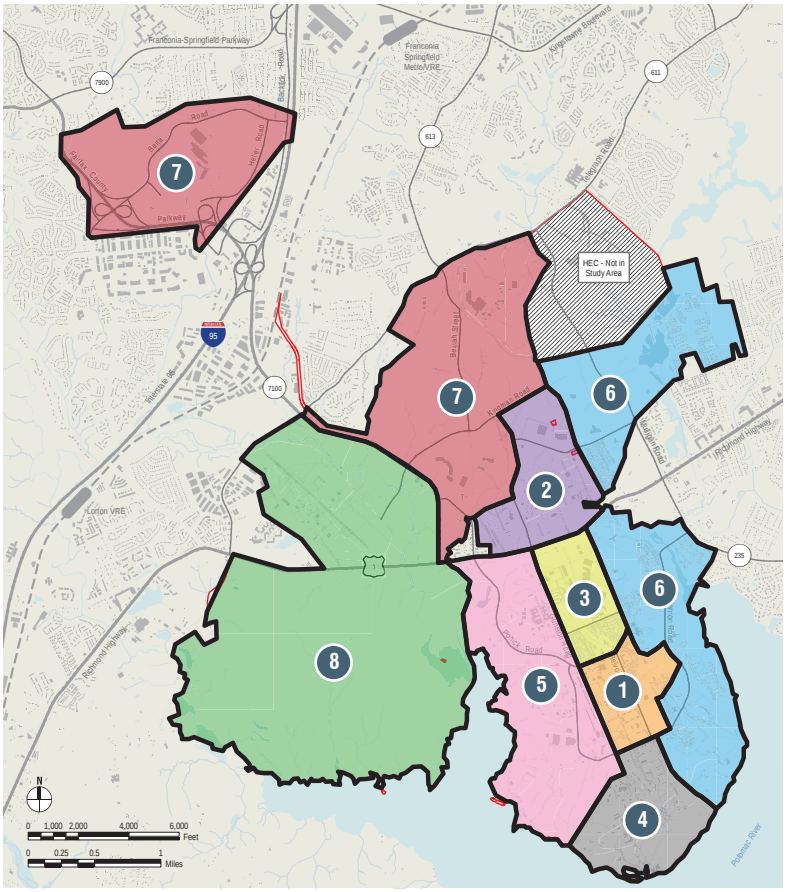
Strengthen community partnerships for mutual benefits:

- Support the local government's comprehensive plans and the surrounding region's planning efforts.
- Explore shared amenities with local community, such as parks and community-based facilities.
- Explore transit opportunities in conjunction with the local community.

The compilation of photos above reflects the ideal state that Fort Belvoir desires to achieve with the integration of the RPMP Vision and Guiding Principles.

Table 1.1 - Neighborhood Meetings		
Time	01 December 2011	02 December 2011
0900-1030	1 Town Center	5 Industrial Area
1100-1230	2 Lower North Post	6 Community / Residential
1330-1500	3 Medical Center	7 Intelligence Campuses
1530-1700	4 300 Area	8 DAAF / SW

Figure 1.2 - Fort Belvoir Neighborhoods



Town Center 12th Street

Neighborhood Meetings

On 1-2 December 2011, Fort Belvoir held Neighborhood Meetings at the Outdoor Recreation Center (Building 778). This gave Installation mission partners the opportunity to discuss issues related to their particular neighborhood area in which their facility exists. There were eight meetings which provided a forum to meet the following objectives:

- Gather mission partners within each neighborhood to discuss issues related to their location.
- Understand if/how mission partners' future plans may affect adjacent organizations.
- Understand how mission partners interact with other organizations and how they use community facilities.

This section briefly summarizes the meeting minutes for each Neighborhood Meeting. Its intent is to outline the main points discussed among the stakeholders present.

Town Center Neighborhood

- Some facilities within the Town Center neighborhood are undersized for the mission partners that occupy them.
- Facilities have minimal to no expansion room surrounding the buildings for future development.
- Across the Installation, there is a general lack of accessible retail and food services within close proximity to mission partner facilities and scattered work centers.
- Facilities and infrastructure are aging and will need to be modernized in the near future to maintain efficient/ effective operations.
- There is a perception that there is not enough parking on-Post. It was recommended that the master plan look at proposing shared parking facilities/structures in this area as it becomes more compact.

Lower North Post Neighborhood

- Sites are restricted by operational, environmental, and other site constraints that do not allow for expansion.
- Roadway projects are impacting existing facilities which may need to relocate in the future.
- Issues regarding the baseline common level of support (i.e., facility and grounds maintenance, etc.) between the Garrison and mission partners needs to be clarified between both parties involved.
- Existing facilities and systems are aging and will need to be modernized in the near future to maintain operations.
- Tenants within the Lower North Post Neighborhood with offices and divisions spread across the Installation need to be consolidated into one location.
- Infrastructure/utilities need to be modernized and redundant lines added for contingency.

Medical Center Neighborhood

- The new Fort Belvoir Community Hospital (BRAC 2005) meets the current needs of the community and is a valuable asset to the Installation.
- Some facilities (such as Dewitt Hospital) are at the end of their life cycles and will need to be either demolished and redeveloped or renovated in the future to maintain operations.
- Meeting attendees expressed safety concerns about pedestrians being struck by traffic, as people try to cross Gunston Road mid-block. One solution would be to have signalized crosswalks at mid-block locations.
- Building and directional signage is lacking within the neighborhood. (This is likely true throughout the Post although not always mentioned in other Neighborhood Meetings.)
- Some facilities will need expansion to accommodate mission growth (i.e., Hospital, Dental Clinic, NRMC).
- Temporary and semi-permanent facilities (i.e., Buildings 1412, 1423, 1444, 1467-1469, 1484, 1490, 1491, 1495-1499) need to be replaced with permanent facilities.
- There is a lack of retail and food services within close proximity to the mission partner facilities.
- Expand mass transit and shuttle services that connect the Post to regional commuter stations to reduce SOV usage and parking shortages.
- A more robust pedestrian network shall be provided in the long term as an alternate mode of transport to navigate the Post.

300 Area Neighborhood

- Many facility mechanical systems are outdated and have experienced above normal systems breakdown frequencies/occurrences.
- Due to environmental and topographical constraints, the neighborhood has no room for expansion or growth unless development displaces surface parking lots and also provides for structured parking.
- Facilities are inadequate to accommodate growing mission partner population.
- Temporary facilities need to be replaced with permanent facilities.
- Tenants with multiple facilities and divisions spread across the restricted area need to be consolidated within close proximity to each other for ease of access and operational efficiency.
- Retrofitting existing facilities with new functions rarely provides for efficient operations following the retrofit.
- Erosion is prevalent at the waterfront.
- Anti-terrorism/Force Protection setback waivers are needed to meet requirements for existing parking.
- Some facilities have reached the end of their life cycle and shall be replaced with modern facilities.

Troop Barracks in Lower North Post

Hospital Under Construction

Aerial View of the 300 Area

Industrial Area Neighborhood

- Retrofitted renovations to existing facilities rarely meet operation requirements, and some facilities may be structurally inadequate and in need of demolition.
- Facilities are inadequate in size to accommodate the growing mission partner population.
- Administrative functions are within the Industrial land use and will need to relocate in the future.

Community/Residential Areas Neighborhood

- Representatives from the Community and Residential Areas on Post did not attend the scheduled meeting; however, it is the understanding in this master planning document that residential areas are stable, and will not be expanding or contracting in the foreseeable future.

Industrial Area Neighborhood

DLA is part of the Intelligence Campuses Neighborhood

Davison Army Airfield

Intelligence Campuses Neighborhood

- There is a perception that there is not enough parking on-Post.
- Due to a lack of contractual agreement with the Garrison, Fort Belvoir North Area (FBNA) is at risk for security surveillance and breach at traffic control points (TCPs).
- Future development on FBNA needs to account for the TCPs and connections to Barta Road and Fairfax County Parkway.
- Encroachments from adjacent housing and commercial development surrounding the FBNA is an issue.
- FBNA needs additional recreation facilities in the future.
- The National Museum of the U.S. Army is planned for FY 2015 adjacent to the Fort Belvoir Golf Course. This will happen in phases.
- The old rail line easement can potentially be used in the future as a connection to Metro or mass transit lines with stops at the Museum or Defense Logistics Agency.

Davison Army Airfield (DAAF)

- DAAF facilities and taxiway setbacks do not meet requirements for safety due to environmental restrictions.
- Due to its isolation, retail and food services are nonexistent within the area as well as connections to mass transit and shuttle service.

Southwest (SW) Area Neighborhood

- Due to funding shortages, maintenance of the SW Area has been neglected since the mid-1980s. Poe Road, the perimeter roadway, is in poor condition and not navigable.
- For the NCR, this area is a valuable training resource as an alternate to Fort A.P. Hill since operational and transportation costs are much less.
- Previous impacts from past operational activities and military functions will limit functional reuse beyond training due to the necessary UXO and environmental cleanup mitigations.

Site Assessment 2

Overview

This section discusses both broad regional influences and specific Installation conditions. It analyzes these factors and summarizes the planning considerations for each factor as they relate to development on Fort Belvoir.

Geographic Location

Fort Belvoir (Main Post and Fort Belvoir North Area (FBNA)) is located along the Potomac River in Fairfax County, Virginia (Figure 2.1). It is situated 16 miles southwest of Washington, D.C. and eight miles southwest of the City of Alexandria. Fort Belvoir is located near Interstate 95, which serves the East Coast as a primary north-south transportation corridor.

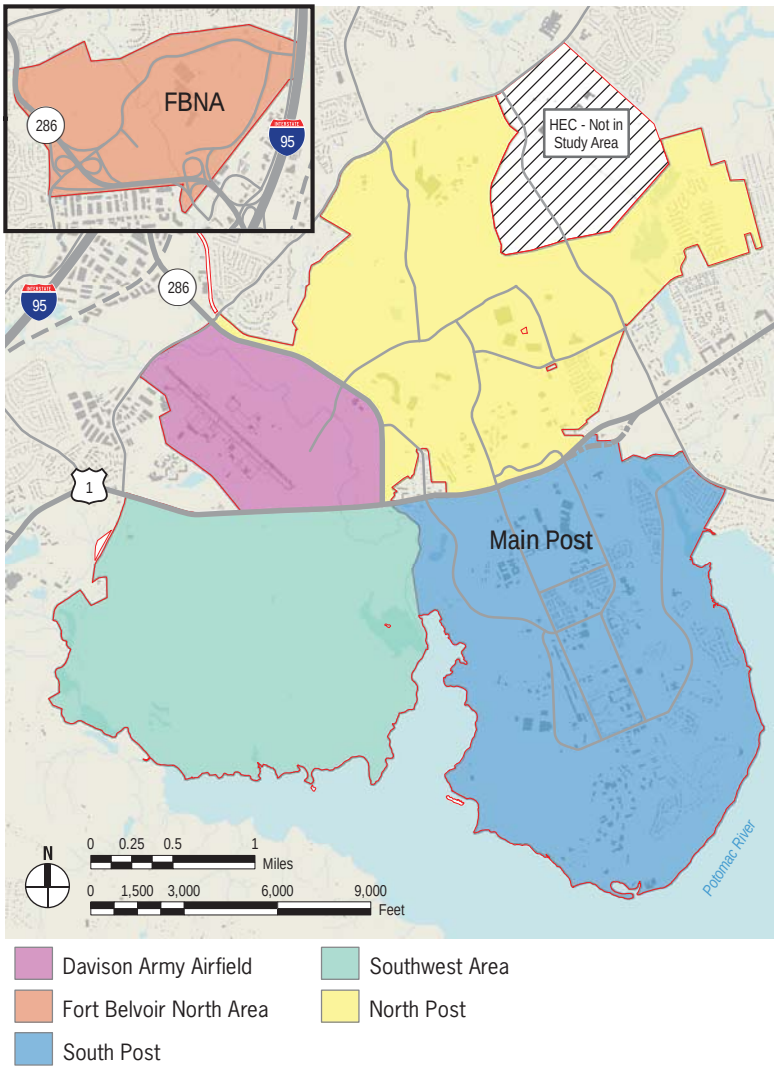
Figure 2.1 - Geographic Location

Fort Belvoir: The Site

As stated previously, the portion of Fort Belvoir included in the study area of this report consists of approximately 8,500 acres of land stretching north and west from the banks of the Potomac River. For ease of reference, Fort Belvoir is discussed using known terminology that identifies sub-areas of land within the Installation.

The first broad division of land is into two areas: Main Post and FBNA (Figure 2.2). Then the Installation can be broken down into five functional sub-areas (Figure 2.2). This page includes a general description of these five areas. The population numbers discussed on this page are estimates based on available information and discussions with Fort Belvoir Directorate of Public Works (DPW).

Figure 2.2 - Fort Belvoir Functional Areas



South Post is an approximately 2,650 acre peninsula located south of U.S. Route 1 directly accessed by three gates: Tulley Gate, Pence Gate and Walker Gate. South Post was the first area to be used and developed by the Army. It includes administration, medical services, education, family housing, research and development, community/ recreational facilities, and a wildlife refuge. South Post has approximately 15,600 employees.

North Post is approximately 2,330 acres located north of U.S. Route 1. The area is accessed directly by two gates: Kingman Gate and Telegraph Gate. Indirect access to North Post is provided from the South Post via the Gunston Road overpass. Additional direct access can be provided by Woodlawn Gate and Lieber Gate, but both are currently closed. The development density and character of the lower portion of North Post is similar to South Post. The upper portion of North Post houses major mission partner organizations that, most of which, require secure campuses. This area also contains a wetland refuge, two 18 hole golf courses, Post support facilities, an elementary school, and a clustering of community facilities: post exchange, commissary, class VI store, convenience store, gas station, bank, and chapel. Woodlawn Village is located in the easternmost portion of North Post. It is separated from the rest of North Post by conservation areas and wildlife corridors. North Post has approximately 14,000 employees.

Southwest Area is roughly a 2000-acre tract of land located to the south of U.S. Route 1 and west of South Post. Two unmanned gates allow access to this area. It encompasses most of the 1,400-acre wildlife refuge, as well as undeveloped wooded areas and operational ranges for engineer/troop training.

Davison Army Airfield (DAAF) is approximately 720-acre area located west of Fairfax County Parkway and between U.S. Route 1 and Interstate 95. It is accessed by Farrar Gate, located off Fairfax County Parkway. DAAF provides training and support facilities for fixed/rotary wing aircraft and houses the U.S. Army Operational Support Airlift Command (OSA COM). Approximately 1,200 employees work in this area. Additionally, a forest and wildlife corridor traverse the site.

Fort Belvoir North Area (FBNA) is an approximately 800-acre area located about two miles northwest of the Main Post to the west of Interstate 95. It is remote from the Main Post, and accessible via Fairfax County Parkway to the west and an unmanned gate on Backlick Road to the east. Until 1988, FBNA was a testing and training area, known as the Engineer Proving Ground. In 2011, FBNA became the home of the National Geospatial-Intelligence Agency (NGA), with a workforce of approximately 8,600 personnel arrived as part of the BRAC 2005 action.

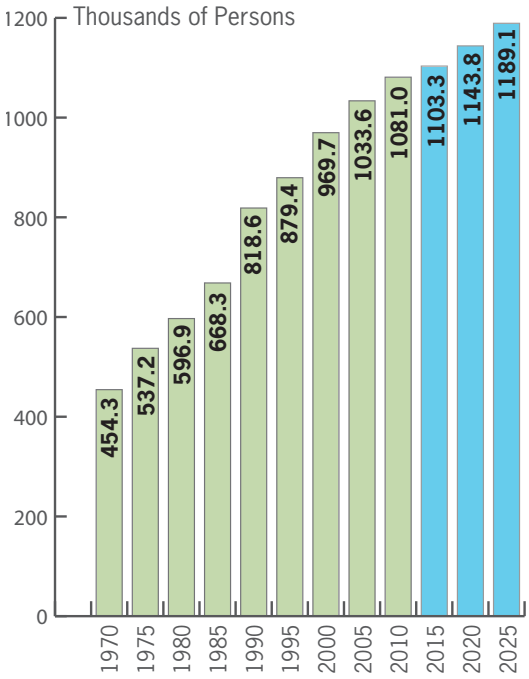
Regional Population and Economy

Population

Fairfax County is the most populated jurisdiction in the Washington Metropolitan Area and Virginia. Its fastest growing segment is persons 45 and older. By 2025, estimates predict a burgeoning population of nearly 1.2 million people, a 9.1 percent population growth (Figure 2.3).

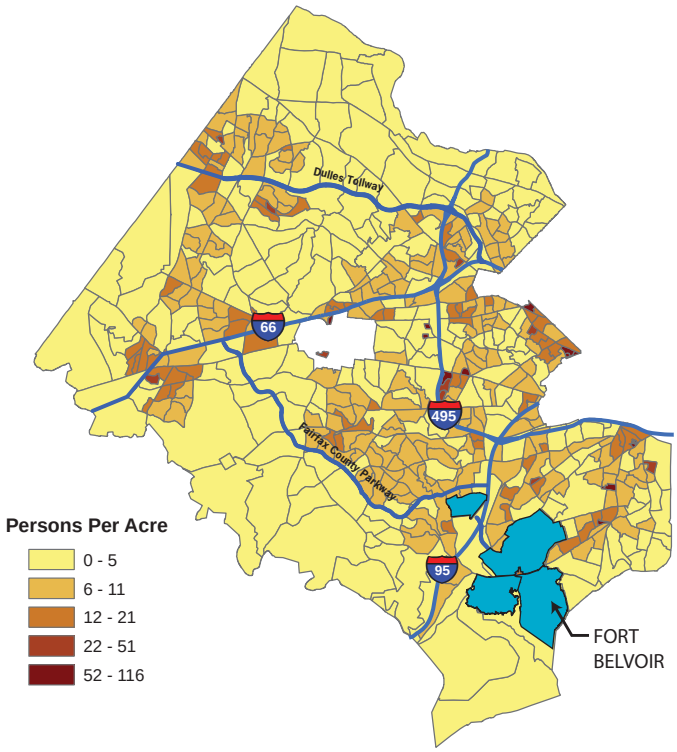
Currently, the denser areas of Fairfax County are located near the City of Alexandria and Washington, D.C. (Figure 2.4). However, there is considerable new population growth projected further out from these areas along the major transportation corridors (Figure 2.5).

Figure 2.3 - Fairfax County Population Estimates and Projections



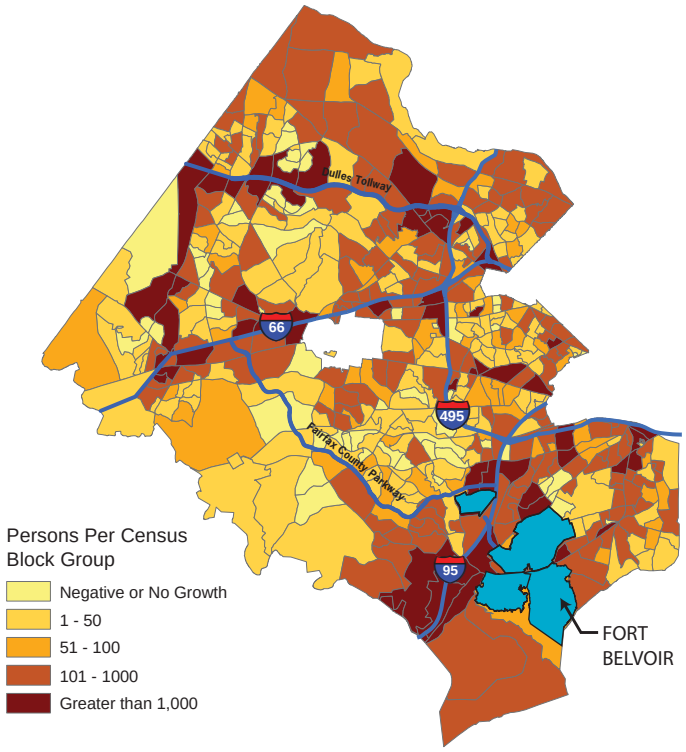
Source: U.S. Census Bureau, 1970, 1980, 1990 and 2000 Decennial Censuses, 2001 to 2025 estimates and forecasts, Fairfax County Department of Neighborhood and Community Services

Figure 2.4 - 2009 Fairfax County Population Density by Subcensus Tract



Source: Fairfax County Department of Systems Management for Human Services. January 2010

Figure 2.5 - 2010-2040 Fairfax County Forecast Population Growth by Census Block Group



Source: Population Growth from Fairfax County Integrated Parcel Lifecycle System. January 2010.

Economy

Currently, Fairfax County enjoys one of the strongest economies in the United States. Major economic drivers include government and defense technologies as well as a large and growing presence of information technology, financial, software, communications, and technology management service providers.

The proximity to the nation's capital directly impacts the economic condition of Fairfax County. Washington, D.C. is one of the most important governmental, institutional, commercial and financial centers in the United States and the world. Among foreign investors, it is ranked as the #1 national and #2 international investment market. The federal government and tourism are the two major economic forces that generate revenue for the entire region. In addition, every core economic segment – office, retail, residential, education, hospitality/tourism, and media/communications – is experiencing robust new development. As a result, the 2010 Gross Regional Product is estimated at $436 billion.

While many regional economies find it difficult to maintain steady growth, particularly during recessions, Greater Washington's economy has grown steadily for the last 20 years, as measured by Gross Regional Product, with a compounded annual growth rate of 5.3 percent. From 2001 to 2009, the economy grew more than 25 percent. In July 2012, the unemployment rate for Fairfax County was 4.2 percent; the Washington Metropolitan Area, 5.5 percent; and nationally, 8.1 percent.

(Sources: Greater Washington 2010 Regional Report and Fairfax County Economic Index 2011-2012)

Planning Considerations:
Regional Population and Economy

- In general, the areas near Fort Belvoir's Main Post are expected to remain low density; however, outlying growth will create more demand on infrastructure and resources. This is particularly the case near FBNA where redevelopment of older industrial uses is occurring.
- A good economy makes employers compete for the human capital. The environment Fort Belvoir can provide for its employees is an important factor in attracting and retaining employees.
- While the Greater Washington region has continued to perform well even within the context of federal deficit and debt reduction, the future federal budget reductions will have some impact on the region and will reduce the rate of growth.

Major Industries and Employers

Greater Washington Area has been recognized as a "hub for business, science and technological innovation, and is the prime location for firms seeking to provide goods and services to the federal government."

The presence of major government agencies – Department of Defense (DoD), National Institutes of Health, and the Food and Drug Administration to name a few – promote area business development in terms of federal contractors, non-profit organizations, law firms, lobbying firms, telecommunication services, administrative services, and consulting firms. This presence also attracts defense contractors, including General Dynamics, Computer Sciences Corporation, Science Applications International Corporation, and Lockheed Martin. Eighteen Fortune 500 companies are headquartered in the Greater Washington Region. Of the 18, 9 are located in Fairfax County.

(Sources: http://www.fairfaxcountyeda.org and Greater Washington Regional Report)

Natural Resources

This section provides information regarding Fort Belvoir's natural resources and lists planning considerations that ensure future development minimally impacts both the regional and Installation natural resources. This section covers the following natural resources: water, vegetation, habitat, mitigations, watershed conditions, topography/soil conditions, and air quality.

Regional Natural Resources

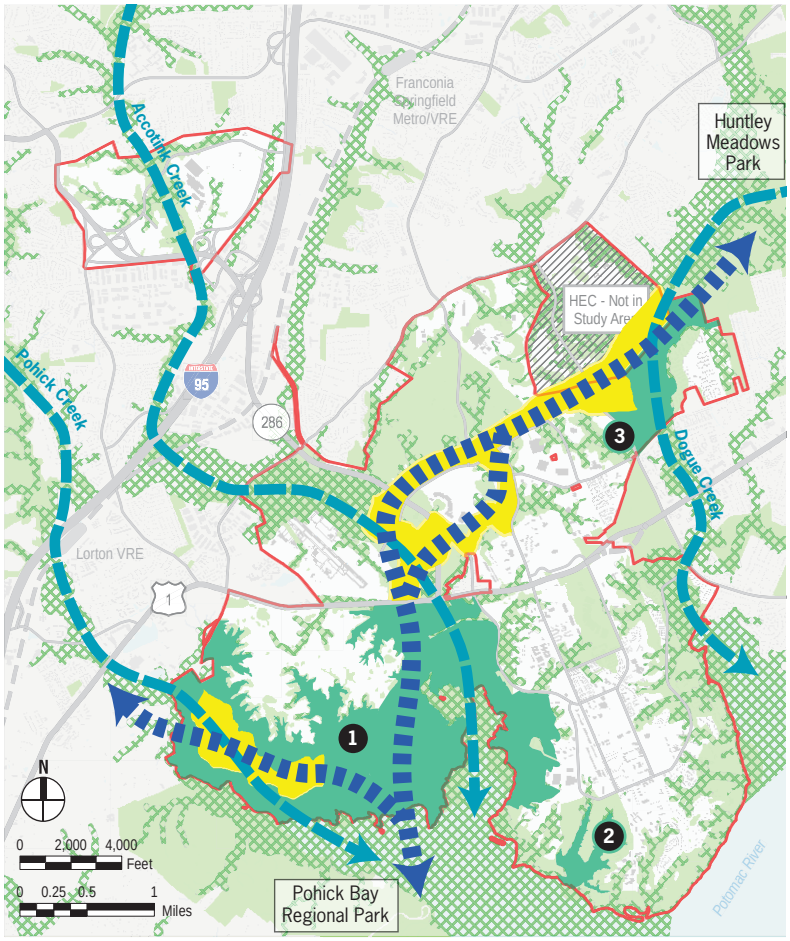
Fort Belvoir's natural environment is a complex area where several ecological subregions converge, resulting in a diversity of environmental conditions, habitats, and climate. Located in one of the most congested regions of the country, Fort Belvoir, along with the surrounding region, must continually balance development pressures with environmental protection. Fort Belvoir has taken the lead on many key environmental initiatives, including: ecosystem management, habitat connectivity and preservation, species migration, biodiversity, endangered species management, water quality best practices, and wetlands preservation. Despite the highly-developed character of nearby areas, approximately 65 percent of Fort Belvoir (Main Post and FBNA) is undeveloped.

Fort Belvoir has conserved three refuges totaling approximately 1,750 acres. They include the Accotink Bay Wildlife Refuge, the T-17 Refuge (located within the T-17 training area and the Jackson Miles Abbott Wetland Refuge. Fort Belvoir also has a designated Forest and Wildlife Corridor of approximately 730 acres. These large areas of native vegetation create a contiguous band of wildlife habitat through the Installation (Figure 2.6). It also connects with off-Post wildlife habitat areas, including Huntley Meadows Park to the northeast and Pohick Bay Regional Park and Mason Neck State Park (part of the Potomac River National Wildlife Refuge Complex) to the southwest. Together these areas represent the largest continuous and most diverse natural habitat area in eastern Fairfax County.

This geographic continuity is not only important to terrestrial wildlife but for bird species as well. The Atlantic Flyway, a major North American bird migration route, passes to the east along the Atlantic Coast. Natural areas along the Potomac River, including areas on Fort Belvoir and those north and south of the Installation, are an important resource for migratory bird species in an area that is otherwise largely developed.

Jackson M. Abbott Wildlife Refuge

Figure 2.6 - Regional Environmental



Wildlife Migration Corridor
Refuges
1 Accotink Bay Wildlife Refuge
2 T-17 Refuge
3 Jackson Miles Abbott Wetland Refuge
Resource Protection Areas
Parks/Natural Areas
Creeks
Habitat Corridor

Fort Belvoir recognizes that the ecological function of this large habitat complex largely depends upon conservation of its own environmental resources. Preserving the size and continuity of these on-Post natural habitats is the single most important management tool for maintaining native diversity both within Fort Belvoir and the broader eastern Fairfax County area.

Fort Belvoir also has a major role in protecting water quality, a significant environmental issue within the region. Fort Belvoir, located on the Potomac River approximately 95 miles upstream from the Chesapeake Bay, has approximately 12 miles of shoreline. Since 1983, the Chesapeake Bay watershed has been the focus of extensive restoration efforts that involve the State of Maryland; the Commonwealths of Virginia and Pennsylvania; the District of Columbia; federal agencies, including the Department of Defense (DoD) and the Department of the Army (DA); universities; nonprofit organizations; and the general public.

Resource Protection Areas (RPAs), established as a component of Fairfax County's Chesapeake Bay Preservation Ordinance (CBPO), are corridors of environmentally sensitive land that lie alongside or near the shorelines of streams, rivers, creeks and other waterways which drain into the Potomac River and eventually into the Chesapeake Bay. Fort Belvoir's RPAs and their connections to the regional RPA system are shown in the adjacent graphic. RPAs protect the Chesapeake Bay and its tributaries from non-point source pollution associated with the use and development of land. They also provide valuable wildlife and riparian habitat (INRMP, 2001). They shall be preserved in a natural condition.

Fort Belvoir's undeveloped areas are an integral element of southeastern Fairfax County's open space network and contribute to the Chesapeake Bay Program's restoration efforts.

Integrated Natural Resource Management Plan

The Integrated Natural Resource Management Plan (INRMP) is a planning document that integrates mission requirements, environmental and master planning documents, cultural resources, and outdoor recreation to ensure both military operations and natural resources conservation are included and consistent with stewardship and legal requirements. In 2001, Fort Belvoir completed its primary baseline natural resources survey with the INRMP, which provides the foundation for the current natural resources program. Natural resources surveys are periodically updated throughout the installation on a project level basis when warranted. Consistent with the principles of ecosystem management, Fort Belvoir aims to preserve both the species and native diversity of natural communities. The Installation does not emphasize single-species management, nor does it aim to increase the number of species or communities on Post. Fort Belvoir respects biodiversity conservation, and has developed and implemented an ecosystem-based natural resources management program so that it can continue as a leader in environmental stewardship in the region.

The INRMP specifies the Post's goals, objectives, implementing actions, and management policies as follows:

- Protect against the loss of native diversity of Fort Belvoir's fish and wildlife resources.
- Emphasize for conservation those wildlife species that have been prioritized for conservation by federal or state statute or regulation, DoD or DA policy, DoD partnered programs (e.g., Chesapeake Bay Program, Partners in Flight Program), State Natural Heritage Program, or through recognized importance to the regional ecosystem function.
- Conserve and enhance native wildlife habitat conditions to ensure habitat areas are sufficiently sized, sufficiently positioned, and possess the appropriate conditions to support healthy, self-sustaining native wildlife populations.
- Conserve and enhance wildlife movement/migration routes within and through Fort Belvoir.
- Protect the military mission and the public from wildlife hazards or disturbances.
- Provide opportunities for public access for recreation and environmental education/study consistent with resource conservation.

Water Resources

Fort Belvoir is located on the Potomac River, the second largest tributary of the Chesapeake Bay, and within the lower reaches of three major watersheds that are tributaries to the Potomac: Accotink Creek, Dogue Creek, and Pohick Creek. Figure 2.13 depicts Fort Belvoir's seven watersheds (Accotink Creek, Dogue Creek, Pohick Creek, Pohick Bay, Accotink Bay, Gunston Cove, and Potomac River). Fort Belvoir has roughly 200 miles of intermittent and perennial streams. This equates to a little over 2,700 acres of Resource Protection Areas (RPAs) along its perennial streams and 1,460 acres of riparian buffers along its intermittent streams. Within the RPAs, there are nearly 1,540 acres of 100-year floodplains (Figure 2.7) (Fort Belvoir GIS, 2010).

When considering new development, the Installation requires a stream assessment report and map depicting all ephemeral, intermittent and perennial streams and their associated RPAs to be submitted to Fort Belvoir DPW ENRD for review. This applies to projects that contain any streams within the site's boundaries and extending 100 feet beyond the site's boundaries.

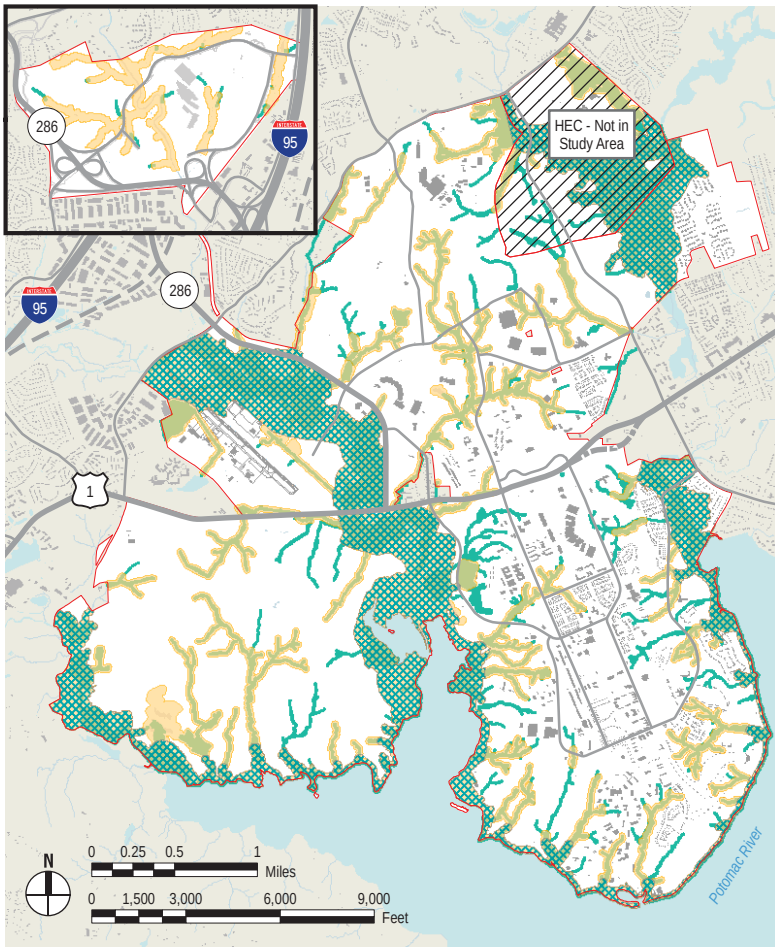
In 1988, Virginia enacted the Virginia Chesapeake Bay Preservation Act (CBPA) to protect the Chesapeake Bay from further degradation due to non-point source pollution and sedimentation. In 1993, Fairfax County adopted the Chesapeake Bay Preservation Ordinance that protects RPAs from most forms of development. The CBPO defines RPAs as consisting of the following:

- A tidal wetland or tidal shore
- A non-tidal wetland connected by surface flow and contiguous to a tidal wetland or tributary stream
- A tributary stream
- Any buffer area as follows: Any land within a major 100-year floodplain; Any land within 100 feet of a tidal shore, a tidal wetland, or non-tidal wetland connected by surface flow and contiguous to a tidal wetland or tributary stream; or Any land within 100 feet of a tributary stream

In summary, all perennial streams on the Installation require a minimum 100-foot RPA buffer. The actual RPA limits are based on the CBPO definition and therefore may vary from the mapped RPA limits. The RPA mapped limits shown in the Master Plan are periodically updated based on field studies and surveys to confirm their actual limits as part of the project/site plan review phase.

To further protect water resources, the Installation requires riparian buffers along all intermittent streams. Riparian and RPA buffers are a key component of the Water Resources Management and watershed conservation recommendations described in the INRMP.

Figure 2.7 - Water Resources



FBNA Resource Protection Area

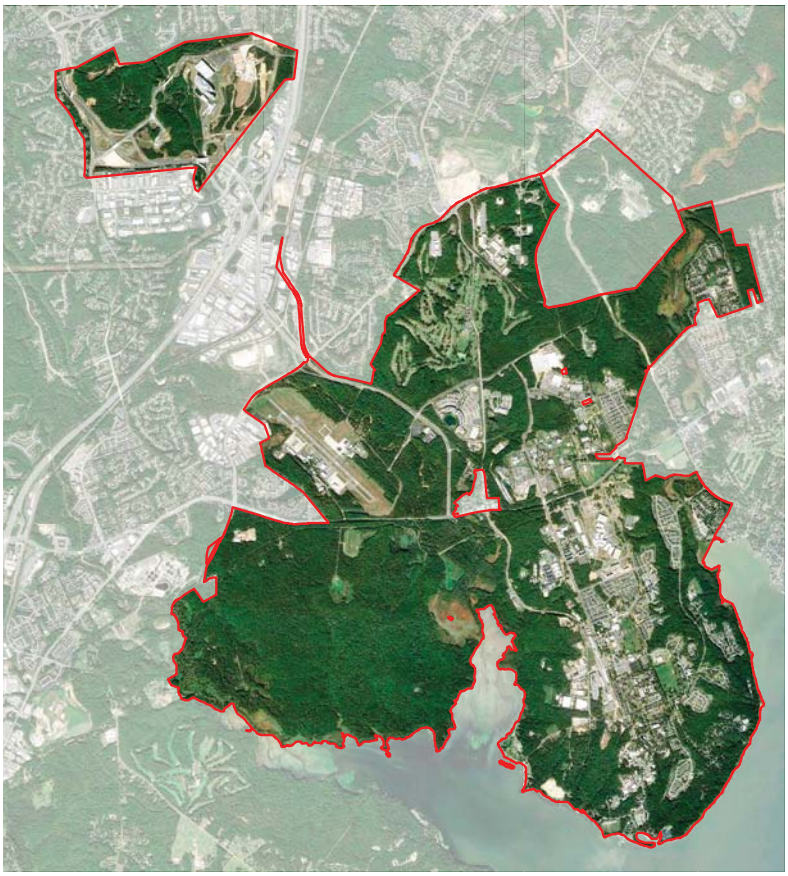
Planning Considerations: Water Resources

- Primarily, construction is not permitted in RPAs; however, construction of infrastructure improvements, recreational facilities, redevelopment, "water dependent" activities, and water wells are permitted (Chesapeake Bay Preservation Ordinance).
- Avoid 100-year floodplains. A field delineation to determine the site-specific flood zone boundary shall be conducted. Habitable structure development or development that could alter downstream floodplains are generally not permitted in flood zones.
- To minimize the impacts to water resources from new development and/or redevelopment, apply environmentally responsible site design and low-impact development (LID) techniques pursuant to UFC 2-100-01 and Section 438 of the Energy Independence and Security Act.

Planning Considerations: Water Resources (cont.)

- Minimize amount of impervious surface created, encourage cluster development, and preserve wooded areas and adjacent steep slopes as much as possible.
- Construct detention or retention stormwater ponds or underground structures, as required by Commonwealth law and County regulations, to manage the increase in water runoff associated with development of impervious surfaces. Other alternatives to detention or retention ponds, such as bioswales, rain gardens, infiltration trenches, and vegetated strips, can be implemented as long as they meet regulatory requirements.
- Construct site-specific controls, such as linear sand filters or biofilters, for water quality management of impervious areas.
- Remove underutilized impervious areas to allow for stormwater percolation. This will typically occur with construction of new facilities on Post.

Figure 2.8 - Forested Areas on Fort Belvoir



Vegetation

Vegetation covers roughly 5,600 acres (66 percent) of Fort Belvoir (Figure 2.8) and includes upland forests, riparian areas, and woody wetlands. Inland or palustrine non-tidal wetlands characterized by trees, shrubs and emergent vegetation (Figure 2.9) are regulated by a number of environmental laws. Upland forested areas are typically developable areas, with the exception of wildlife corridors, refuges and areas with threatened or endangered species habitat, which are discussed in the Habitat section and shown on the Special Natural Areas Map (Figure 2.10).

Upland Forests

While forested areas are typically developable, Fort Belvoir is committed to reducing the amount of clearing and has a reforestation policy to address the replacement of trees removed for development.

Wetlands

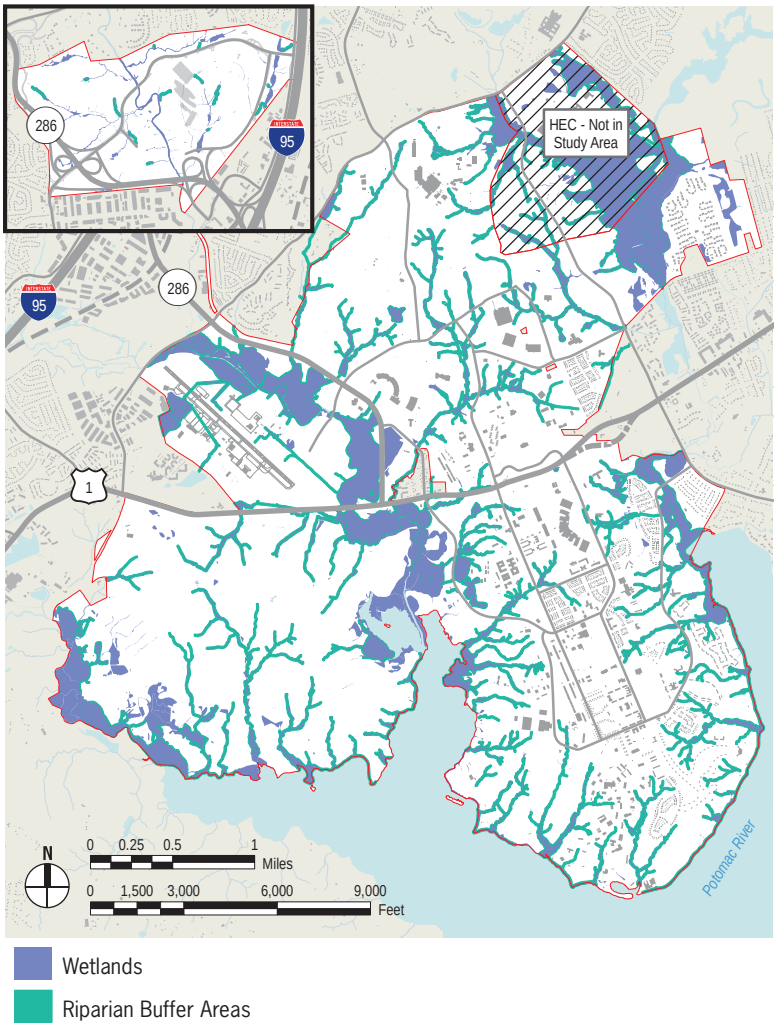
Wetlands are lands where seasonal or permanent saturation is present. Lands commonly known as swamps, bogs and marshes are all wetlands. The presence of wetlands is not always immediately noticeable since they might not be inundated or saturated throughout the entire year.

Also, the vegetation might vary or might even be absent. A set of criteria must be met in order for an area to be defined as a wetland. The term wetlands includes wet forested systems, wet shrub systems, wet meadows, open water bodies and streams.

Wetlands are complex ecological systems that perform a range of functions. Wetlands filter and purify water before it enters surrounding waterways by trapping sediments and removing excess nutrients and pollutants. During rain events wetlands store excess runoff and stormwater, providing flood protection. Wetlands protect stream banks and shorelines from high velocity waters, reducing erosion and sedimentation of our waterways. Wetlands are rich in biodiversity, supplying high quality habitat for many fish and wildlife species.

Fort Belvoir has approximately 1,150 acres of wetlands. There are four significant wetland areas, three of which are also designated as wildlife refuges. Federal laws regulate activities in tidal and non-tidal wetlands. Wetland boundaries are determined during a jurisdictional delineation in the field by United States Army Corps of Engineers (USACE). Construction in wetlands is possible but requires permits and mitigation such as wetland replacement or banking, in which wetlands are created elsewhere on Post or wetland credits are purchased from wetland banks (such as the Cedar Run and Bull Run Banks in Fauquier and Prince William Counties, Virginia). The Installation's policy is to mitigate wetlands within the same watershed as the impacted area before resorting to purchasing mitigation credits off site. Wetland credit approval takes several months and coordination with the Virginia Department of Environmental Quality (VDEQ) and the U.S. Environmental Protection Agency (EPA).

Figure 2.9 - Riparian Buffer and Wetlands Areas



Riparian Buffers

Riparian buffers are vegetated areas adjacent to intermittent streams and must be considered when planning development. Fort Belvoir requires a 35-foot riparian buffer along all intermittent streams. These buffers reduce the impacts of upland sources of pollution by trapping or filtering sediments, nutrients, and other chemicals from entering a water body (Figure 2.9).

The U.S. Environmental Protection Agency (EPA) defines riparian buffers as a vegetated system along a water body through which energy, materials, and water pass. Riparian areas characteristically have a high water table and are subject to periodic flooding and influence from the adjacent water body. These systems encompass wetlands, uplands or some combination of these two landforms.

Riparian buffers filter water as they intercept sediments, excess nutrients and other harmful pollutants before they reach a waterway. The roots of the vegetation reduce soil erosion and stabilize floodplains by reducing flow velocities. Riparian buffers provide habitat for wildlife by exporting detritus and branches for habitat structures.

Collectively, the 35-foot riparian buffer along intermittent streams and the RPAs that provide a minimum 100-foot buffer for perennial streams are all considered to be part of a larger riparian area to preserve the streams. Cumulatively, the riparian buffers and the Resource Protections Areas provide a total of approximately 4,170 acres that protect the Installation's water resources. Within these riparian areas, over 4200 linear feet of stream restorations and riparian buffers were completed on the Main Post in the last four years as part of BRAC mitigations.

Further details on the stream assessment surveys, wetland types, riparian buffers, RPAs, and applicable regulations and mitigation measures can be found in **Appendix B1 Supplemental Natural Resources Data**. For an overview of how Fort Belvoir's environmental site constraints align with Fairfax County Environmental Quality Corridors (EQC) policies, see **Appendix B2**.

Planning Considerations: Vegetation Areas

Forests

- While upland forested areas are typically developable, the Garrison's reforestation policy is to plant two trees, two inches in diameter for every tree with greater than or equal to four inches in diameter that is removed. The policy states that out-of-kind mitigations will be implemented if it is not possible to provide the required number of replacement trees on site.
- Configure development footprints to reduce clearing and grading on wooded sites, and when tree loss occurs, on-site reforestation is always the preferred option. If reforestation is not possible within the project limits, then other on-Post areas to consider include: RCI Housing areas, areas designated in the INRMP for riparian restoration and shoreline stabilization, along disturbed areas (i.e., road widening along Gunston and future Route 1 widening), abandoned utility stations and corridors, existing parking lots as part of ongoing maintenance and replacement program efforts. If tree replacement is not possible, out-of-kind mitigation considerations include stream restoration and removal of invasive species.
- On-site reforestation shall remain the preferred option for replanting; Fort Belvoir will make efforts to coordinate with Fairfax County Department of Public Works and Environmental Services - Stormwater Planning Division (DPWES-SWPD)regarding watershed and/or riparian buffer planting recommendations.

Wetlands

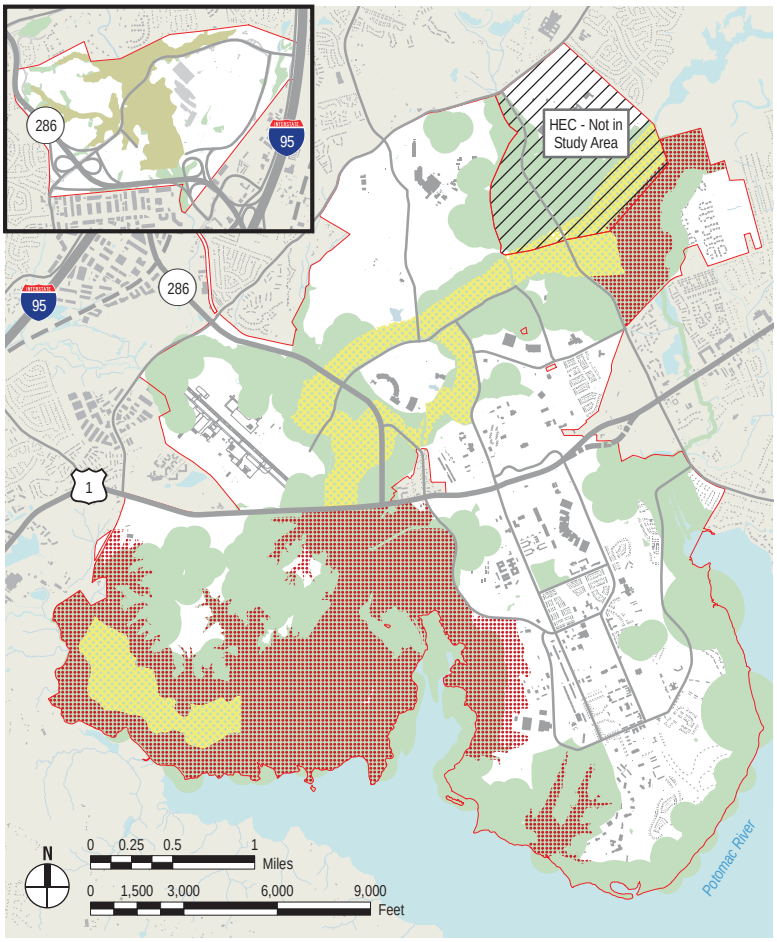
- Avoid adverse impact to existing aquatic resources; offset unavoidable impacts.
- Strive to achieve no net loss of value or functions of existing wetlands.
- Achieve no overall net loss of wetlands on Army-controlled lands.
- Protect existing, rehabilitate degraded, restore former and create new wetlands.
- Conservation of upstream areas will protect large wetland areas downstream from pollutants and help improve the Installation's waterways.

Planning Considerations: Vegetation Areas (cont.)

Riparian Areas

- Avoid adverse impact to existing riparian buffer resources; offset unavoidable impacts.
- Protect existing, rehabilitate degraded, restore former and create new riparian buffer
- Avoid development in riparian areas where possible. If unavoidable, incorporate stream restoration practices into design to ensure stream stability.
- Redevelopment of existing uses within riparian areas should, to the extent possible, provide for the restoration of degraded riparian areas. Redevelopment affords opportunities to improve stormwater management controls, and these redevelopment projects, particularly where proposed in riparian buffers, should be designed to provide controls for any previously unmanaged stormwater runoff.
- The only new development permitted within riparian areas is passive recreation uses and their associated site amenities provided these uses are constructed in a manner that does not result in clearing or that, if clearing is unavoidable, minimizes disturbance.
- Continuous riparian buffer areas shall be maintained, particularly in stream corridors and along the shoreline.

Figure 2.10 - Special Natural Areas



Accotink Creek Conservation Corridor

Forest and Wildlife Corridor

Wildlife Refuge Area

Ecologically Significant Flora and Fauna Area

Habitat

Fort Belvoir possesses a variety of habitat types and extensive areas of high-quality habitat. On Post, the Virginia Department of Conservation and Recreation (DCR) mapped 17 native ecological communities including 4 (wetland types) of high significance. These include Essential Fish Habitat, and habitat for federal- and state-listed threatened and endangered species; species at Risk for Listing; habitat for Species of Concern; breeding habitat for Partners in Flight High Priority Bird Species.

Special Natural Areas

An important element of the INRMP is the Special Natural Areas on Fort Belvoir, it includes ecologically significant natural resources areas on Post such as wildlife refuges; wildlife and conservation corridors; and ecologically significant flora and fauna areas (see Figure 2.10). Primarily, these areas were established and/or expanded as mitigation for major Installation construction/developments.

Planning Considerations: Habitat

- Development in special natural areas is not permitted.
- No facilities construction is permitted in the Forest and Wildlife Corridor, except for wildlife habitat enhancement. Fort Belvoir has designated the corridor an environmentally sensitive area, protected from development to ensure ecological integrity.
- The Fairfax County EQC is a comprehensive plan policy; it is not enforced by regulation. However, on FBNA, as part of BRAC 2005, Fort Belvoir has agreed to keep development outside the county-defined EQC, which is now called the Accotink Creek Conservation Corridor (ACCC).
- Fort Belvoir's environmental site constraints that include RPAs, riparian buffers, streams, 100-year floodplains, steep slopes, and special habitat areas compare and align with Fairfax County EQC policies. See **Appendix B2** for an EQC analysis.
- Continue to identify and manage rare and unique habitat communities that are identified in the INRMP. New projects located adjacent to these areas will conduct field surveys to reflect their actual limits as part of the site plan and construction process in order to preserve and protect them; and to manage these vegetative resources for biodiversity.

Small Whorled Pogonia
Source: http://www.sas.usace.army.mil/ppogonia.htm

Planning Considerations: Special Natural Areas

- Avoid adverse impact to existing special natural areas; mitigate unavoidable impacts.
- Protect existing, rehabilitate degraded and restore former special natural areas.
- Reduce excess impervious surfaces and enhance natural stream channel conditions when warranted throughout Installation watersheds.
- Along forest and wildlife corridors, add wildlife crossing structures at existing roads and reduce fencing in the area unless it is used to help direct wildlife into a wildlife crossing structure.
- Future development and/or redevelopment that is adjacent to Special Natural Areas may require field survey to be conducted. The Wetlands and Habitat Program Manager of DPW-ENRD will determine this requirement.

There are over 2,600 acres of protected wildlife refuges and corridors on Fort Belvoir. The wildlife refuges (over 730 acres) include Accotink Bay Wildlife Refuge, Jackson Miles Abbott Wetland Refuge and the T-17 area. The protected corridors include the Forest and Wildlife Corridor (1,753 acres) and the Accotink Creek Conservation Corridor (ACCC) (191 acres). The ACCC was established during the BRAC 2005 NEPA process.

There are ecologically significant flora an fauna areas that overlap but are not entirely included within the wildlife refuges and the corridors mentioned above. Approximately 530 acres of Fort Belvoir serve as buffers for flora (identified by U.S. Fish and Wildlife Service/ Virginia Department of Conservation and Recreation (USFWS/VDCR) as special species or listed by state/federal governments as threatened/endangered) or as potential habitat for threatened/endangered fauna species known to occur on the installation. Other conservation areas that support wildlife habitat and are identified as ecologically significant flora and faunas areas include early-successional habitat and wetland conservation areas. Additionally, there are approximately 3,750 acres of buffers for Partners in Flight (PIF) bird sightings on Fort Belvoir.

Habitat for the Northern Virginia Well Amphipod (Stygobromus phreaticus) is found in wetland seeps in the T-17 portion of Fort Belvoir. The Northern Virginia Well Amphipod is a species of concern in Virginia. Wood turtle (Glyptemys insculpta) has been sighted and documented on Fort Belvoir in Accotink Creek. The wood turtle and Peregrine Falcon are listed as state threatened species by the Virginia Department of Game and Inland Fisheries. Peregrine Falcon (Falco peregrines) has been observed using Fort Belvoir's stream corridors and Accotink and Pohick Bays to forage during migration and winter seasons. Potential habitat for the small whorled pogonia (Isotria medeoloides), a species listed as threatened by the U.S. Fish and Wildlife Service (USFWS), is found throughout Fort Belvoir. Small whorled pogonia is generally found within mature, mesic, hardwood-dominated forests on nearly level terrain, particularly on colluvial soils of stream terraces.

Special Fauna areas include the Bald Eagle, Furtive Forktail, Least Bittern, Amphipod, Paper Ponshell, Peregrine Falcon, Sphagum Sprite, Umber Shadowfly, Wood Turtle, and PIF Breeding Bird Buffers. Special Flora areas include the Small Whorled Pogonia, Tidal Freshwater Marsh Spikerush/ Golden-club, Tidal Freshwater Marsh Mixed, Coastal Plain/ Piedmont Acidic Seepage Swamp, Tidal Freshwater Marsh Wild Rice/Smartweed, Tidal Freshwater Marsh Mud Flat, and Tidal Hardwood Swamp.

Additional information on fish and wildlife species and their habitat is available in the Fort Belvoir INRMP. Further details on the programs governing Special Natural Areas and applicable regulations are included in **Appendix B1 - Supplemental Natural Resources Data.**

Biodiversity

One of the key goals of Fort Belvoir's INRMP program is biodiversity conservation to preserve and enhance its unique habitats. Biodiversity consists of the following three components:

- Genetic Diversity
- Ecosystem Diversity
- Landscape Diversity

Biodiversity is not a static condition. It is a dynamic process of change within the ecosystems and can be affected in a positive or negative way as a result of new development. The INRMP program recognizes the major influence that biodiversity has on the long-term stability and sustainability of its natural systems. New projects are encouraged to strive to design facilities that will establish a naturally maintained low impact system rather than one that requires human maintenance. Recent stream restoration efforts, as shown in the photo below, is just one example of how this can be achieved.

Mitigation Areas

Mitigation areas on the Post are areas set aside because of either a NEPA required action, such as the BRAC 2005 EIS ROD, or are permit requirements for the construction of other Installation programmed projects (Figure 2.11). Mitigation areas are legally binding agreements between the Garrison Commander and the governing state and federal agencies responsible for regulating these protected resources. Mitigation areas contain stringent regulatory requirements for their protection and in some cases require ongoing monitoring efforts (e.g., to establish compensatory replacement wetlands) and are not open for development. This section briefly outlines these mitigation areas that impact future development on Fort Belvoir.

Existing Mitigation and Conservation Areas

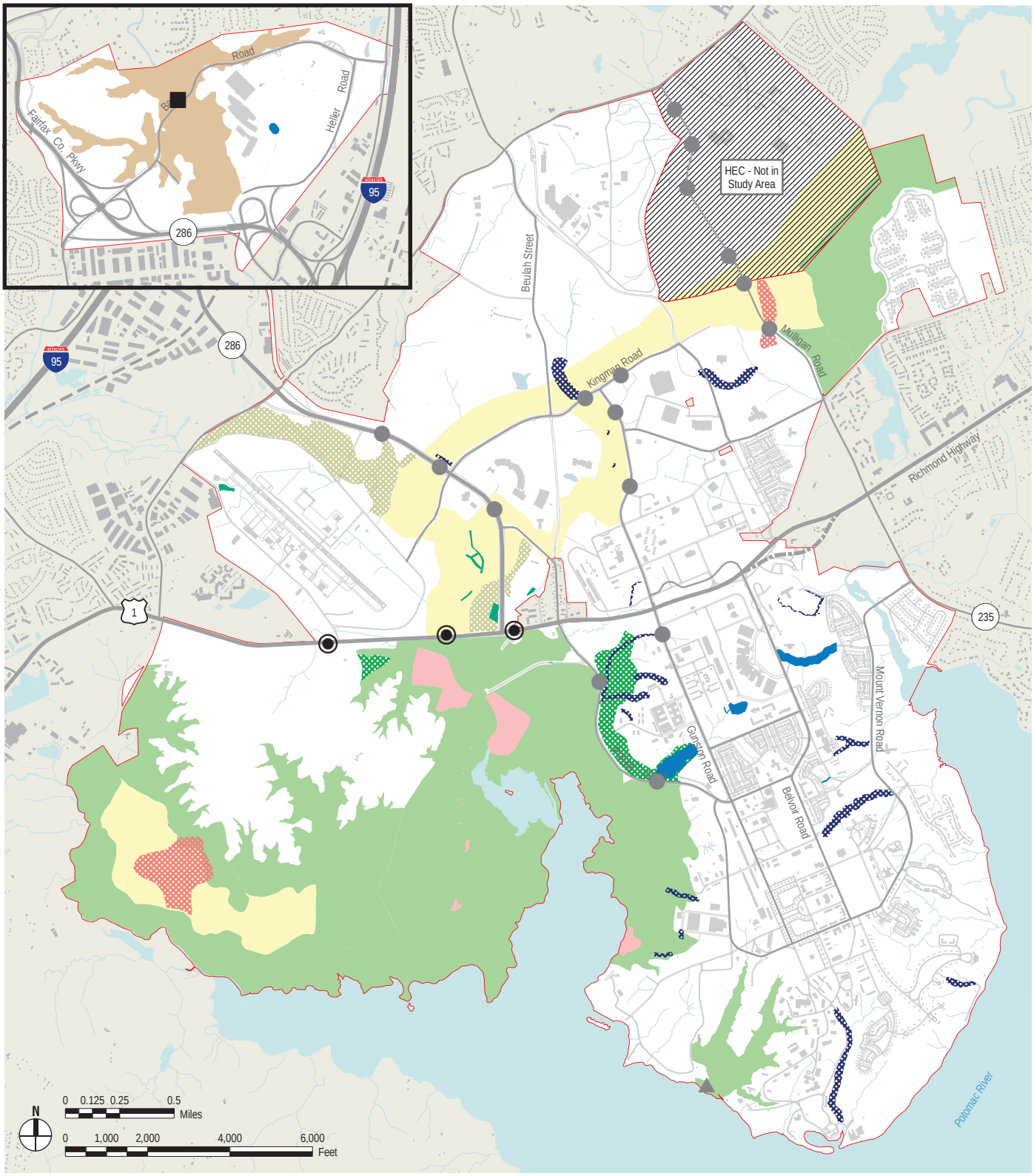
Accotink Creek Conservation Corridor. A stream corridor at Belvoir North Area dedicated as a Special Natural Area as a mitigation for BRAC 2005. The corridor boundaries were created using the Fairfax County's Environmental Quality Corridor criteria and adjusted to include adjoining steep slopes that fell outside the area delineated by the County's criteria.

Stream Mitigation Areas. Presently, the Installation has identified and targeted 19 sites for stream restoration and wetland mitigation. Five stream segments were reconstructed and restored as mitigation for BRAC 2005 and as elements of the stormwater systems for certain BRAC projects. These include three stream segments near the Fort Belvoir Community Hospital on Main Post and one at Fort Belvoir North Area. The remaining project sites are either in the concept or design phases. The locations of these mitigation areas are shown on Figure 2.11. Once completed, these areas are monitored and evaluated to ensure the mitigation measures are successful. Fort Belvoir's DPW-ENRD utilizes a sub-watershed integrated aquatic resources plan to preserve and enhance the ecological resources within the Installation.

Wetland Mitigation Areas. The following wetland mitigation areas shown below are also included in Figure 2.11:

- Fairfax County Parkway. Several wetland mitigations were constructed to mitigate for wetlands loss during the construction of the Fairfax County Parkway in 1995. Areas are located to the northwest of the Fairfax County Parkway/Route 1 intersection.
- Davison Army Airfield. Approximately one acre of wetlands was constructed in 1994 to mitigate for construction.
- 300 Area Pier. Submerged Aquatic Vegetation plantings were installed in 2002 along the shoreline to mitigate for boat ramp construction.

Figure 2.11 - Mitigation Areas



Completed Mitigation Sites:

- Trail Mitigation Area
- Wildlife Crossing Mitigation Area
- Accotink Creek Conservation Corridor
- Forest and Wildlife Corridor
- PIF Mitigation Area
- Stream Mitigation Area
- Wetland Mitigation Area
- Refuge Mitigation Area

Proposed Mitigation Sites:

- Bridge Mitigation Area
- Wildlife Crossing Mitigation Area
- Forest and Wildlife Corridor
- PIF Mitigation Area
- Stream Mitigation Area
- Refuge Mitigation Area

Partners in Flight Habitat Restoration. Partners in Flight (PIF) is a national program established to conserve bird populations and their habitats on public and private lands. Fort Belvoir conducted surveys and found that the Installation has a diverse abundant migratory bird population. The PIF mitigation areas are early-successional habitats identified to support PIF's high priority bird species. As a result of the NEPA process, several PIF areas were recently identified and restored. These high priority bird habitat areas were planted with native grasses, trees and shrubs to improve depleted habitats for the benefit of PIF's high priority bird species as well as other species in the special natural areas. The habitat restoration was performed as a mitigation for BRAC 2005.

Forest and Wildlife Corridor (FWC). Established as a mitigation for BRAC 1988, the corridor is a dedicated forest land tract that extends from the northeast portion of Main Post to the Southwest Training Area. The corridor was established to provide wildlife a migration corridor between large tracts of undeveloped land (Huntley Meadows Regional Park, Pohick Bay Regional Park), thereby ensuring genetic diversity by allowing wildlife movement across property boundaries. The FWC is transected by several roadways but contains numerous wildlife crossings to ensure safe passage.

Accotink Bay Wildlife Refuge. Originally established in 1979 as a mitigation for building development by the Army Engineer School, the refuge boundaries have been expanded three times. The latest boundary expansion was a mitigation for BRAC 2005 actions.

Jackson Miles Abbott Wetland Refuge. Originally established in 1989 to commemorate Jackson Miles Abbott, a retired Army Lieutenant Colonel, for his contributions to the Army and conservation. The refuge was originally 160 acres and was expanded by 32 acres as mitigation for BRAC 2005 actions.

T-17 Refuge. The T-17 Refuge was established as part of the mitigations presented in the BRAC 2005 EIS ROD. The area supports habitat for the Northern Virginia Well Amphipod (Stygobromus phreaticus), a Virginia species of concern and a Species at Risk for listing in the Endangered Species Act. This species is found in seeps.

Wildlife Crossings. Ten wildlife crossings were installed in conjunction with the BRAC infrastructure upgrades at various road sections where biologists identified frequently used wildlife travel corridors such as stream crossings and ravines. As a follow-on to BRAC 2005, three wildlife crossings are going to be added to the Route 1 widening project. Six wildlife crossings were installed at appropriate points in conjunction with the Mulligan Road project, which transected the Forest and Wildlife Corridor as part of military construction (MILCON) projects.

Restoration and Enhancement Areas. In addition, Fort Belvoir has performed restoration and enhancement work in various locations on the Post as stewardship actions, not because of requirements for a permit or FNSI/ROD. Invasive species control, stream bank stabilizations, PIF habitat enhancements, and wetland and tree plantings are a few of these restoration activities that enhance Fort Belvoir's existing and proposed mitigation areas.

This stream was engineered to reduce water flow and allow runoff particulates to settle out in larger pools as part of the Fort Belvoir stream restoration efforts.
(Photo by Gregory W. Fleming, Fort Belvoir DPW-ENRD)

Planning Considerations: Mitigation Areas

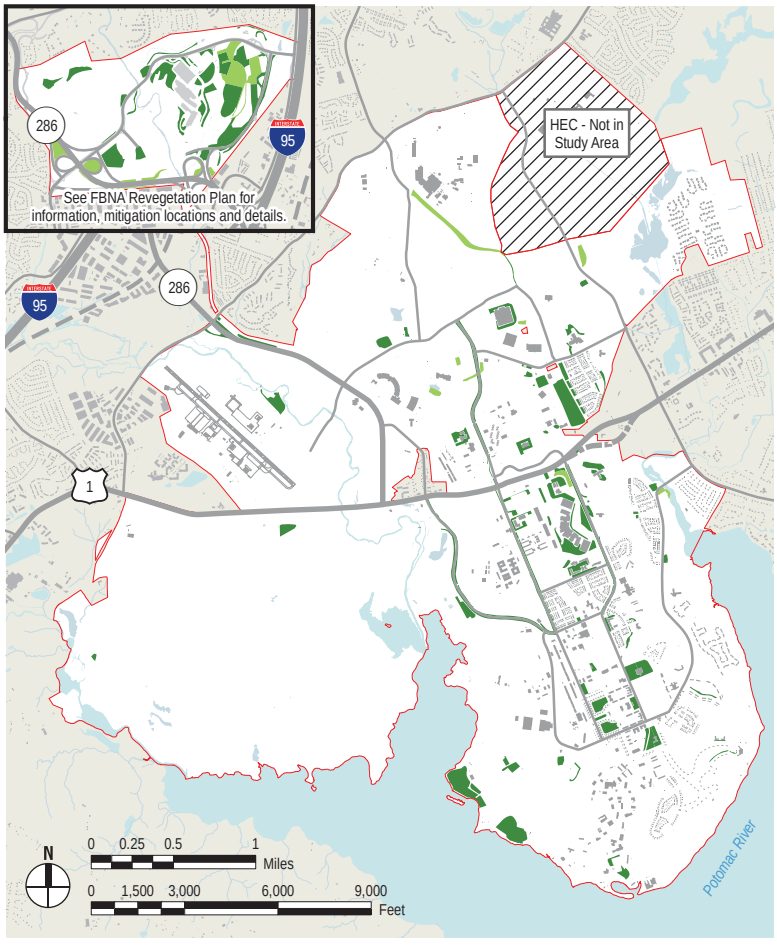
- Avoid adverse impacts to existing aquatic resources, streams, wetlands, riparian buffer resources, and special natural areas or offset unavoidable impacts.
- Protect existing, rehabilitate degraded, restore former and create new wetlands, riparian buffers, and special natural areas.
- All stream restoration and wetland mitigation areas are to be avoided, preserved and protected.
- All PIF habitat restoration areas are to be avoided. PIF mitigation areas shall continue to be enhanced and preserved by the Installation in support of the PIF initiative, and state, federal, and DoD regulations.

Proposed Natural Resources Mitigation Strategies

Natural resource-related mitigations for each short-term project will be regulated through the Fort Belvoir Tree Replacement and Protection policy. Mitigations under this policy are determined by the number of trees 4-inch diameter-at-breast-height (dbh) that are removed due to development. The policy provides for several mitigation options including replacing the lost trees at a 2 to 1 ratio or an out of kind mitigation such as stream restoration or Partners In Flight (PIF) habitat enhancement. The out-of-kind mitigation budget is determined by the current industry cost of the 2 to 1 tree replacement option, and the final mitigation project is chosen by DPW-ENRD staff. Areas for PIF habitat mitigations and potential future tree mitigation plantings are shown in Figures 2.11 and 2.12.

Fort Belvoir proposes to mitigate the cumulative impacts of implementing the 50 short-term projects through a two-fold approach. First, additional areas of land will be added to Fort Belvoir's Forest and Wildlife Corridor and the Accotink Bay Wildlife Refuge. These land parcels contain sensitive areas such as wetlands, locally rare ecotypes, and wildlife migration corridors. Protecting these parcels under the FWC and ABWR designation will preserve their ecological value. Second, the installation will pursue funding to assess, design, and restore seventeen degraded stream segments. These stream restoration projects may include repairs such as culvert removals or more extensive stream channel restoration and bank stabilization. An initial stream assessment will determine the proper restoration strategy. The seventeen stream segments are shown in Figure 2.11.

Figure 2.12 - Tree Mitigation Areas



Existing Tree Mitigation Area

Proposed Tree Mitigation Area

Existing Tree Reforestation Program

When BRAC 2005 became law, one of the major measures pursued to mitigate the environmental impact of biological resources was the continuation of a long standing priority of replacing trees at a two-for-one ratio. In keeping with this tradition, the BRAC 2005 EIS ROD committed to replace any removed tree with diameters greater than or equal to four inches with two other trees on Fort Belvoir property.

Revegetation and landscaping projects are ongoing efforts on the Post; however, with completion of BRAC 2005 in 2011, the Installation has planted thousands of specimen trees and seedlings. The selection of plant materials is based on native species, such as various oak species, Virginia pine seedlings, and Dutch Elm disease-resistant American elm cultivars. These primary cultivars are not only beneficial to wildlife, but ensure that these plantings have the best shot of surviving. The average tree newly planted in the urban landscape has a lifespan of less than ten years due to poor cultural practices and poor initial planting. To help overcome this issue, the tree planters place a plastic

Planning Considerations: Tree Reforestation Program

- Impacts to tree reforestation in non-buildable areas are to be avoided; these mitigation areas are considered permanent reforestation.
- Tree reforestation in buildable areas shall also be avoided; however, they may be removed and relocated to other areas, if necessary, to support future development.
- When tree reforestation is required and cannot be provided on-site, off-site areas that can buffer incompatible land uses, to provide screening and enhance or expand riparian buffers, is encouraged.
- Tree mitigation shown on FBNA, that was created as part of BRAC 2005 and is located on buildable land, could be relocated with future development subject to meeting Fort Belvoir's tree replacement requirements.

tree tube around each hardwood seedling. This tube helps retain moisture and warmth for the tree and protects it from elements as well as animals, especially deer. With the protective measures, Fort Belvoir ENRD staff estimates that 80 percent will survive at least five years.

These tree replacement and mitigation sites have occurred on both developable areas and non-developable areas (Figure 2.12). Where planting has occurred in developable areas, consideration has been given to future uses for screening purposes and enhancing existing uses; in non-buildable areas the planting has been used to enhance existing native woodland species. In addition, the tree reforestation program includes the removal of invasive and exotic vegetation control. The removal of invasive species improves the health of native species and provides cleared areas for potential reforestation. Figure 2.12 depicts both permanent and temporary tree replacement and mitigation areas. Temporary areas are those sites that can be impacted and removed with future development provided a suitable replacement site is available.

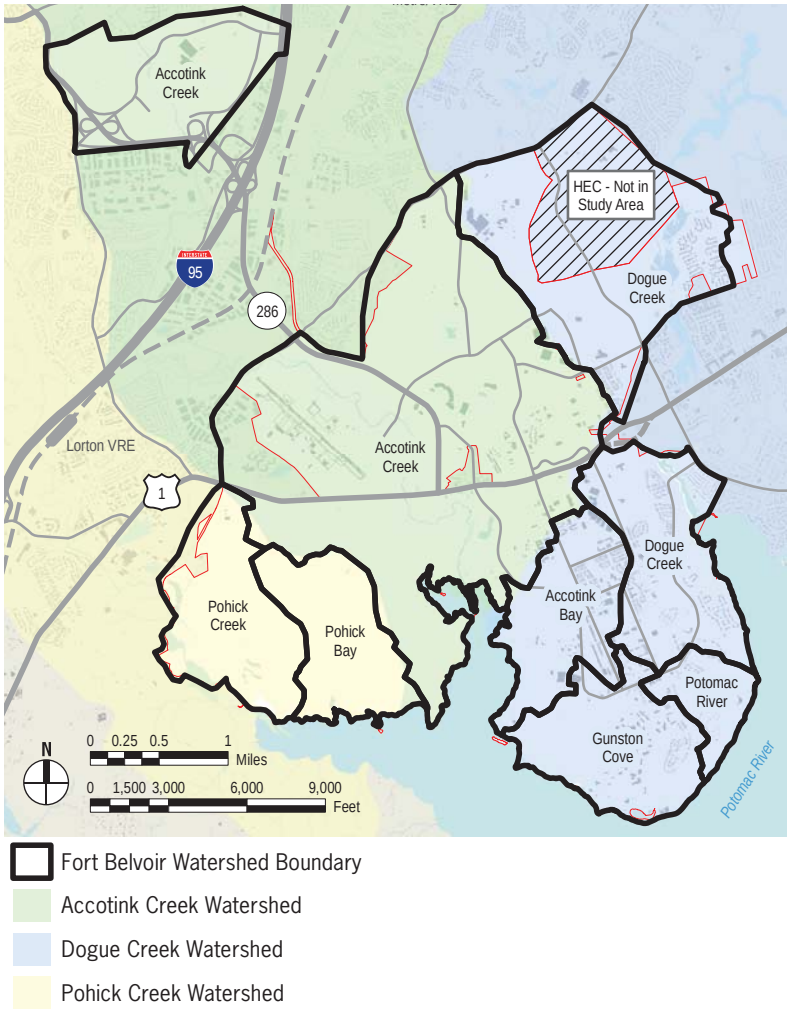
Out-of-Kind Replacement. In accordance with Fort Belvoir Policy Memorandum #27, dated 11 October 2012 and signed by the Garrison Commander, the tree replacement policy now allows for out-of-kind replacement if it is not possible to plant the required number of replacement trees. Out-of-kind replacement includes alternatives such as "environmentally-benefical restoration, enhancement or preservation measures." The specific treatments would be determined on a project-by-project basis as part of the site plan review and approval phase conducted by DPW ENRD. DPW approval of out-of-kind compensatory measures requires that the funding must be equivalent to that required to plant the remaining trees. ENRD maintains a list of mitigation and restoration options and restoration sites. A copy of the Commander's Policy Memorandum #27 is in **Appendix B3** of this document.

Watershed Conditions

Figure 2.13 shows the three Fairfax County identified watersheds that cover Fort Belvoir: Accotink Creek, Dogue Creek and Pohick Creek. The graphic also identifies the seven watersheds identified in the Fort Belvoir's INRMP.

In 1999, Fort Belvoir conducted a baseline watershed survey and further delineated Fort Belvoir's seven main watersheds into 53 sub-watersheds (described on Page 7-6, Figure 7.2 of the INRMP). This comprehensive baseline watershed survey was undertaken to characterize installation waterways and their associated watersheds, to identify existing stream problems and to recommend concepts to correct problems. (Watershed conditions are described on Page 7-6, Figure 7.2 INRMP). A stream corridor assessment was also undertaken to address problem conditions identified in the baseline survey and to develop management recommendations. The recommendations developed in the INRMP form the overarching basis for the Installation's watershed management and conservation practices today. This watershed management approach guides project decision making on stormwater management; erosion control; water quality; stream restorations and riparian buffer plantings, maintenance and protection; and fish and wildlife habitat protection and restoration. Some of the recommendations from the INRMP program have been implemented, whereas others have yet to be executed. Information on the Installation's watershed management approach for stormwater improvements, stream restoration and mitigation can be found in **Section 5 Infrastructure Plans**.

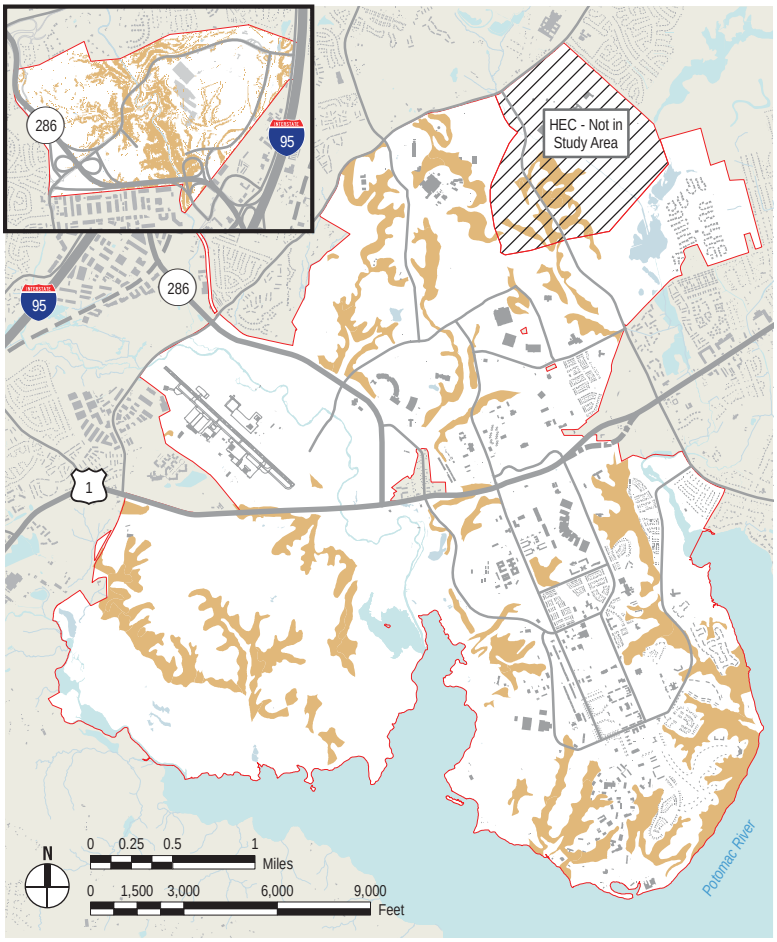
Figure 2.13 - Fort Belvoir Watersheds



Topography and Soil Conditions

The topography of Fort Belvoir is characterized by upland plateaus (40 percent), lowlands (40 percent), and steeply sloped terrain (20 percent) (Figure 2.15). Elevations range from approximately sea level along the Potomac River to roughly 300 feet above mean sea level (msl) on FBNA (Fort Belvoir INRMP, 2001).

Figure 2.14 - Topography Conditions



Planning Considerations: Topography and Soils

- Though discouraged, construction on steeply sloped terrain greater than 15 percent that is located outside RPA and Riparian Areas is reviewed on a case-by-case basis by analyzing individual building sites and appropriate engineering practices. Development on steep slopes located adjacent to streams and floodplains is not permitted.
- The Commonwealth of Virginia mandates erosion/stormwater control techniques be implemented during and after construction of all facilities and site elements on Fort Belvoir, especially on highly erodible soils. Costs shall be incorporated into design and construction costs if additional mitigation is required for highly erodible soils or steep slopes.

Air Quality

Fort Belvoir is designated as a major stationary source of air emissions because of its potential to emit greater than 100 tons per year (tpy) of a criteria pollutant. In addition, Fort Belvoir is located within a non-attainment area for both ozone and very fine particles. Given the possibility of future projects to exceed emissions thresholds for non-attainment pollutants and their precursors, and the following general conformity rule (GCR), Fort Belvoir will ensure that any new project will not:

- Cause or contribute to any new violations of any National Ambient Air Quality Standards (NAAQS) in an area;
- Increase the frequency or severity of any existing violation of any NAAQS in an area; and
- Delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in an area.

Planning Considerations: Air Quality

- All new air emissions contribute to an already existing regional air quality problem. New stationary source emissions that exceed Non-attainment New Source Review (NSR) thresholds will trigger stringent regulatory requirements.
- Non-attainment NSR requires employing state-of-the-art emission controls on all new stationary sources using low-emission construction techniques, and/or obtaining emission offsets within the region.
- The Non-attainment NSR process can take up to two years. However, available sources of emission offsets are very limited within the applicable non-attainment area.
- Non-attainment NSR permits are issued by VDEQ. They are required for new major sources or existing major sources making a major modification in a non-attainment area. NSR permits are legal documents that specify what construction is allowed, what emission limits must be met, and how the source must operate. To assure compliance, permits also require monitoring, record keeping, and reporting.
- In addition, all future actions will be required to comply with the general conformity rule; a formal conformity determination will be necessary. Because the State Implementation Plans (SIPs) are currently under development for the region, strict emission controls and contemporaneous emission offsets may be required to ensure these guidelines are met.

Cultural and Historic Resources

Fort Belvoir has a commitment to stewardship of the land it occupies, and recognizes the importance of its history, both before and after it became a U. S. Army installation. There are many sources that describe this history, including the Fort Belvoir web site (http://www.belvoir.army.mil), from which much of the general overview of Fort Belvoir's history presented here is extracted. Scholars and independent historians continue to be interested in the historical themes that relate to Fort Belvoir and the surrounding region. With input from stakeholders, including the National Trust for Historic Preservation, the Mount Vernon Ladies Association, the Gum Springs Historical Society, Fairfax County, and many other local entities, the region's historical narrative continues to grow and develop.

From a master planning viewpoint, history is important because historical activities and artifacts, and past development, all affect how we plan and build at Fort Belvoir today. Cultural resources such as archaeological sites and historic structures provide both constraints and opportunities for planners. Constraints include development restrictions such as those related to the potential for archaeological resources to be present in proposed development areas, while opportunities include the adaptive reuse of historic buildings and site design.

This section provides a brief overview of Fort Belvoir's history, and then discusses the historical and archaeological resources on Fort Belvoir and in the surrounding region.

Fort Belvoir's History

Early History. The Fort Belvoir region was first settled about 11,500 years ago. At that time, the climate was significantly colder and the coast of North America lay nearly 160 miles further east than it is today. The Belvoir peninsula was a high upland and the Potomac River a small stream. Early peoples in the area traveled in small groups and relied heavily on hunting and gathering for survival. As the glaciers slowly receded during the next several thousand years, the climate grew warmer and sea levels rose.

By about 2,750 B.C., the region's climate had stabilized close to what it is today. Early peoples wandered less as local food resources became more abundant. Instead, they established larger more permanent camps near rivers and streams, where a variety of important resources were within easy reach. Many archaeological sites have been identified at Fort Belvoir that provide insight into the prehistory of southeastern Fairfax County. Projectile points, ceramics and other artifacts found in the county represent over 8,000 years of human occupation in the region.

The Seventeenth Century. After England's establishment of the Virginia colony, English settlers began arriving to claim large tracts of land for agrarian use. This period of history marked the beginning of large plantations. By 1690, much of the waterfront property that today is included within Fort Belvoir had been patented and subdivided.

The Eighteenth Century. During the 1730s, Colonel William Fairfax purchased 2,200 acres of land, much of which is now considered Fort Belvoir, and built the Belvoir Mansion plantation. He named the new manor Belvoir, a French word meaning "beautiful to see." By 1750, navigable rivers like the Potomac were the main commercial arteries of the Virginia colony. At this time, four large homes were located in the area: George Mason's Gunston Hall, Colonel Dennis McCarty's Cedar Grove, William Fairfax's Belvoir Manor, and Lawrence Washington's Mount Vernon. George William Fairfax left Belvoir in 1773 to return to England to reclaim ancestral lands. Without a household to maintain the plantation house, it fell into gradual decline and was never re-occupied. Belvoir manor house burned in 1783 and its ruins were further demolished by British cannon fire during the War of 1812 "Battle of the White House."

The Nineteenth Century. Construction of Woodlawn Plantation began in 1800. The plantation house was built upon land given by George Washington to his step-granddaughter, Eleanor Custis, and his nephew Major Lawrence Lewis as a wedding present. The house was designed in the Georgian/Federal style by Dr. William Thornton, architect of the U.S. Capitol, and was completed in 1805.

Eventually, soil exhaustion and inheritance would prompt the sale and sub-division of many of the large eighteenth and early nineteenth century land holdings in the Fort Belvoir area. Former plantation land was bought by many settlers from northern states. The ruins of Belvoir Manor remained, while the surrounding land was divided into small agricultural parcels. Among the new arrivals to the area were members of the Society of Friends (Quakers) from New Jersey and Pennsylvania who purchased the Woodlawn Mansion and surrounding 2,000-acre Woodlawn tract, as well as nearby Mount Vernon lands. They divided and sold the land as small farms to other like-minded Quakers, Baptists and free blacks. By 1850 the Quakers and Baptists had created a thriving agricultural community at Woodlawn and commercial center at Accotink.

In order to establish a system of agriculture that was not based on slave labor, the Quakers and Baptists engaged in timber harvesting and preparation of land for farms, gardens, and orchards. This progressive community helped foster land ownership among the growing population of free black residents whose families had resided in the surrounding area for many years before the arrival of the Quakers. The established African-American community remained in the Woodlawn neighborhood until the expansion of Fort Belvoir at the beginning of World Wars I and II.

Woodlawn residents, including many Quaker and African American families, were displaced when their properties were either purchased by the Army, or taken by eminent domain. Some of the Woodlawn neighborhood's African American families moved to Gum Springs, a historically black community just north of Mount Vernon. The Woodlawn Methodist Church was relocated to Gum

Springs, along with most of its congregation. The church's burial ground remains, an inholding within Fort Belvoir, and continues as an active cemetery. The Woodlawn Quaker Meetinghouse and the Woodlawn Baptist Church are still active places of worship in the area today.

In addition to the Quakers, the Otterback family utilized the land for timber farming and established the White House fishery along the Potomac River. During the Civil War, the presence of both Union and Confederate forces in southeastern Fairfax, disrupted the lives of the area's residents and devastated much of the area's farm and timber land. Both Pohick Church and the Woodlawn Quaker Meetinghouse were occupied by soldiers during the conflict. Despite the disruption, many of the families that had moved into the region before the war remained, and both the black and the white communities developed strong social and cultural institutions in the post-Civil War years.

Continual subdivision of land through both sale and inheritance led to the development of smaller farms and a more dense population. Much of the land near Woodlawn owned by Quakers and other northerners, as well as free black farmers, would become the site of Fort Belvoir's Commissary, Lewis Village, and Fort Belvoir Elementary School.

Aerial view of Fort Humphreys, 1932

The Original Fort Humphreys' Plan Still Exists

1917-1918: Establishment of Camp A. A. Humphreys. In 1912, the Engineer School began conducting training exercises on government-owned parcels, located near and on Fort Belvoir. America's entry into World War I in April 1917 led to a wave of military construction. Named in honor of Civil War commander and former Chief of Engineers (1866-79), Major General Andrew A. Humphreys, construction of the temporary cantonment known as Camp A.A. Humphreys began in January 1918. Fourteen farms on the peninsula between Accotink and Pohick Creeks were transformed into target ranges; two large parcels along Dogue Creek were taken through government condemnation proceedings; and a 3,300-acre parcel that today comprises most of the North Post and Davison Army Airfield was purchased by 1918.

Transportation systems and utilities were also improved. Previously, the most direct access to the Belvoir Peninsula had been by boat down the Potomac River from Washington, D.C. The unpaved Washington-Richmond Highway (U.S. Route 1) was surfaced with concrete in 1918, and a plank road was constructed that linked the camp to the Washington-Richmond Highway. Standard gauge and narrow gauge railways followed.

To accommodate the 20,000 men anticipated at the camp, plans called for the construction of 790 temporary wood-frame buildings. Within only four months of the start of construction, Camp A.A. Humphreys was in full swing. Several schools operated here during World War I, including the Army Gas School and the School of Military Mining. At war's end in November 1918, the Camp became a demobilization center where troops were prepared for their return to civilian life.

Inter-War period: 1919-1939. Camp A.A. Humphreys remained active after the war and continued to expand. By 1919, the camp had grown from its original 1,500 acres to approximately 6,000 acres, and the Engineer School was officially relocated here from the Washington Barracks. Camp A.A. Humphreys was designated a permanent post in 1922 and renamed Fort Humphreys. In 1926, the Army initiated an ambitious, nation-wide building program. Many of the Fort's most important buildings were constructed as a result of this program. These included officer and non-commissioned officer (NCO) housing, barracks, administrative buildings, and a hospital – all designed in a Colonial Revival style.

The elaborate new layout for Fort Humphreys called for separate functional areas united in a formal plan. Administrative and instructional buildings were arranged along one side of the parade ground, with the barracks, theater, gymnasium, Post Exchange (PX), and post office in two squares on the opposite side of the parade ground. NCO housing was arranged in two blocks behind the barracks area, while the officers' housing was placed along a picturesque, curving road in a park-like setting. Warehouses and support buildings were located at the edge of the new Post in this plan. The layout of this formal plan remains intact today with the Fort's national register eligible historic district.

Housing in Belvoir Village - Built in 1934-35

In 1935, the name of the installation was changed from Fort Humphreys to Fort Belvoir. It is said that the name change occurred after President Franklin D. Roosevelt's visit to neighboring Gunston Hall. Louis Hertle, the owner of Gunston Hall, spoke of the vibrant history of the area, which inspired the President to initiate the new name of the Post in honor of the historic Fairfax estate.

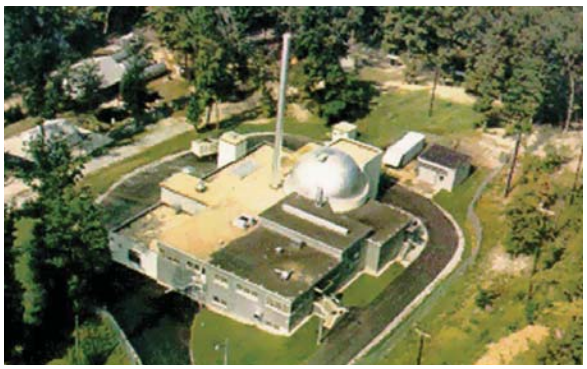
World War II Period: 1940-1945. During World War II, Fort Belvoir expanded; an additional 3,000 acres north of U.S. Route 1 were acquired to make room for the new Engineer Replacement Training Center (ERTC). At the height of World War II, the ERTC turned out 5,000 trained engineer soldiers per month. The massive influx of inductees at Fort Belvoir prompted another wave of temporary construction. Housing was constructed for approximately 24,000 enlisted men and officers. Like the temporary structures built during World War I, the World War II-era, wood-frame buildings were designed to be simple and inexpensive to construct.

The Engineer Board, responsible for the Corps' research and development activities, also grew during the war years. The Engineer Board conducted most of its testing and development at the Engineer Proving Ground (EPG); 807 acres acquired in 1940. In 1963, the EPG was renamed the Fort Belvoir North Area (FBNA).

Post World War II: 1946-1988. After World War II, less training was required and Belvoir's mission began to shift more toward research, development and testing. Perhaps no structure on the Post illustrates Fort Belvoir's research and development phase more than the SM-1 (Stationary, Medium Power, First Prototype) nuclear power plant. The SM-1 Plant, the first national nuclear training facility for military personnel, became operational in 1957 and remained in operation until its decommissioning in 1973.

The innovative initiatives pursued at Fort Belvoir during the post-war period were also illustrated in its residential architecture. In 1948, the well-known architectural firm of Albert Kahn & Associates designed and oversaw construction of the Thermo-Con House. This full-scale prototype was to exemplify a methodology for low-cost, mass-produced housing. Prospective Army residents, however, rejected the design concept, and no additional structures were built.

Fort Belvoir's mission began to expand in other directions between 1950 and 1980. During that time, the Post began playing host to a variety of organizations. These included the DeWitt Hospital, the Defense Systems Management College, and the Defense Mapping School (DMS). Due to a shortage of land for training at Fort Belvoir, the Engineer School relocated in 1988 to Fort Leonard Wood, Missouri. Testing and training operations at the FBNA ended. Although Fort Belvoir's role as an engineer training center diminished, the Post continued to fulfill an important and valuable role - providing essential administrative and basic operations support to its tenant organizations.



SM-1 Plant

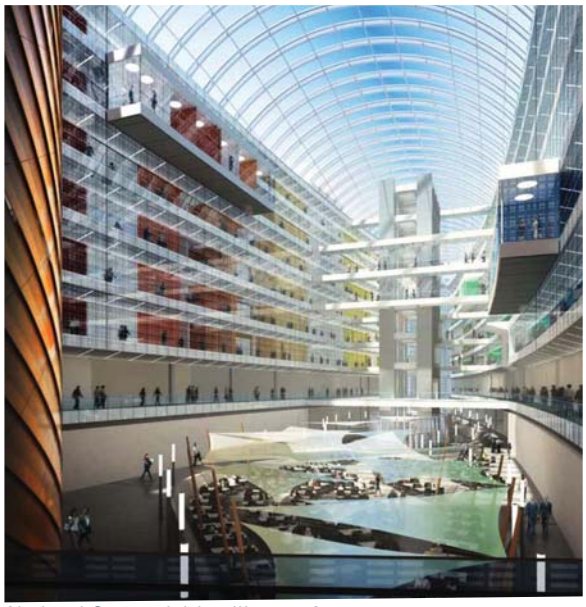
Thermo-Con House

BRAC: 1989-Present. Beginning in 1989, Fort Belvoir, like many other Department of Defense (DoD) installations, was subject to a series of the new Base Realignment and Closure (BRAC) legislations. There were four BRAC legislations from 1989-1995, resulting in a number of large agencies, including the Defense Logistics Agency (DLA) and the Defense Threat Reduction Agency (DTRA) relocating to new facilities on Fort Belvoir.

Following the terrorist attacks on 11 September 2001, the Post initiated new security requirements for access onto the Post. A number of agencies in locally leased facilities also began to move to Fort Belvoir for security purposes. In 2005, the fifth BRAC action and first since 1995, directed the largest BRAC net population gain of any DoD installation to Fort Belvoir. The Installation (Main Post and the sub-installations) would have a net gain of 19,300 personnel. This action essentially doubled the size of the garrison.

Defense Logistics Agency

National Geospatial-Intelligence Agency



National Geospatial-Intelligence Agency

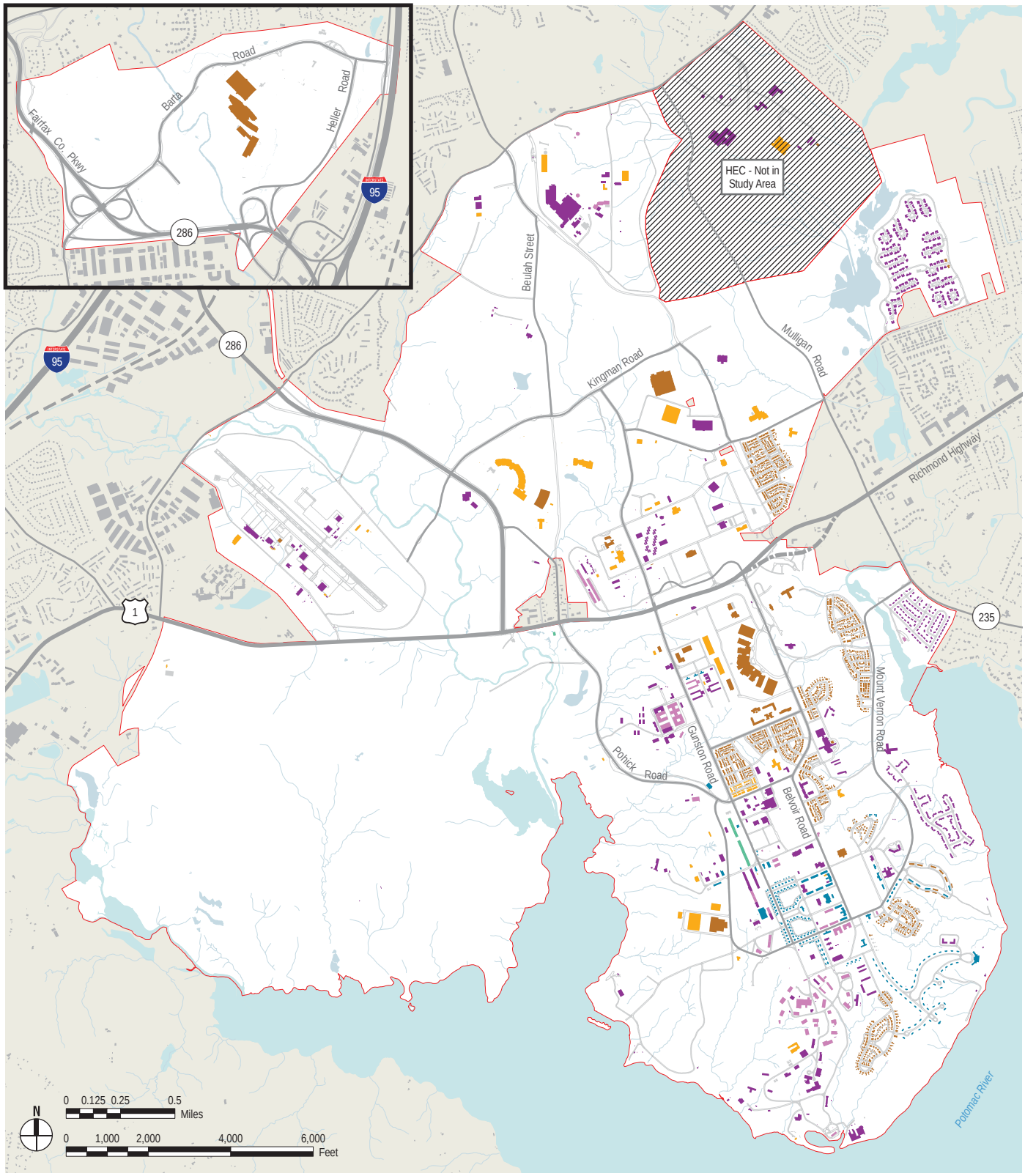
Fort Belvoir Community Hospital

Implementation of BRAC 2005 on Fort Belvoir involved constructing more than $4 billion in projects. This was the largest BRAC military construction program in history to date. It included construction of the Fort Belvoir Community Hospital and the Missile Defense Agency (MDA) on Main Post; the National Geospatial-Intelligence Agency (NGA) on the Fort Belvoir North Area; two large office buildings at the Mark Center in Alexandria for the Washington Headquarters Services; the Joint-Use Intelligence Analysis Facility (JUIAF) at Rivanna Station in Charlottesville, Virginia; and a host of associated infrastructure improvements on- and off-post. These improvements included the construction of the final section of the Fairfax County Parkway along the southern border of the North Area. Renovations to existing buildings to accommodate approximately 3,000 incoming personnel working in leased office space in the National Capital Region were another major accomplishment of the BRAC program.

The map (Figure 2.16) on the following page depicts the current facilities on Fort Belvoir and the time period in which they were constructed.

Today, Fort Belvoir continues its historic transformation, expanding its role as a strategic sustaining base for America's armed forces worldwide. To carry out this mission effectively, Fort Belvoir has evolved from a traditional military post to a more broadly based community. In many ways it currently functions like a small city, with its own ordinances, land use plan, building codes, utilities, public parks, and academic institutions. Fort Belvoir continues to be "beautiful to see", situated on a hilltop overlooking the Potomac with abundant wildlife and wetlands surrounding a diverse mixed-use community. This master plan integrates and respects this great history as the Post looks forward to the future and continues to be the Army's installation of choice for soldiers, families, civilians, and retirees.

Figure 2.15 - Development Pattern Over Time



1917-1918: Est. of Camp A.A Humphreys
1919-1939: Inter-War Period
1940-1945: World War II
1946-1988: Post World War II
1989-2004: Previous BRAC
2005-Present (includes BRAC 2005 projects)

Historic and Archaeological Resources

Fairfax County has an active historic preservation program within the Department of Planning and Zoning and the Park Authority. The County's historic property inventory has identified a number of resources located on or adjacent to Fort Belvoir. Three of the historic properties near Fort Belvoir have an established historic overlay district: Mount Air, Pohick Church, and Woodlawn (see Figure 2.17). Although Fort Belvoir is not required to follow County regulations for these districts, the installation takes into consideration the surrounding area when making planning decisions and consults with the County as needed.

Federal legislation and Army Regulations require that Fort Belvoir manage cultural resources on the installation. To that end, Fort Belvoir has a Cultural Resources Management Program within the Directorate of Public Works' Environmental and Natural Resources Division. The Cultural Resources Management Program is responsible for identification and management of historic properties on the installation, compliance with Section 106 and 110 of the National Historic Preservation Act (NHPA) and other cultural resources laws, and public interpretation of cultural resources on the installation.

Fort Belvoir's historic properties identification efforts have resulted in a comprehensive assessment of the installation for archaeological resources. The assessment is the culmination of multiple archaeological surveys using the latest techniques and methods. These surveys have resulted in the identification of more than 300 archaeological sites, of which more than 150 have been either recommended for further study or determined eligible for listing in the National Register of Historic Places (NRHP). One archaeological site, Belvoir Mansion Ruins and the Fairfax Grave Site (44FX0004), is listed in the NRHP. No archaeological resources were found within the Fort Belvoir North Area (FBNA).

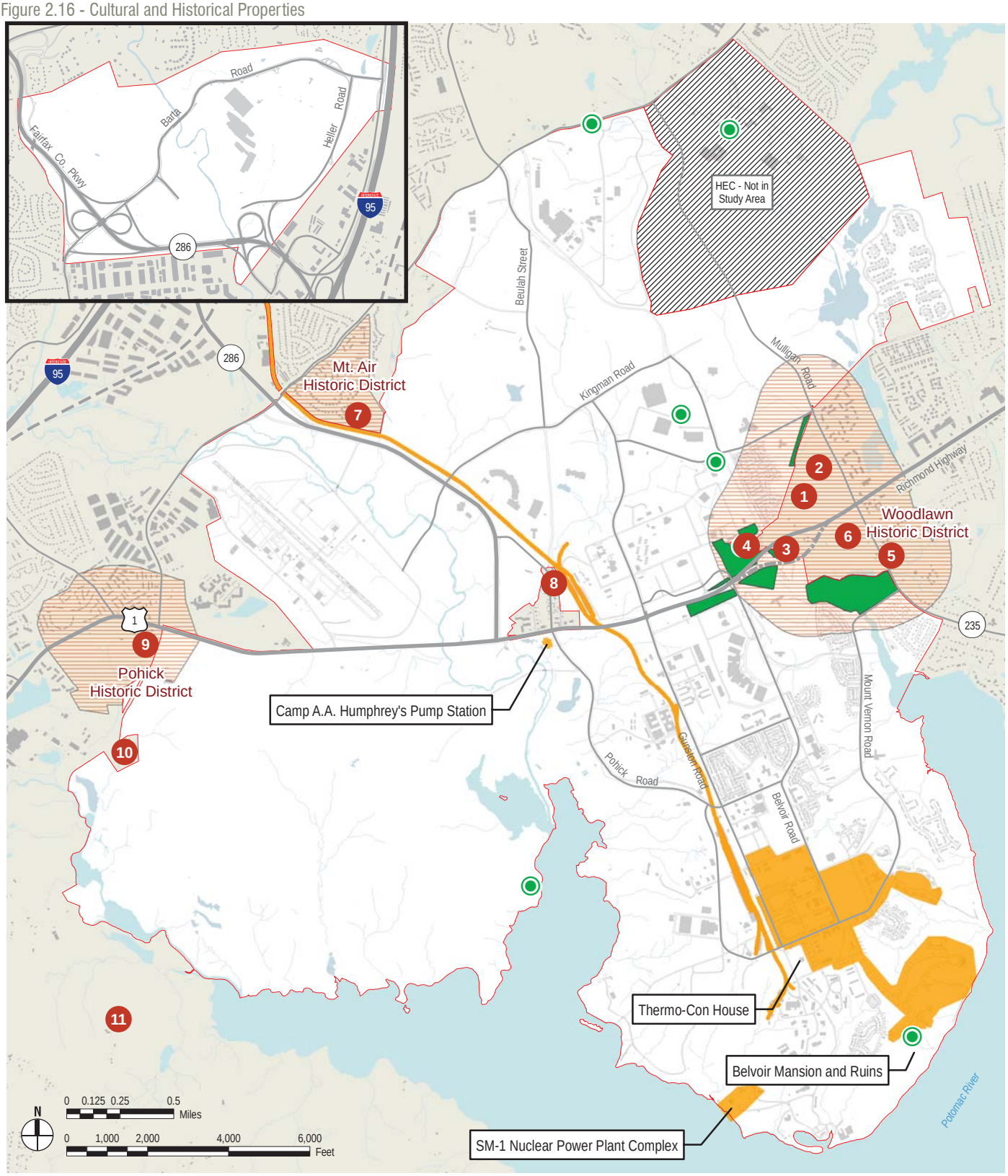
Fort Belvoir, in an effort to continue being a good steward of its historic lands, recognizes that Section 110 of the NHPA is an ongoing process. While the installation has conducted required levels of archaeological survey on 100 percent of its land for sites, it is always mindful that new technologies and additional research could allow for previously unknown archaeological sites to be identified as well as for sites currently categorized as recommended for further study to be determined ineligible.

Fort Belvoir routinely evaluates the buildings on the installation that are 50 years old or older for eligibility for listing in the NRHP. These evaluations have resulted in the identification of more than 220 buildings and structures as eligible for NRHP listing. These include the Fort Belvoir Historic District, Thermo-Con House, Camp A. A. Humphrey's Pump House Station and Filter Building, and the SM-1 Nuclear power reactor (see Figure 2.17).

Planning Considerations: Historic and Cultural Resources

- Section 106 of the NHPA requires that Fort Belvoir consider the effects of all undertakings on historic properties. Compliance with Section 106 requires that Fort Belvoir consult with the Virginia State Historic Preservation Officer and other Consulting Parties on all undertakings that have the potential to affect historic properties. This applies to all historic properties, regardless of whether they are located on or off the Installation. Fort Belvoir must consider all potential effects to historic properties, both direct and indirect (visual, auditory, cumulative), as part of its compliance with Section 106.
- The Section 106 process culminates in the determination of no historic properties affected or no adverse effect to historic properties, or in an adverse effect determination. Determinations of adverse effect are resolved by either altering the undertaking to avoid the adverse effect, minimizing the effect, or mitigating the adverse effect(s). Any adverse effect mitigation must be documented in an agreement document signed by the Consulting Parties, and certain stipulations of the agreement must be completed prior to implementation of the undertaking. Adverse effects shall be avoided whenever possible in order to avoid potential delays and costs that may be associated with the adverse effect resolution process.
- The Fort Belvoir Real Property Master Plan identifies development restrictions and maintenance standards which, if followed, will result in determinations of no historic properties affected or no adverse effect to historic properties (Figure 2.17, Table 2.2 and Figure 2.18). In 2011, Fort Belvoir began Section 106 consultation to develop a Programmatic Agreement for the implementation of the Fort Belvoir Real Property Master Plan. The Programmatic Agreement will allow Fort Belvoir to streamline Section 106 consultation on projects that, when these guidelines are followed, will result in a determination of either no historic proprieties affected or no adverse effect of historic properties. It also requires Fort Belvoir's Cultural Resource Manager (CRM) to produce a biannual cultural resource management report that will document all historic properties and no adverse effect determinations.

Figure 2.16 - Cultural and Historical Properties



- Cemetery
- Fort Belvoir Historic District
- Woodlawn Viewshed Protection Areas (BRAC PA)
- Historic Zoning Overlay Districts

Fairfax County Historic Property Inventory

1. Woodlawn
2. Pope-Leighey House
3. Woodlawn Baptist Church & Cemetery
4. Woodlawn Quaker Meetinghouse & Cemetery
5. Washington's Grist Mill
6. Otis T. Mason House
7. Mount Air
8. Accotink United Methodist Church
9. Pohick Church & Cemetery
10. LaGrange Site & Marders Family Cemetery
11. Lebanon

Historic Preservation Development Restrictions and Standards

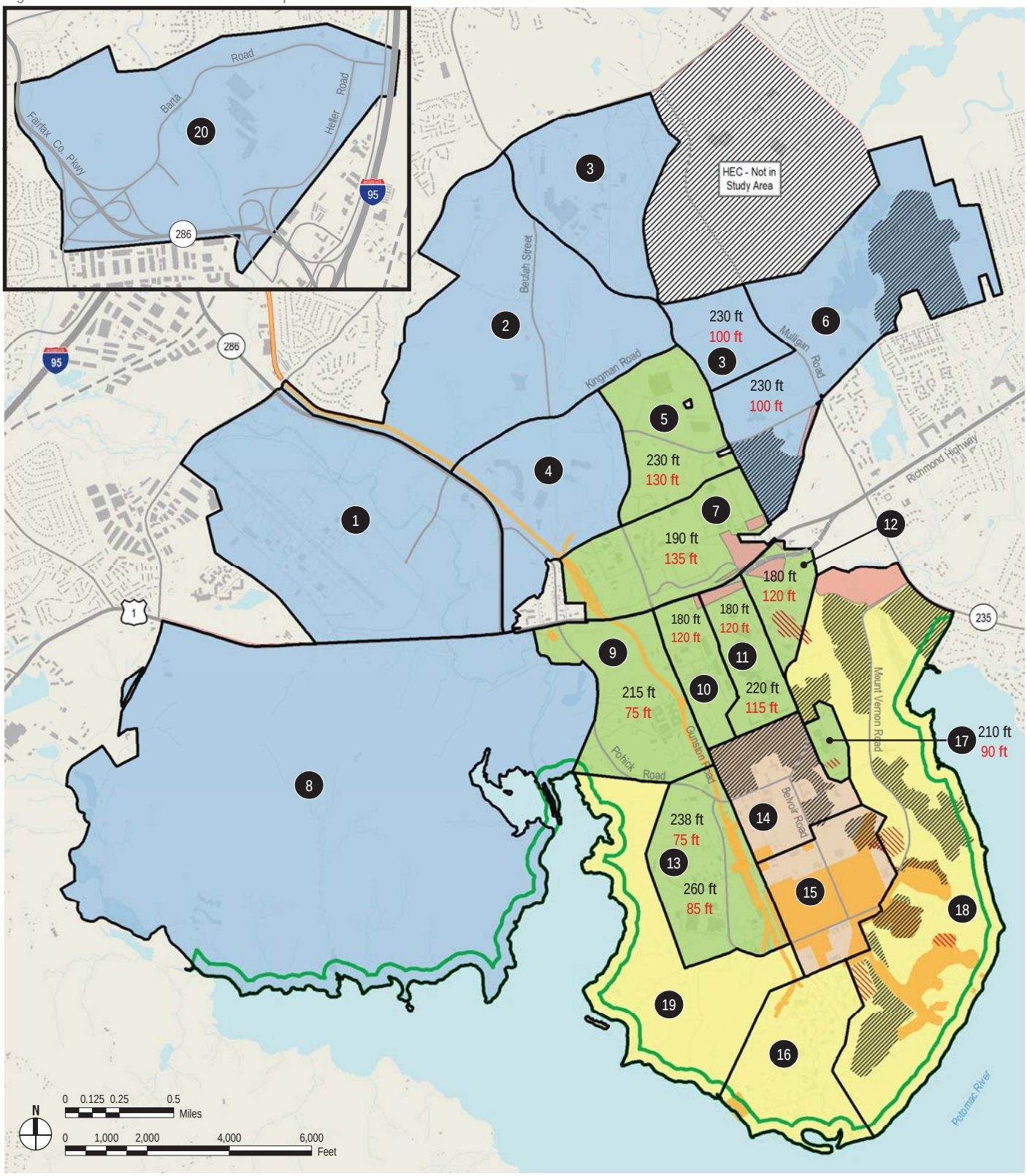
Figure 2.17 and Table 2.2 correspond to the historic preservation development restrictions and standards placed on adjacent facilities and future development according to the Section 106 MOP Programmatic Agreement (Appendix F). The programmatic agreement provides guidance on the management of historic properties located on lands encompassed by Fort Belvoir, and the responsibilities to comply with Section 106 regulations as addressed in the Cultural Resource Planning Considerations. In accordance with consulting parties, the Area of Potential Effects (APE) document and map was developed as part of the RPMP MOP Programmatic Agreement. This document defines the boundaries of the viewsheds of adjacent historic properties as outlined in Figure 2.17. Table 2.2 summarizes the restrictions and standards guiding Fort Belvoir's development near adjacent historic viewsheds. The Visual APE is provided in Appendix D. Below are brief definitions of the table categories.

- **Preservation District** – The district designates specific zones on Fort Belvoir that are bound by similar land use, design and/or preservation restrictions. These districts are identical to the districts utilized in the Installation Planning Standards.
- **Historic Properties Identified** – This column identifies the type of historic properties present in the specific preservation district. These property types are defined as follows: archaeological sites and architectural resources, which include buildings, structures, objects and historic districts, identified as either listed and/or eligible for listing in the NRHP or requiring further study. All of these properties were identified as part of the Section 106 consultation process and are listed in the RPMP Programmatic Agreement (Appendix D). This column and the supporting appendix will be updated as the Installation conducts future Section 110 in compliance with NHPA.
- **Historic Preservation Restriction Archaeology** – This restriction requires that no ground disturbance occur in the specified preservation district within 50 feet of an archaeological site. Ground disturbance is defined as excavation in which a work operation or activity results in a disturbance or displacement of the soil. All of these sites were identified as part of the Section 106 consultation process and are listed in Appendix D. Fort Belvoir's CRM shall oversee conformance with this restriction. Actions that will occur within 50 feet of an archaeological site shall require formal Section 106 consultation with the State Historic Preservation Office and all other applicable consulting parties.

  Additionally, all projects requiring excavation shall be required to follow Fort Belvoir's Unanticipated Discovery Policy, which requires that in the event of unanticipated discovery of archaeological materials during any excavation activity, the entity performing the excavation shall immediately stop work in the area of discovery and notify the Fort Belvoir CRM. The entity shall ensure that no unauthorized personnel have access to the site and no further damage is done to the discovery until Fort Belvoir has complied with 36 CFR 800.13(b) and any other legal requirements. Failure to report such finds shall be interpreted as willful destruction of archaeological properties on federal land.
- **Historic Preservation Restriction Architecture** – This restriction requires that maintenance, repair, and additions made to historic properties identified within the preservation district conform to the Secretary of the Interior's Standards (SIS) and the Design Guidelines for the Department of Defense Historic Buildings and Districts. All historic properties were identified as part of the Section 106 consultation process and are listed in Appendix E. Fort Belvoir's CRM shall oversee conformance with this restriction.
- **Historic Preservation Restrictions Visual** – This restriction requires undertakings occurring within the specified preservation district conform to the specified visual restrictions to result in a finding of either No Historic Properties Affected or No Adverse Effect. These restrictions include limiting project height, following specified preservation standards or design guidelines, and/or conforming to existing Programmatic Agreements and Historic Preservation Height Restrictions (Figure 2.18). Limitations are described in Average Max Height above Sea Level that a structure can be built to without potentially causing adverse effect to a historic property.

  Building height limitations were established using the APE developed as part of the RPMP MOP Programmatic Agreement. Height restrictions were also developed using observations of existing structures and conditions on Fort Belvoir, review of the Woodlawn Historic District Viewshed Study, site visits, and analysis of street views on Google Maps. The height restrictions for Davison Army Airfield were also factored in and shown when stricter than the established historic preservation height restriction. Airfield height restrictions are defined by takeoff patterns and approach paths. These height restrictions are covered in greater detail in the Airfield Operations section of this document. Fort Belvoir's CRM shall oversee conformance with this restriction.
- **Historic Preservation Restrictions Auditory** – This restriction requires that all undertakings within the preservation district conform to the specified auditory restrictions to result in a finding of either No Historic Properties Affected or No Adverse Effect. Auditory restrictions were established using the Auditory Area of Potential Effect (APE) developed as part of the RPMP Programmatic Agreement (Appendix D). Auditory restrictions are based on maintaining the existing land use in each preservation district. In addition to land use restrictions, preservation districts may also feature specific construction restrictions due to adjacent historic properties. Fort Belvoir's CRM shall oversee conformance with this restriction.
- **Historic Preservation Restrictions Land Use** –This restriction requires that all undertakings within the preservation district be consistent with the future land use specified in the RPMP (See the Future Land Use in Chapter 3). Restrictions also feature guidelines for maintaining and preserving existing landscapes (such as the Historic District and Fremont Field) that have been identified in the preservation district. Fort Belvoir's CRM shall oversee conformance with this restriction.

Figure 2.17 - Historic Preservation Development Restrictions



Woodlawn Viewshed Protection Areas (BRAC PA)

Privatized Army Lodging Areas *

Family Housing Areas *

90 Foot Building Height Restriction Areas *

Airfield Height Restriction Areas (See Figure 2.22) *

Historic Viewshed Height Restriction Areas *

Historic Height Restriction Areas *

300 Foot Shoreline Buffer *

Preservation District Boundaries *

Fort Belvoir Historic Districts *

220 ft Average Max Height Above Sea Level

80 ft Average Ground Elevation

* Please refer to Table 2.1 Historic Preservation Development Restrictions and Standards for detailed guidance on height restrictions outlined in this graphic.

Table 2.1 - On-Post Historic Preservation Development Restrictions and Standards

Map ID	Preservation District	Historic Properties Identified	Historic Preservation Restriction Archeology	Historic Preservation Restriction Architectural Resources	Historic Preservation Restrictions Visual	Historic Preservation Restrictions Auditory	Historic Preservation Restriction Land Use
1	Davison Army Airfield	Archeological Sites. No Historic Architectural Resources.	No ground disturbance within 50 feet of archeological sites.	N/A	Building Height Limits: Airfield height restrictions with exception of control tower.	Undertakings resulting in sustained increases in air operations will require full Section 106 consultation.	Future development shall be consistent with the Future Land Use identified in Chapter 3.
2	Golf Course/ National Museum of the US Army	Archeological Sites. Historic Architectural Resources: Fort Belvoir Military Railroad		Maintenance, repair, and additions to historic properties shall conform to the Secretary of Interior's Standards and the Design Guidelines for DoD Historic Buildings and District. Additional requirements are set forth in the Fort Belvoir Installation Planning Standards.	Building Height Limits: Airfield height restrictions.	Future development shall be consistent with the Future Land Use identified in Chapter 3.	
3	Intelligence	Archeological Sites. No Historic Architectural Resources.		N/A			
4	Defense Logistics Agency/ Intelligence Security Command	Archeological Sites. Historic Architectural Resources: Fort Belvoir Military Railroad		Maintenance, repair, and additions to historic properties shall conform to the Secretary of Interior's Standards and the Design Guidelines for DoD Historic Buildings and District. Additional requirements are set forth in the Fort Belvoir Installation Planning Standards.			
5	North Post Community Support	Archeological Sites. No Historic Architectural Resources.		N/A	Building Height Limit: 230 feet Above Sea Level (ASL)		
6	North Residential	Archeological Sites. Historic Architectural Resources: Woodlawn Historic District					
7	Lower North Post	Archeological sites. Historic Architectural Resources: Woodlawn United Methodist Cemetery, Woodlawn Quaker Meetinghouse, Woodlawn Historic District, Amphitheater & Fort Belvoir Military Railroad	No ground disturbance within 50 feet of archeological sites or within 50 feet of the Woodlawn Quaker Meeting House or the Woodlawn United Methodist Cemetery	Maintenance, repair, and additions to historic properties shall conform to the Secretary of Interior's Standards and the Design Guidelines for DoD Historic Buildings and District. Additional requirements are set forth in the Fort Belvoir Installation Planning Standards.	Building Height Limits: 190 feet Above Sea Level (ASL)	No weekend construction within 1/2 mile of Woodlawn Quaker Meeting House or Woodlawn United Methodist Cemetery. All other future development shall be consistent with the Future Land Use identified in Chapter 3.	Fremont field shall be used for ball fields and event fields. No development between Lampert Road and Goethals Road and between Woodlawn and Franklin Roads. Future development shall be consistent with the Future Land Use identified in Chapter 3.
8	Southwest Area	Archeological Sites. Historic Architectural Resources: Pohick Church	No ground disturbance within 50 feet of archeological sites.	N/A	No development within 1/4 mile of Pohick Church. Building Height Limit: 200 feet Above Sea Level (ASL)	No development within 1/4 mile of Pohick Church. All other future development shall be consistent with the Future Land Use identified in Chapter 3.	Future development shall be consistent with the Future Land Use identified in Chapter 3.
9	1400 West	Archeological Sites & Historic Architectural Resources: Humphreys Pump Station Complex & Fort Belvoir Military Railroad		Maintenance, repair, and additions to historic properties shall conform to the Secretary of Interior's Standards and the Design Guidelines for DoD Historic Buildings and District. Additional requirements are set forth in the Fort Belvoir Installation Planning Standards.	Building Height Limits: 215 feet Above Sea Level (ASL) to the west of Gunston Road	Future development shall be consistent with the Future Land Use identified in Chapter 3.	

Table 2.1 - On-Post Historic Preservation Development Restrictions and Standards (continued)

Map ID	Preservation District	Historic Properties Identified	Historic Preservation Restriction Archeology	Historic Preservation Restriction Architectural Resources	Historic Preservation Restrictions Visual	Historic Preservation Restrictions Auditory	Historic Preservation Restriction Land Use
10	1400 East	Archeological Sites & No Historic Architectural Resources	No ground disturbance within 50 feet of archeological sites.	N/A	Building Height Limits: 180 feet Above Sea Level (ASL) to the east of Gunston Road	Future development shall be consistent with the Future Land Use identified in Chapter 3.	No development allowed between Route 1 and First Street. Vegetative screening shall be retained to greatest extent possible. Future development shall be consistent with the Future Land Use identified in Chapter 3.
11	Medical	No Archeological Sites. Historic Architectural Resources. Proximity to Woodlawn Quaker Meetinghouse and Woodlawn Historic District.	N/A		Building Height: 220 feet Above Sea Level (ASL)	No weekend construction within 1/2 mile of Woodlawn Quaker Meeting House. All other future development shall be consistent with the Future Land Use identified in Chapter 3.	
12	South Post Community Support		No ground disturbance within 50 feet of archeological sites.		Building Height Limits: 180 feet Above Sea Level (ASL)		Area to the east of Halleck Road shall be reserved for ball fields. Vegetative screening shall be retained to greatest extent possible. No development allowed between Route 1 and Casey Road. Future development shall be consistent with the Future Land Use identified in Chapter 3.
13	Industrial Area	Archeological Sites. Historic Architectural Resources. Contains portions of Fort Belvoir Historic District & the Fort Belvoir Military Railroad	No ground disturbance within 50 feet of archeological sites.	Maintenance, repair, and additions to historic properties shall conform to the Secretary of Interior's Standards and the Design Guidelines for DoD Historic Buildings and District. Additional requirements are set forth in the Fort Belvoir Installation Planning Standards.	New construction adjacent to historic district conform to the Installation Planning Standards. Building Height Limits: 260 Above Sea Level (ASL)	Future development shall be consistent with the Future Land Use identified in Chapter 3.	Future development shall be consistent with the Future Land Use identified in Chapter 3.
14	Town Center	No Archeological Sites. Historic Architectural Resources: Contains portions of Fort Belvoir Historic District.	N/A		New construction adjacent to historic district conform to the Installation Planning Standards and be compatible in size and massing to adjacent historic district. New construction with in the historic district shall conform to the Secretary of Interior's Standards and the Design Guidelines for DoD Historic Buildings and District.		Development between Belvoir and Middleton Roads north of 16th Street shall be recreational in nature. Future development shall be consistent with the Future Land Use identified in Chapter 3.
15	Historic Core	No Archeological Sites. Historic Architectural Resources: Fort Belvoir Historic District.	N/A		All undertakings shall conform to the Secretary of Interior's Standards and the Design Guidelines for DoD Historic Buildings and District.		Future development shall be consistent with the Future Land Use identified in Chapter 3. No development shall occur on P1 parade field.
16	300 Area	Archeological Sites. Historic Architectural Resources: SM-1 Reactor Complex (349, 371-374, 380, 7350, & Pier) and Fort Belvoir Military Railroad.	No ground disturbance within 50 feet of archeological sites.	Maintenance, repair, and additions to historic properties shall conform to the Secretary of Interior's Standards and the Design Guidelines for DoD Historic Buildings and District. Additional requirements are set forth in the Fort Belvoir Installation Planning Standards.	Building Height Limits: New construction height will not exceed 90 feet. New construction within 300 feet of shoreline shall require additional Section 106 consultation.	Future development shall be consistent with the Future Land Use identified in Chapter 3.	Future development shall be consistent with the Future Land Use identified in Chapter 3.
17	Admin. Campus	Archeological Sites. No Historic Architectural Resources.		N/A	Building Height Limits: 210 feet Above Sea Level (ASL)		

Table 2.1 - On-Post Historic Preservation Development Restrictions and Standards (continued)							
Map ID	Preservation District	Historic Properties Identified	Historic Preservation Restriction Archeology	Historic Preservation Restriction Architectural Resources	Historic Preservation Restrictions Visual	Historic Preservation Restrictions Auditory	Historic Preservation Restriction Land Use
18	Community Activities	Archeological Sites. No Historic Architectural Resources.	No ground disturbance within 50 feet of archeological sites.	N/A	New construction height will not exceed 90 feet. New construction adjacent to historic district conform to the Installation Planning Standards and be compatible in size and massing to adjacent historic district. New construction within 300 feet of shoreline shall require additional Section 106 consultation.	Future development shall be consistent with the Future Land Use identified in Chapter 3.	Future development shall be consistent with the Future Land Use identified in Chapter 3.
19	Recreation				New construction height will not exceed 90 feet. New construction adjacent to historic district conform to the Installation Planning Standards and be compatible in size and massing to adjacent historic district. New construction over 1-story within 300 feet of shoreline shall require additional Section 106 consultation.		
20	Fort Belvoir North Area	No Archeological Sites. No Historic Architectural Resources.	N/A	Additional requirements are set forth in Fort Belvoir Installation Planning Standards.	N/A		
	Family Housing Areas	Archeological Sites. Historic Architectural Resources: Historic Landscapes and Historic Architectural Resources.	All undertakings shall comply with existing Privatized Housing Programmatic Agreement.				
	Privatized Army Lodging Areas	No Archeological Sites. Historic Architectural Resources.	All undertakings shall comply with existing Privatized Army Lodging Programmatic Agreement.				

Operational Resources

Other constraints which limit development and may drive land use decisions are operational constraints. Fort Belvoir classifies operational constraints as: active and closed ranges and training areas; sites in which releases of hazardous substances may have occurred (Military Munitions Response Program (MMRP) sites, Solid Waste Management Units (SWMUs), Petroleum Storage Areas (PSAs) and Petroleum Release Sites (PRSs); and constraints associated with easements, leased areas, Land Use Control Areas (LUCAs), landfills, noise zones, and airfield height restrictions.

A primary difference between some of the environmental issues related to operational constraints and the various environmental/cultural resources mentioned previously is the desire to remediate operational constraints (such as SWMUs) under the Defense Environmental Restoration Program (DERP) versus a desire to preserve environmental/cultural resources. Therefore, the primary concern associated with constraints resulting from some operational activities is cost and time related to mitigation. This master plan, in accordance with the Guiding Principles, supports the continuing efforts to remediate and mitigate contaminated properties in order to re-use for appropriate developments.

Some corrective measures might take several years to achieve closure. Regulatory agency involvement in investigative/corrective actions is very high, and must be factored into the time it takes to achieve site closure. Coordination with regulatory agencies occurs while developing work plans, conducting site investigations and subsequent remedial actions, and preparing closure reports. The regulatory compliance requirements for each program and the amount of available information for individual sites are highly variable. For example, some sites were never studied while others are already closed. A brief description of each specific operational constraint is discussed below, including regulatory compliance and mitigation requirements.

In addition to regulatory involvement, the Army is required to involve the public at key points in the remedial process. This includes not only bi-annual Restoration Advisory Board solicitation, but also, in some cases, the requirement to provide the public the opportunity to review documentation leading to remedy selection.

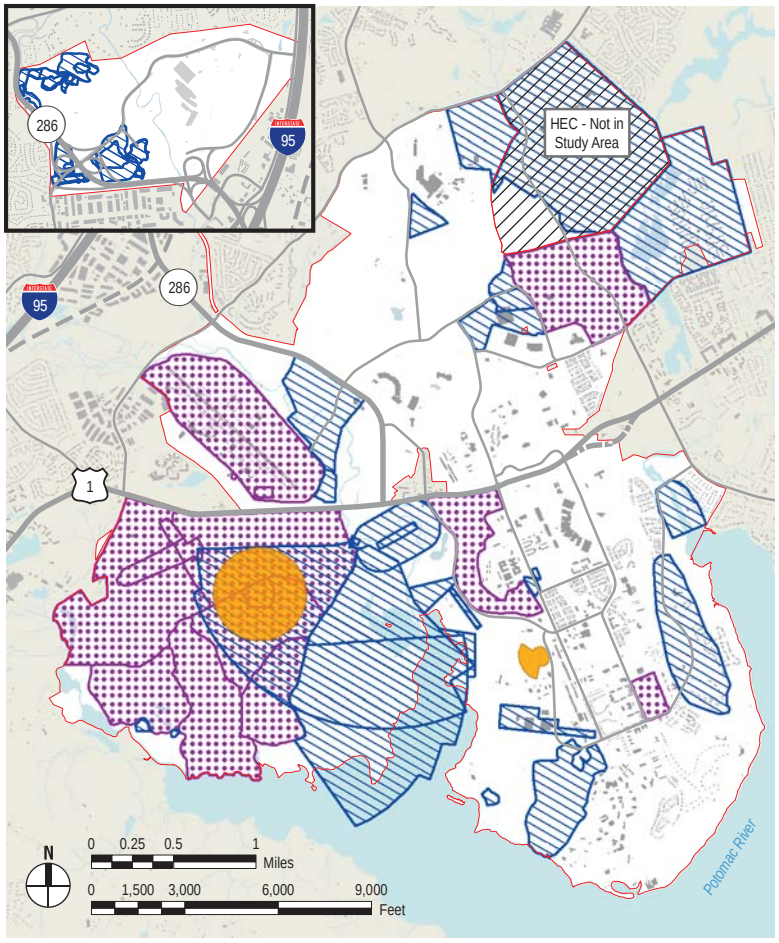
The information provided in this report is general in nature. Building proponents should always consult with DPW and ENRD to obtain the latest information regarding operation resources.

Ranges and Training Areas

Fort Belvoir has identified 16 active training and range areas and 24 closed/inactive training and range areas on Main Post (Figure 2.19). Additionally, there are 19 closed/inactive training and range areas on FBNA. In 2006, the 19 closed training areas were determined to be eligible for the Defense Environmental Restoration Program (DERP) and subsequently enrolled in the MMRP.

Given its historical use and concentration of ranges, FBNA is considered an MMRP site. The ranges at FBNA were used for mine warfare material testing, research, and development. UXO clearance occurred at FBNA between 2003 and 2005, in preparation for the proposed land transfer for the Fairfax County Parkway Right-of-Way (ROW). Subsequent clearance occurred between 2006 and 2009 for the areas outside of the Fairfax County Parkway ROW in support of the 2005 BRAC-related construction.

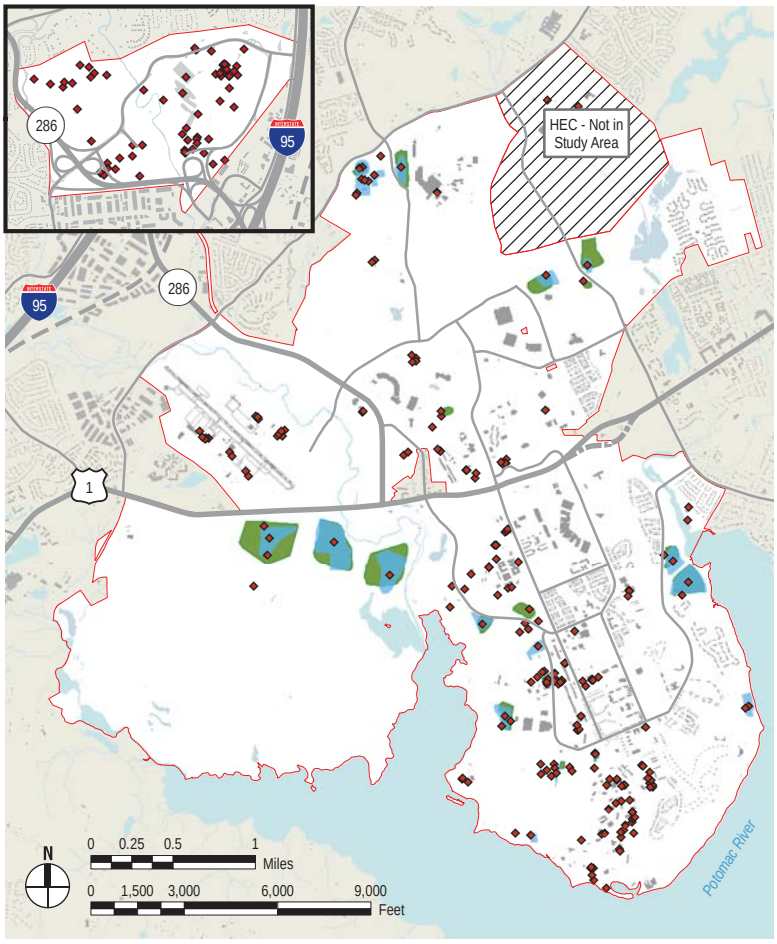
Figure 2.18 - Ranges and Training Areas



Planning Considerations: Ranges and MMRP Sites

- Siting of development within operational ranges and MMRP areas must be evaluated on a case-by-case basis using future intended land use and risk of exposure as decision criteria.
- DPW-ENRD reviews each project to ensure proposed development is compatible with existing land use. Construction support is required for all projects in areas where the potential for Munitions and Explosives of Concern (MEC) exposure exists; investigations to determine the nature and extent of both MEC and MC contamination.
- Land use controls are being developed in accordance with CERCLA as interim measures to ensure proper management of MMRP sites. Additional remedies, if required, will be developed through CERCLA, as well.
- Development within active ranges and training areas is limited to activities that pertain to the training being conducted within that range or training area.

Figure 2.19 - Solid Waste Management Units (SWMUs) and Landfills



Solid Waste Management Units (SWMUs)

Landfill

Areas of Potential Concern

The Main Post Ranges were used for small arms training and mine warfare and demolition training indicative of Army combat engineer training. In a 2008 site inspection of 19 closed ranges on Main Post, 12 were recommended for no further action, and 7 were recommended for Remedial Investigation (RI). Remedial investigations were completed in July 2012 for 5 of the sites. Two sites were contracted to reach response complete by 2014. Upon completion of the RI, Fort Belvoir will conduct feasibility studies to evaluate potential remedial actions against appropriate cleanup requirements.

Solid Waste Management Units (SWMUs) and Landfills

Fort Belvoir manages an active SWMU Cleanup Program that is conducted in accordance with Army, federal and state regulations. The following discussions summarize what is currently known with regard to the SWMUs at FBNA and Main Post. Figure 2.20 shows the location of known SWMUs, landfills and areas of potential concern.

In 2005, Fort Belvoir identified and investigated potential releases of hazardous substances to the environment on FBNA. As of December 2011, 62 sites received a no further action concurrence from the U.S. EPA. Ten sites will require additional actions with regard to soil or groundwater contamination in accordance with CERCLA.

In 2008, Fort Belvoir completed a visual site inspection (VSI) and historic document review for each SWMUs on Main Post. The results are documented in the "Visual Site Inspection Report -- Main Post SWMU Program." The findings in the VSI has led Fort Belvoir to identify a significant number of sites which shall not require any investigation or remediation, and Fort Belvoir is currently working with regulators to close those sites out. The remaining sites are in various stages of the Resource Conservation and Recovery Act (RCRA) Corrective Action Process, which includes any newly discovered sites. Due to the evolving nature of these sites, a conservative approach has been adopted for the purpose of this Master Plan evaluation, to include the implementation of LUCs as discussed later in this section.

As a result of BRAC 2005, Fort Belvoir has significantly reduced the number of SWMUs from over 200 (pre-BRAC) to approximately 40 (post-BRAC). As a result of the SWMU cleanup program, efforts to remove these remaining SWMUs continues.

Landfills

In addition to managing SWMUs, Fort Belvoir has the requirement to manage landfills in accordance with the Virginia Solid Waste Management Regulations. Currently Fort Belvoir has two landfills: Cullum Woods Landfill and Theote Road Landfill.

Planning Considerations: SWMUs and Landfills

- Siting of development within SWMU sites must be evaluated on a case-by-case basis using future intended land use and risk of exposure as decision criteria.
- In order to determine cleanup standards for restoration sites and their intended use, DPW-ENRD evaluates historical data on the site; determines whether the intended use requires cleanup to residential or industrial environmental regulation standards; and performs risk screening evaluations. Specific remediation measures can only be determined following the detailed site investigations. Due to the variety of remediation among sites, costs for any SWMU are difficult to estimate at this time.
- Some corrective action may involve costly landfill caps and require 30-year monitoring programs. Other SWMUs may only require soil sampling to confirm contamination is not present. In an effort to capture generalized data for this evaluation, a worst-case scenario is used. This way, any future changes will likely lessen mitigation requirements and costs. Additionally, Fort Belvoir uses land use controls described below to manage these sites.

Petroleum Storage Areas and Release Sites

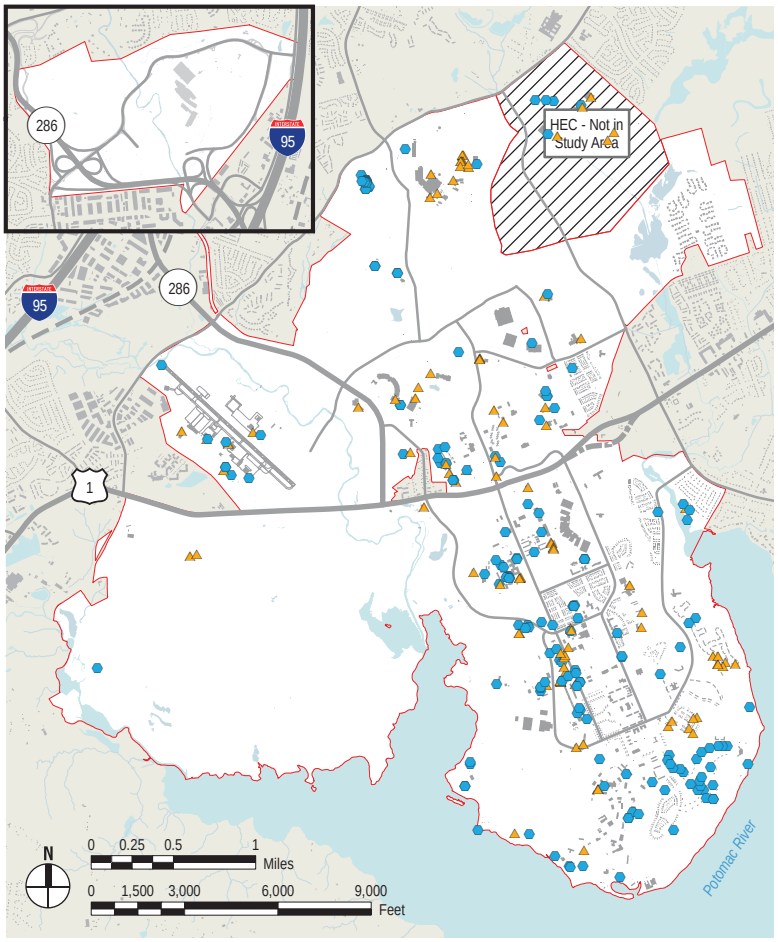
For more than two decades, Fort Belvoir DPW-ENRD's Petroleum Management Program (PMP) has been addressing petroleum storage areas (PSAs) and petroleum release sites (PRSs). This program manages all aspects of PSAs and PRSs, including scheduling operation and maintenance, compliance monitoring, tank closure and removal, environmental investigations, remediation system design, management, and reporting. More than a thousand PSAs formerly existed or currently exist at Fort Belvoir. PSAs include aboveground storage tanks (ASTs) and underground storage tanks (USTs) that store petroleum (Figure 2.21). PSAs range in size from 100-gallon ASTs to 50,000-gallon USTs.

Of the more than 1,000 PSAs at Fort Belvoir, approximately 150 have released petroleum into the environment, resulting in designation of PRSs. Site investigations are performed to delineate the impacted areas of soil and groundwater. Fort Belvoir is actively managing its PRSs under the VDEQ Petroleum Program regulation guidance. As a result of BRAC 2005, the Installation has removed a number of USTs (most notably at FBNA).

Planning Considerations: PSAs and PRSs

- Siting of development on or around PSAs/PRSs must be evaluated on a case-by-case basis using future intended land use and risk of exposure as decision criteria.
- PSAs located within a proposed building envelope can be aggressively addressed as part of the site preparations. Many of the open PSAs are unregulated, so a costly formal closure process can be avoided.
- On average, one in five USTs at Fort Belvoir has had a release. Site investigations at each release require approximately one month to complete. Mitigation measures can be integrated into the construction phase of the project in concert with the site preparation and earthwork features for minimal impact to the overall construction schedule.
- Any disturbance to the subsurface soil at a PRS site can require reopening the case, developing a work plan, sampling, monitoring, and reporting of site conditions and waste generation. Mitigation measures can be integrated into the construction phase of the project in concert with the site preparation and earthwork features for minimal impact to the overall construction schedule. Excavation and sampling of petroleum impacted soil areas will likely be the most timely and cost-effective manner to mitigate the PRSs.

Figure 2.20 - Petroleum Storage Tank Locations



Land Use Controls

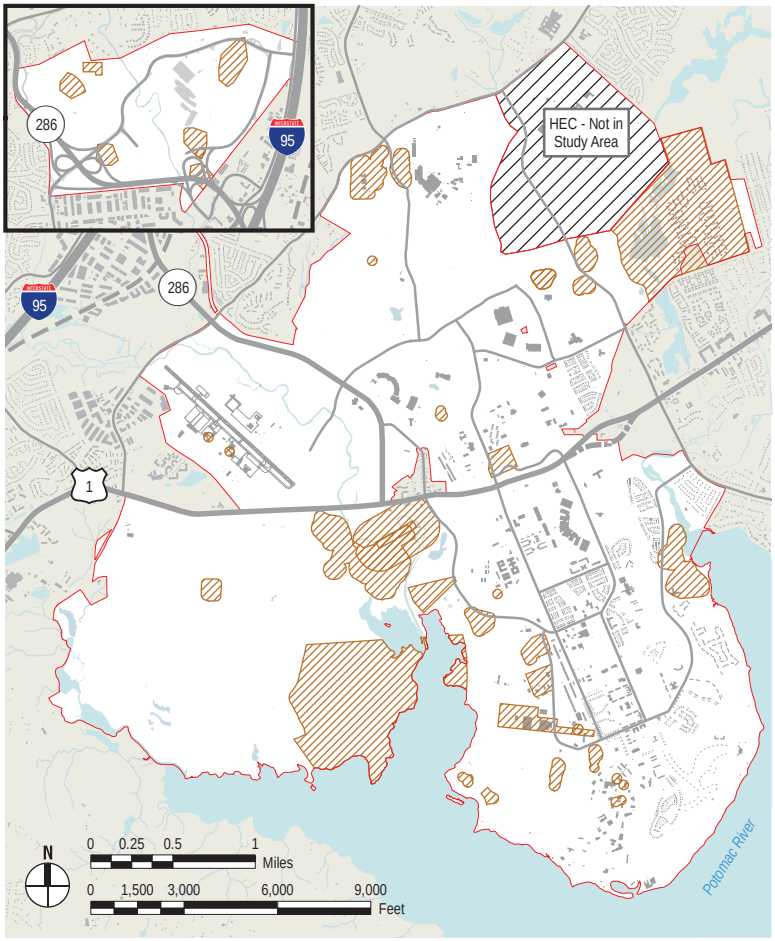
At sites where environmental restoration activities have occurred, responsible parties sometimes need to limit exposure to hazardous substances or pollutants. When required, this is accomplished through Land Use Controls (LUCs) in accordance with applicable laws and regulations (Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), RCRA, or Defense Environmental Restoration Program (DERP)). LUCs include any physical, legal, or administrative mechanism that places restrictions on the use of, or limits access to, real property to prevent exposure to chemicals above permissible levels. The intent of these controls is to protect the integrity of the selected remedy at the release site as well as human health and the environment by limiting the activities that may occur at a particular site.

Fort Belvoir maintains two different types of LUCs. The first type are developed and managed in accordance with CERCLA or RCRA and are considered a part of the final remedy at a cleanup site. Currently, Fort Belvoir manages two cleanup sites where a portion of the final remedies include LUCs. In addition, Fort Belvoir is in the process of finalizing LUCs at numerous MMRP sites, in accordance with CERCLA. The second type of LUCs were created as administrative land use controls, and are used internally by Fort Belvoir, Directorate of Public Works, Environmental and Natural Resources Division to evaluate various projects to determine whether a potential for exposure to hazardous materials exists. All current Land Use Control parcels are shown on Figure 2.22.

Fort Belvoir management of all LUCs employs three main elements:

- Documentation of controls through the Installation's Geographic Information System (GIS) and in this Real Property Master Plan;
- Maintenance controls through a siting approval process, demarcation of the area through physical markers or GIS, training, and inspections; and
- Managing, modifying, and terminating the LUCs on the Installation once final remediation goals have been achieved.

Figure 2.21 - Land Use Controls



Land Use Control Parcel

Planning Considerations: Land Use Controls

- From the planning to construction, all work planned or performed at Fort Belvoir is required to be compared against the LUCs. This is to aid project planning, limit construction, or to ensure that proper health and safety requirements at the project site are met until the selected remedy is complete and the LUC is no longer required.
- For parcels of land transferred from Army ownership, the Army recommends provisions such as limiting the disturbance of an area or limiting the use of groundwater in an area. The provisions are inserted into the deed, and these restrictions are recorded at the appropriate courthouse or land record office. Enforcement depends on the jurisdiction, but typically this will be enforced under state law. Restrictions are enforced until the remedy is complete and are no longer required.
- Once the cleanup site has been delineated, a Land Use Control Implementation Plan (LUCIP) is prepared. It serves as an internal management tool for Fort Belvoir that documents the extent of the area and explains the Land Use Controls (LUCs) that will be established. The LUCIP also defines the responsible parties for maintaining and managing LUCs.

Land Use Encumbrances

Fort Belvoir has a number of land leases, public utility easements, right of access agreements and out-parcels, which accommodate various mission partner activities and non-DoD organizations located at the Post. These are important factors when considering development on the Installation. These areas include:

- Rights-of-way held by Virginia Department of Transportation (VDOT) along Backlick Road, Telegraph Road, Woodlawn Road, Beulah Street, U.S. Route 1, and the Fairfax County Parkway (Virginia Route 286). The widths of these rights-of-way vary based on the road size and classification and includes area for such elements as sidewalks, trails, bicycle lanes, utilities and bus stop shelters. The public roads are maintained by VDOT.
- Public Utility Easements on Post consist of a major sanitary sewer gravity line that runs along Accotink Creek on FBNA and a recently installed sewer force main that runs south of Route 1. These County maintained lines flow to the Lower Potomac Sewage Treatment Plant located west of the Southwest Training Area.
- Fort Belvoir Elementary School is built on land leased for 50 years to the Fairfax County School Board (see Figure 2.23). The lease agreement automatically renews after the 50 years unless Fairfax County constructs a new school off-Post as a replacement.
- The Eleanor U. Kennedy Shelter is leased to Fairfax County (see Figure 2.21). This historic building was renovated in 1986 for use as a homeless shelter. New Hope Housing operates the shelter under contract with the Department of Family Services. Many command units at Fort Belvoir provide equipment, supplies, and volunteer services to support the Kennedy Shelter.
- In 2003, the family housing at Fort Belvoir became privatized under the Army's Residential Communities Initiative (RCI) program. The Army and Clark Pinnacle Family Communities formed a new entity that owns the housing – Fort Belvoir Residential Communities LLC (FBRC). The agreement includes 577 acres of land leased for 50 years.
- The Post also contains or surrounds seven historic cemeteries, with one located on HEC (see Figure 2.21).
- In August 2011 the Army transferred ownership and operation of its transient lodging facilities to Actus Lend Lease, a private sector development company. Actus then formed a special-purpose entity, Rest Easy, LLC to execute the lease. The Army granted 50-year leases to Rest Easy of the land underlying the existing facilities and other land for constructing new lodging. As part of the lease agreement, Rest Easy renovated Buildings 80, 81, 470, 507, 508, 509, 806, and 807. All these facilities will be returned to the Installation for other uses except for Building 470 (Knadle Hall) once the new Army lodging facility is constructed. Knadle Hall will continue to be used as Army lodging under the lease agreement.

Planning Considerations: Land Use Encumbrances

All current leases, easements, right of access agreements and out-parcels extend beyond the horizon of this master plan. These encumbered areas shall be integrated into future plans as parcels that are remaining in their current land uses.

Figure 2.22 - Land Use Encumbrances

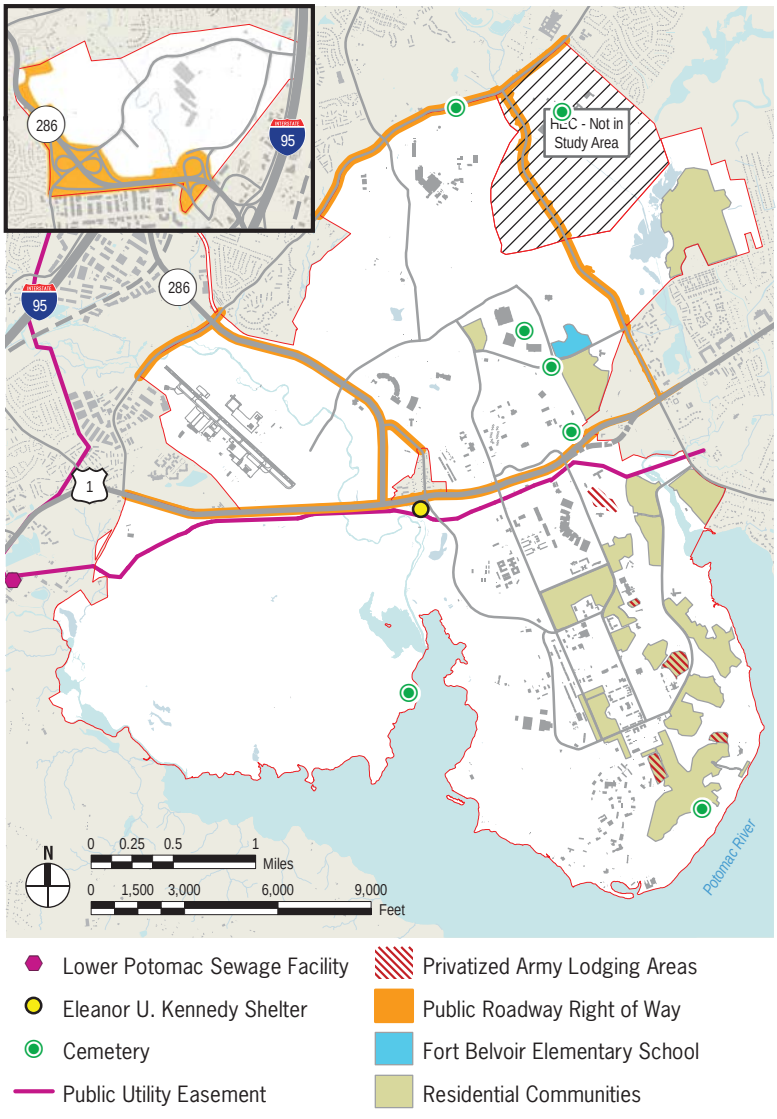
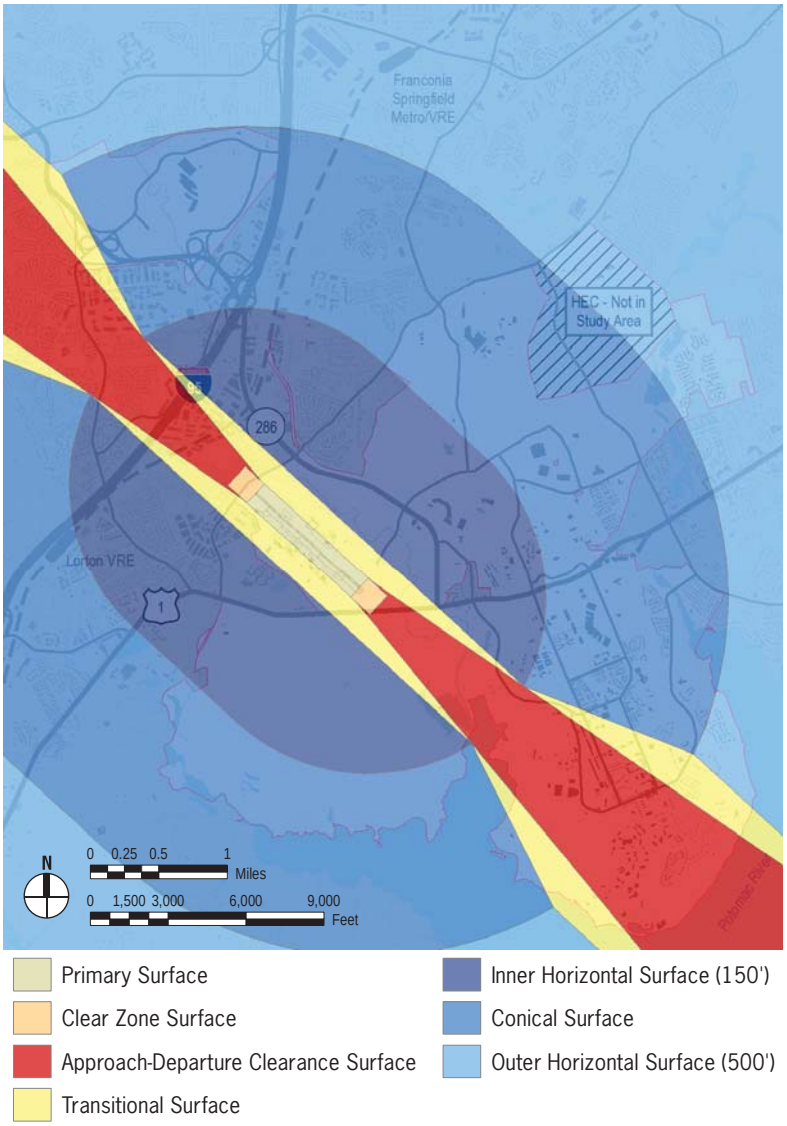


Table 2.2 - DAAF Imaginary Surfaces, On-Post Obstructions and Impacts on Development	
Imaginary Surface	Development Impacts and Existing Obstructions*
Primary Surface	No manmade or natural features are allowed. Obstructions include Building nos. 3136, 3137, 3138, 3140, 3141, 3230, 3231, 3233, 3234, 3237, and 3239.
Clear Zone (graded area only)	No manmade or natural features are allowed. No obstructions identified.
Approach-Departure Surface	No structure must puncture this surface. No obstructions identified.
Inner Horizontal Surface	No structure must puncture this surface. Obstructions include Building no. 2462.
Conical Surface	No structure must puncture this surface. Obstructions include Building nos. 2901, 2902, and 2905.
Outer Horizontal Surface	No structure must puncture this surface. No obstructions identified.
Transitional Surface	No structure must puncture this surface. No obstructions identified.
Note: * Existing Obstructions were calculated based on Fort Belvoir GIS data provided. Field investigations are required to verify these conclusions.	

Figure 2.23 - Airfield Constraints



Airfield Operations

Davison Army Airfield (DAAF) is an operational and aviation training facility. The DAAF area encompasses approximately 455 acres and includes the Accotink Creek and DFMWR's Anderson Park; however, the airfield operational area that falls within the existing fence line is about 350 acres. DAAF accommodates five operational flying units within the U.S. Army Military District of Washington/National Capital Region and a training unit of the District of Columbia Air National Guard.

DAAF is required to comply with guidelines and regulations to meet a Class A airfield as outlined in the Unified Facilities Criteria (UFC) 203-260-01, Airfield and Heliport Planning and Design. The maximum aircraft size that can be safely accommodated at DAAF is UC-35 (Citation 560). Although C-130 operations exceed the design weights and pavement geometry parameters of this Class A regulated airfield, they have occurred frequently, and this has resulted in the rapid deterioration of the airfield pavements. Additionally, the existing facility layout, with building structures and taxiways that are too close to the runway centerline to meet UFC obstruction clearances, often results in the interaction of helicopter and fixed wing aircraft operations, which reduces the operational safety and capacity of the airfield.

Figure 2.24 maps the imaginary surfaces associated with the runway at DAAF. No man-made structures or natural features are allowed on the primary surface and clear zones. Height restrictions are imposed on the development and landscape below the rest of the surfaces. The DAAF runway elevation is +74 feet MSL (mean sea level). The associated imaginary surfaces are calculated based on this level. Table 2.3 lists impacts and current obstructions for the airfield.

Maximum allowed height for development on any given parcel is determined by the topography and the imaginary surface the parcel falls under. Figure 2.25 depicts the maximum allowed height for development surrounding the airfield and is presented for general planning purposes only.

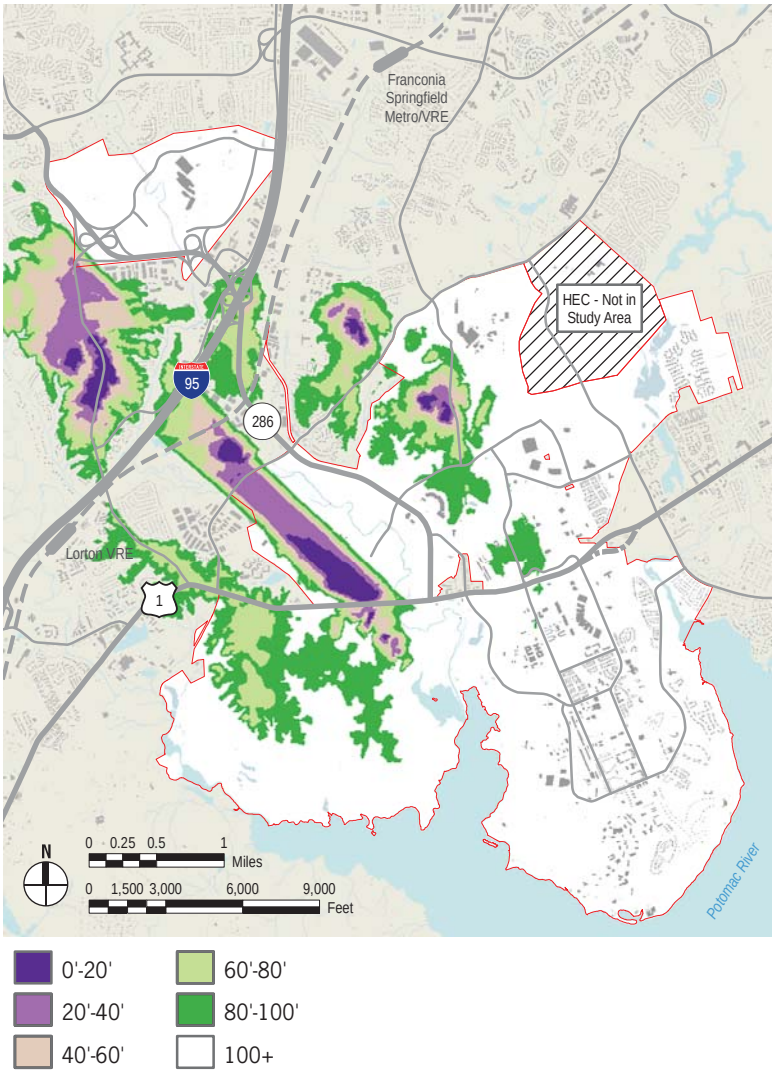
Planning Considerations: Airfield Safety

- Current and future facilities shall not penetrate the imaginary surfaces detailed in Figure 2.25. Table 2.3 lists the existing facilities that conflict with the imaginary surfaces. While height restrictions apply to the entire Post and FBNA, restrictions of 100 feet or lower only apply to parts of the North Post and Southwest Area (Figure 2.18 and Table 2.2 on Historic Preservation Development Restrictions). Severe restrictions of 40 feet or lower apply to small areas within the North Post Golf Course and the eastern portion of the Southwest Area. It is extremely important that existing obstructions are removed and potential future obstructions are prohibited.
- DAAF plays a key role in the National Emergency Response plan. In the event of a National Emergency, DAAF will be in "lockdown," restricting personnel from leaving or accessing the airfield until the Emergency has passed. These National Emergency Response plans must be considered during land-use development planning.
- Any new development must be able to maintain airfield safety standards as outlined in the UFC for Airfield and Heliport Planning and Design, while minimizing impacts to environmentally sensitive areas that lie within DAAF.

DAAF is responsible for maintaining the airfield facilities and reporting any operational changes that may affect its Air Installation Compatible Use Zone (AICUZ) program to Belvoir DPW. In November 2010, the U.S. Army Institute of Public Health completed an Operational Noise Consultation that reaffirmed noise contours for DAAF. The study concluded that the operations at DAAF generate a Land Use Planning Zone (LUPZ) (60—65 decibel (dB)) A-weighted Day Night average Noise Level (ADNL) noise contour that extends along the approach and departure route to the airfield. A Zone II (65-75 dB ADNL) noise contour extends beyond the northwestern boundary extending to Interstate 95. Fly-Neighborly Areas depicted in Figure 2.26 are noise-sensitive areas located near Route 286 and the hospital area and are included as part of DAAF's noise abatement procedures.

Based on aerial imagery, the study concluded that the area within the Zone II noise contour is industrial and therefore no "non-recommended" land uses within that area. Other than the DAAF fire station expansion, no near-term or long-term projects are proposed for DAAF as part of this RPMP; however, Fort Belvoir DPW has indicated it will seek funding approval for an updated AICUZ.

Figure 2.24 - Potential Maximum Building Heights based on Airfield Imaginary Surfaces Restrictions*

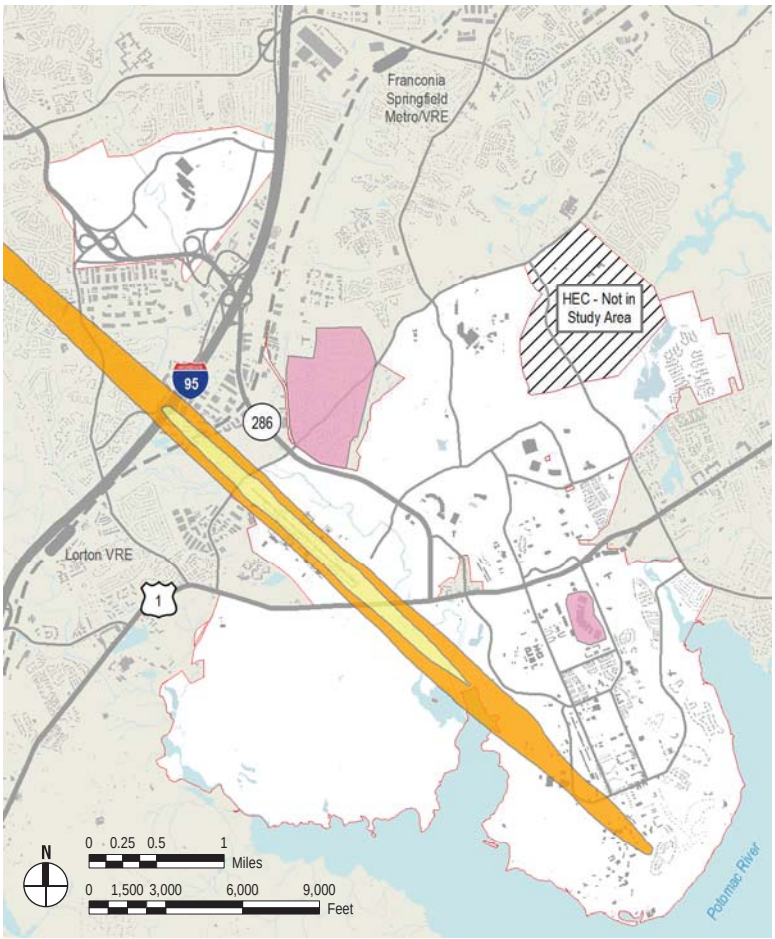


*Note: Figure above only indicates maximum building heights based on Airfield operational restrictions, and is not meant to be a comprehensive analysis indicating all constraints for the Installation. Other restrictions such as cultural and viewshed restrictions apply in the 100+ areas that limit building heights. See Figure 2.18 for a Comprehensive Map indicating land and height restrictions.

Planning Considerations: Airfield Noise

- The ADNL contours indicate that annual average noise levels from the aviation activity are compatible with the surrounding environment. However, individual events have the potential to cause annoyance and possibly generate noise complaints.
- The DAAF should continue to use the noise management program to reduce the potential for noise complaints, caused by day-to-day operations through a responsive noise complaint procedure, and taking actions that are appropriate to guide future development of those properties adjacent to its boundaries.
- Existing and future development located in the LUCZ and Zone II will need to consider their mission needs that could be affected by DAAF indoor and outdoor noise levels.

Figure 2.25 - Average Noise Level Contours (ADNL)



Fly-Neighborly Areas

Noise Zone

LUPZ - 60-65 dB ADNL

Zone II - 65-75 dB ADNL

Environmental Constraints Composite

Protecting and preserving the environment at Fort Belvoir is of paramount importance. As documented on the prior pages of this report, the Installation has numerous natural, cultural, and historic properties, as well as operational considerations that limit the areas on Post that can be developed.

Environmental issues on Fort Belvoir are addressed through established programs and guidelines, including the Installation's Integrated Natural Resources Management Plan (INRMP), then coordinated through the Fort Belvoir Directorate of Public Works (DPW), Environmental and Natural Resources Division (ENRD).

Fort Belvoir complies with numerous federal environmental programs and regulations to aid in protecting the environment and natural and cultural resources. As a federal installation, Fort Belvoir is not required to abide by local government regulations (aside from a few exceptions), but does consider all local regulations and policies during its planning processes.

Identifying environmental constraints makes the developable areas on Fort Belvoir evident. The Directorate of Public Works Environmental and Natural Resource Division (ENRD) provided environmental GIS data, in which 25 constraints related to natural/cultural resources and operational activities on Fort Belvoir were identified (Table 2.4). These constraints, which have been documented on the previous pages, were combined into a overall composite constraints map (Figure 2.27). The map shows that constraints cover morthan 65 percent of the Main Post and FBNA. At first glance, it appears that much of Fort Belvoir cannot be developed without significant impacts to the environment. However, some constraining factors are more easily mitigated than others. In some circumstances, the clean-up of areas such as PSAs or PSRs for development can be beneficial to the environment.

Constraints differ in criteria and requirements regarding encroachment. Therefore, not all resources are equally impacted by development or require the same level of mitigation. Some constraints are federally mandated and require significant mitigation. Other constraints are Best Management Practice (BMP) for which mitigation requirements vary from one to another.

The map (Figure 2.27) shows the Post divided into areas according to three levels of development suitability. The areas designated as "Most Suitable for Development" have no environmental constraints and are recommended for development. The "Moderately Suitable for Development" areas have some constraints associated with them that require mitigation before development can occur. The "Least Suitable for Development" areas have constraints that may require significant mitigation measures (for example, a sensitive natural area).

Future development is expected to be concentrated in the areas designated as “Most Suitable for Development” as construction will be less costly, faster and more convenient. Developing sites within the “Moderately Suitable for Development” areas is possible but will require mitigation prior to development.

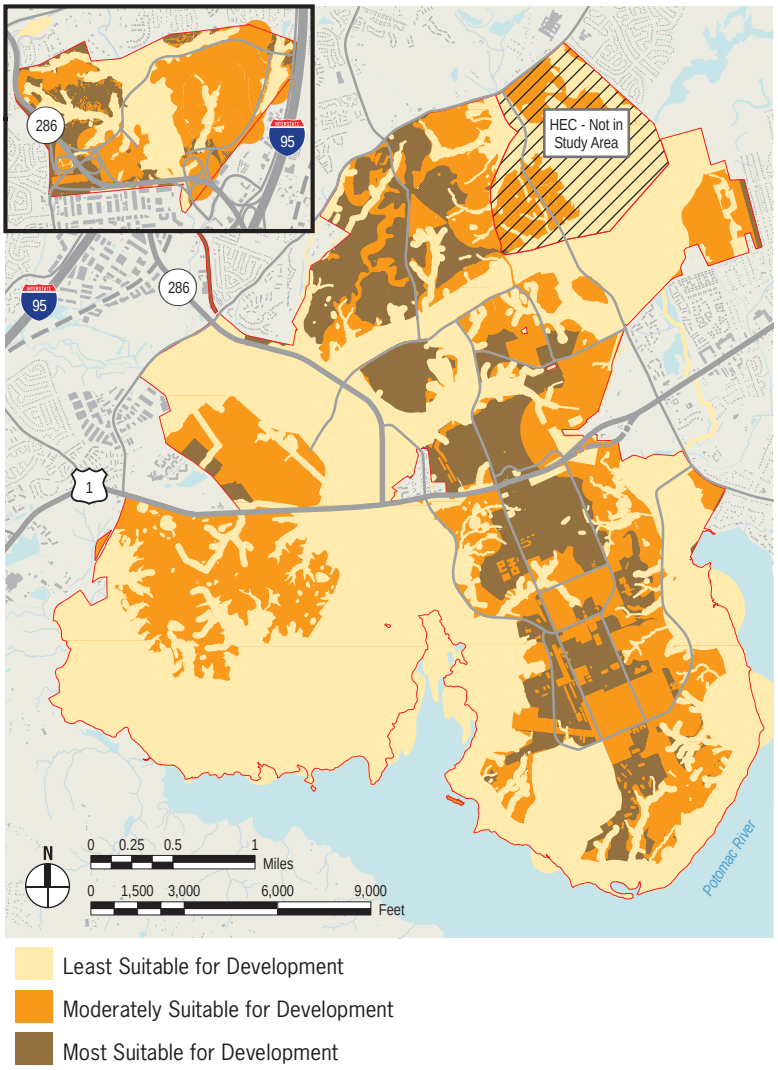
Sites within the “Least Suitable for Development” areas shall only be developed when they are unavoidable (e.g., a necessary road crossing) or where they can take place with no adverse impacts to the ecological services that these constrained areas are providing. It is recommended that the values lost, if any, due to the encroachments on these areas be directly mitigated where possible. Mitigation efforts shall occur through the restoration of degraded areas (e.g., RPA buffer areas, streams) elsewhere on the Post or on nearby sites if there is insufficient restoration capacity on impacted sites.

This constraints composite map is only part of the equation when determining environmental constraints. This map primarily depicts land-based constraints posed. There are other factors to consider, such as height or land use restrictions based on protected viewsheds and airfield field operations.

Table 2.3 - Level of Environmental Constraint
Least Suitable for Development Constraints
Natural Resources
Resource Protection Areas (RPAs)
100-year Flood Zones
Riparian Areas
Wetlands
Wildlife Refuge Areas
Forest and Wildlife Corridor
Accotink Creek Conservation Corridor (ACCC)
Sensitive Flora Species
Sensitive Fauna Species
Cultural Resources
Archaeological Sites
Cemeteries
Historic Properties Buffer
Moderately Suitable for Development Constraints
Natural Resources
Grassland Management Areas
Wetland Conservation Areas
Partners in Flight (PIF) Breeding Bird Buffers
Steep Slopes
Cultural Resources
Historic Zoning Overlay Districts
Historic Structures
Historic Districts
Operational Resources
Ranges*
Solid Waste Management Units (SWMUs)**
Hazardous Waste Management Units (HWMUs)**
Petroleum Storage Areas (PSAs)**
Petroleum Release Sites (PRSs)**
Land Use Encumbrances

Notes: * May require OE clearance or removal
** Require investigation and remediation

Figure 2.26 - Environmental Composite Constraints



Land Use

This section provides a summary of existing land use conditions (on-Post and off-Post) and an analysis of inconsistencies and incompatibilities.

Existing Land Use

Fort Belvoir's existing land use is fairly well-organized by use and function. A summary of existing land use conditions and an analysis of inconsistencies and incompatibilities are provided on the following pages. Numbers listed next to descriptions are keyed to locations on the Existing Land Use Map (Figure 2.28). The Existing Land Use Map provides a generalized view of the Installation and reflects the dominant land use of each area.

Professional/Institutional

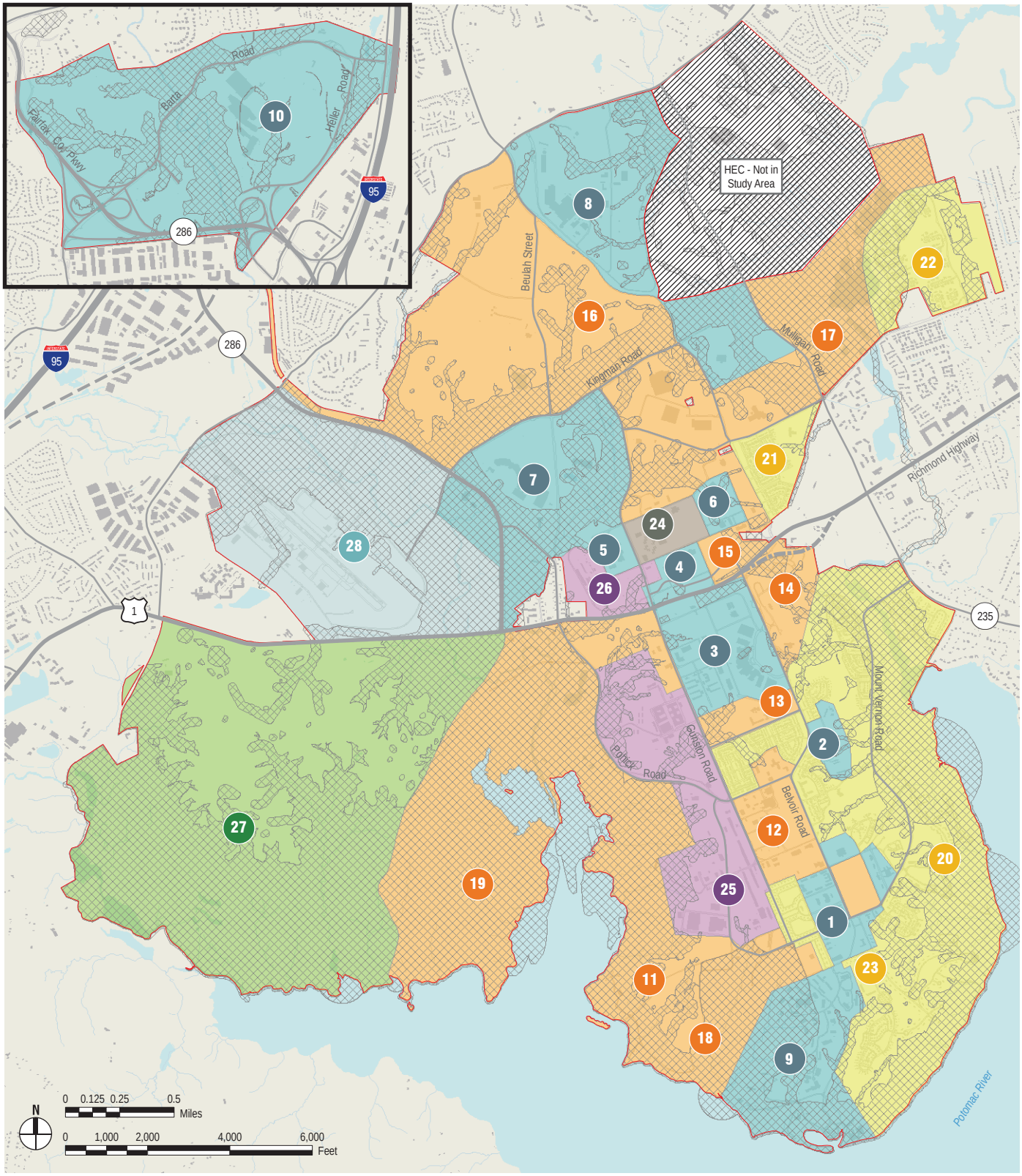
Fort Belvoir's current administrative land uses are generally organized into ten areas. There are six pockets of administration and education facilities located along the central north-south axis of the Main Post, and there are three larger research and development (R&D) areas that connect to this core but extend outward toward the Main Post boundaries. These R&D areas have restricted access and security in addition to the Post security. The last of the ten administrative areas is FBNA. A more detailed description of each area is provided below:

1. Located around the historic Long Parade Grounds on South Post, this area includes the Post's Headquarters, the Missile Defense Agency, other agencies' headquarters, general administrative facilities, and training facilities.
2. The DeWitt Army Hospital, formerly the primary medical facility on Post, is surrounded by residential land uses. DeWitt Hospital is no longer used and is slated for demolition.
3. Located between Belvoir Road and Gunston Road, this area includes the new Fort Belvoir Community Hospital and other supporting medical administration facilities. Additionally, office buildings that house many of the mission partners that relocated to Fort Belvoir under BRAC 2005 and the new U.S. Army Legal Services Agency (USALSA) building are located here.
4. On North Post, there are three administrative clusters that surround the McRee Barracks. Included in these is the new Office of the Chief, Army Reserve (OCAR) facility.

Garrison Headquarters Building

5. The area located to the west of McRee Barracks includes the Army National Guard Reserve Center and the new D.C. National Guard Resource Training Center.
6. The area east of McRee Barracks includes general administration functions and the Center for Army Analysis. The area also includes a few support facilities (dining hall facility and the Wells Field House) for the troops housed in McRee Barracks.
7. Located on North Post between Fairfax County Parkway and Gunston Road, this area is one of the three large research and development (R&D) clusters on Main Post. The Defense Logistics Agency (DLA) is the main mission partner in this area.
8. Located adjacent to Humphreys Engineering Center is the second largest R&D cluster. Activities here are of a classified nature and access is restricted. The Aerospace Data Facility - East (ADF-E) is the primary mission partner in this area.
9. Located on the south end of the Main Post is the last of the R&D clusters. It extends close to the Post's historic residential villages and includes numerous older laboratories and research facilities.
10. Fort Belvoir North Area (FBNA) is classified entirely as Professional/Institutional land use. The main mission partner is the National Geospatial-Intelligence Agency (NGA) with 8,500 employees. FBNA also includes an Emergency Services Center and a Remote Inspection Facility.

Figure 2.27 - Fort Belvoir Existing Land Use



Community

Most of the retail-based activities - shopping, dining, and services - are located along the primary north-south axis of the Post. There are three main areas set aside for outdoor recreation: two golf course areas and the Tompkins Basin Recreation Area. Other small areas for outdoor recreation are dispersed throughout the Post and include sports fields, tennis courts, racquetball courts, a skateboard park, and football fields. A more detailed description of each area is provided below:

11 The Tompkins Basin Recreation Area is located on the southwestern edge of the Post's main peninsula at Gunston Cove. Currently the area's recreational opportunities include a new Family Travel Camp, handicap accessible hiking/biking trails, two baseball fields, an outdoor archery range, canoeing and kayaking, picnic areas, fishing pier and a boat launch for non-motorized boats. Future development plans include cabins at the Family Travel Camp and additional sports fields.

12 Located at the center of the South Post, this area includes the original community facilities from the early-mid twentieth century. Additional community services were built in later years. It also has a new town center area built along 12th Street which is a mixed-use development for residential and retail.

13 Located south of the new Fort Belvoir Community Hospital (FBCH), this area contains the Warrior Transition campus, USO, and a few sports courts.

Town Center

14 Located east of FBCH, this area includes a new Child Development Center. A 144-room, all-suite privatized Army lodging is under construction adjacent to the Community Center, and there are plans to locate additional community support elements for the hospital within this area.

15 Located on North Post just north of U.S. Route 1, this area includes open fields and Fremont Parade Grounds. The area is used for sports events and celebrations such as 4th of July and Oktoberfest. This area is the public face of the Post because of the views into the area from off-Post.

16 Located on North Post between Abbot and Telegraph Roads, this area includes the community support facilities of the PX, the Commissary, the bank, and the 36-hole golf course. These facilities are considerably larger and have more users than those on South Post. They are regional assets and serve many dependents and retirees living off-Post. The National Museum of the U.S. Army is planned to be located within this area.

17 The Abbott Wetlands Refuge is near the Woodlawn Village Housing area along Dogue Creek. The Refuge, open to the public, provides recreational trails through non-tidal wetland and forest.

18 The T-17 wildlife refuge is bordered to the west by Morrow Road, to the north by Tompkins Basin Recreation Area, to the east by the 300 Area perimeter fence and to the south by the shoreline. Only elevated stand hunting is permitted within this area to the public.

19 The Accotink Bay Wildlife Refuge offers the public well-maintained trails through deciduous forests that descend to the bay below. The site's forest attracts many interesting spring and fall migrants including a variety of shorebirds, waterfowl, and offers a hunting ground for nesting ospreys. The refuge is open daily from dawn to dusk.

Herryford Village - New RC Housing

Residential

Family Housing consists of twelve villages primarily situated along the southeastern and eastern edges of the Post. Under the U.S. Army's Residential Communities Initiative (RCI), Clark Pinnacle and the Department of the Army (DA) formed a 50-year public-private partnership to develop, rehabilitate, and build 2,156 homes on 577 acres of the Post. Prior to the RCI, Fort Belvoir housing was in poor condition and was built at low to medium densities. The RCI project began in December 2003. The development plan, spanning eight to ten years, included the demolition and replacement of 1,900 homes and the renovation of 170 historically significant homes. A more detailed description of the housing areas are as follow:

20 Located on the east side of the South Post, this area contains the first housing developments, which were constructed from the 1920s to early 1940s. These included Belvoir Village, Gerber Village, and Jadwin Loop. By the mid 1950s, construction began on Fairfax and Dogue Creek Villages. Colyer, George Washington, and River Villages are located just south of U.S. Route 1 and east of the South Post Golf Course. River Village is located on the eastern bank of Dogue Creek; approximately one-third of the community lies within the 100-year floodplain. RCI is currently in the process of replacing most of the housing units within this area, with the exception of the historic housing and housing located within the floodplain. The housing in the floodplain will be demolished and replaced elsewhere on Post.

21 Lewis Village, located off of Woodlawn Road just north of U.S. Route 1, is one of two family housing clusters on North Post constructed in the 1950s. This cluster was demolished and rebuilt in 2005.

22 Woodlawn Village, the second cluster on North Post constructed in the 1980s, is separated from the rest of the Post and has been further isolated by the closing of the gate at Pole Road. Residents of Woodlawn Village must exit the Post and reenter at a different gate in order to access other portions of the Post.

22 As of August 2011, Fort Belvoir Lodging (Visiting Officers' Quarters) has been privatized to the InterContinental Group. The company brings first branded hotels to military installations and upgrades the current facilities to meet private sector standards for hotels.

Troop

The primary troop land use is located between Abbot and Goethals Roads. There are some other isolated troop-related facilities located in other areas. A more detailed description of the main troop area is provided below:

24 The primary troop area consists of McRee Barracks, built in 1975, a fitness center, theater, and dining hall (circa 1968). This area also includes the maintenance facilities between Meade and Goethals Roads just north of U.S. Route 1. There are five motor pools (two being Army Reserve) and six maintenance shops (two being Army Reserve). McRee Barracks buildings were renovated in 2008.

McRee Barracks

Industrial

There are two primary industrial areas on the Post. They are organized along the former rail line and consist primarily of warehouses. A more detailed description of the two industrial areas is provided below:

25 The larger of the two industrial areas is located on South Post. It serves as the primary Post supply/ storage area. It contains over 35 storage facilities, many of which are in inadequate condition. The area includes the Army Museum Support Center warehouse (circa 2010) and also includes two small maintenance clusters: a vehicle maintenance shop (directly west of Gunston Road in the 700 Area) and a transportation motor pool (on 16th Street).

26 The second industrial area, located along Meade Road, comprises the remaining storage area on Post. The facilities in this area are in very poor condition.

Industrial Area along Meade Road

South Post Industrial Area

Ranges and Training

There is one large range and training area, 1,423 acres, currently designated on Fort Belvoir: the Southwest Post. In addition to this area, the Fort Belvoir Range Plan maintains range designations at numerous areas throughout the Post. Many of these smaller areas are not active, and only maintain their range designation because the process to officially remove the designation has not been done.

27 Primarily outdoor training takes place on the Southwest Area. Much of the land on the Southwest is not developable due to operational and environmental constraints.

Airfield

28 Davison Army Airfield is located on the Post's western edge north of U.S. Route 1. It serves the Army's aviation needs in the National Capital Region with an average of 20 missions (takeoffs and landings) per day. An increase in takeoffs and landings is projected by the airfield operators. The facilities are in generally poor condition. However, a new airfield operational tower was recently constructed.

Planning Considerations: On-Post Land Use

Overall, Fort Belvoir's existing land use is fairly well-organized by use and function, and major land use shifts are not required. However, there are a couple incompatibilities that need to be addressed in any future redevelopment plans:

- The Industrial land use on the South Post borders the western side of the Town Center and the residential development in the historic district. While several of the older warehouse buildings (early 1900s) are presently being used for professional/institutional uses, there are still a number of industrial uses that should be screened and buffered.
- Tulley Gate is the primary visitor entrance to the Post. This directs visitors along some industrial land uses. Care must be taken to redevelop this part of the Post to present an appropriate first impression to visitors.

Adjacent Off-Post Land Uses

This section discusses the existing land uses adjacent to Fort Belvoir and is organized by the Planning Districts presented in Fairfax County's Comprehensive Plan (Figure 2.29).

Mount Vernon Planning District
The areas immediately adjacent to the Installation consist primarily of low density single family homes. There are also several parks and historic sites. Concentrated along Route 1, there are low-scale commercial uses consisting of convenience stores, fast food restaurants, auto services, motels and warehouses. Further to the east on Route 1 is a recently completed multi-story hotel.

Rose Hill Planning District
The areas adjacent to the Installation consist of low density single family homes, parks and recreations uses, and a secondary school. Within this district, Humphreys Engineering Center (HEC) is the largest adjacent use to Fort Belvoir.

Springfield Planning District
Directly adjacent to the north boundary of the Main Post, the land use is primarily low density residential with one new Village Center (commercial uses) being planned near the Telegraph Gate area. Further northwest, the land uses transition to a large concentration of warehouse, industrial and commercial uses that are centered around the I-95 corridor/Route 286 intersection. These industrial uses directly border the southern boundary of FBNA and the northern border of Davison Army Airfield (DAAF). There have been some new developments directly adjacent to both DAAF and FBNA. Immediately north of the runway at DAAF is a recently constructed regional FedEx shipping and receiving facility. Immediately south of FBNA is a newly completed secure high rise office building, which is part of a larger development called Patriot Ridge. Directly north of FBNA, the uses are primarily low density residential.

Pohick Planning District
The adjacent land uses along the western edge of FBNA are primarily low density residential and parks.

Lower Potomac Planning District
The land uses along the western edge of Main Post include both low and high density residential as well as commercial and industrial uses. The commercial and industrial uses are primarily located along the regional roadways. The southern edge of Main Post is bounded by Pohick Bay, Accotink Bay and Gunston Cove that drain to the Potomac River. This district contains Accotink Village and also includes single-family and commercial uses located at the intersection of the Fairfax County Parkway and Route 1. The widening of Route 1 will create redevelopment opportunities.

Planning Considerations: Adjacent Off-Post Land Use

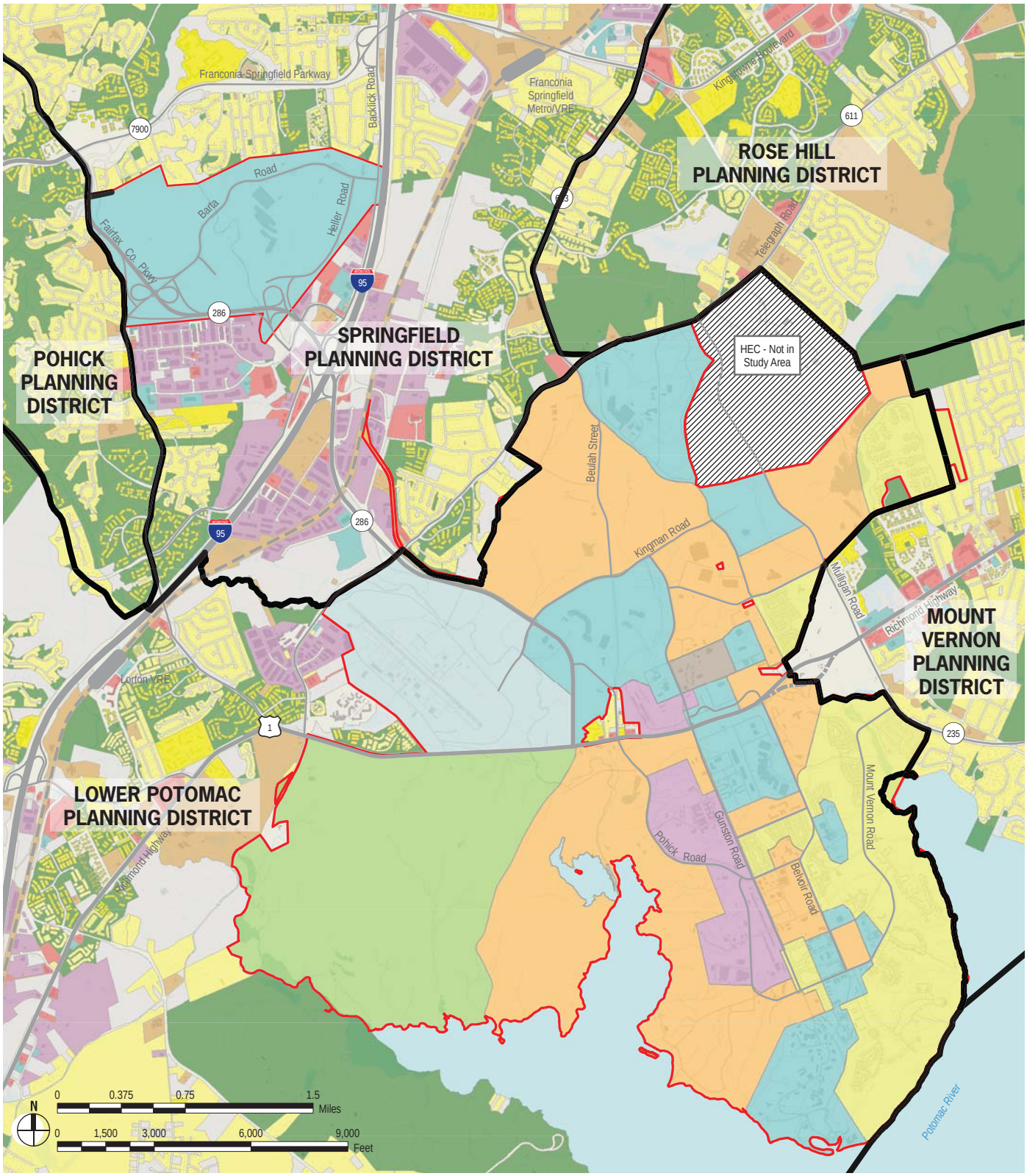
There are a number of land use issues and potential symbiotic relationships that need to be taken into account for future planning:

- Land uses around DAAF affect the operational capability of the airfield. A joint land use study (JLUS) could be undertaken to identify actions that can be taken jointly by the surrounding community and the Post to solve existing compatibility problems and to prevent future ones.
- With the completion of the NGA campus on FBNA, there is pressure to change the industrial zoning south of FBNA to zoning that will permit more office/administration uses within this area. Future development or expansion of the FBNA campus must continue to address the transition between on-Post and off-Post development as well as the on-Post security requirements.
- The future Route 1 widening is causing the removal of existing buffering woodlands along the Posts's boundaries. Additionally, there are redevelopment plans for Accotink Village. Future planning efforts should consider how this future development will affect Fort Belvoir and development mitigations if necessary.

Industrial Area south of FBNA


New Housing Area West of Fort Belvoir off of Route 1

Figure 2.28 - Fairfax County Existing Land Use



On Post Land Use
- Professional/Institutional
- Residential
- Troop
- Community
- Range/Training
- Airfield
- Industrial

Off Post Land Use
- Recreation/Green Space
- Government/Institution
- Industrial
- Low Density Single Family
- High Density Housing
- Office
- Retail
- Vacant Land

Developable Areas

The Developable Areas Map (Figure 2.30) is a result of combining the areas identified as "Most Suitable for Development" and "Moderately Suitable for Development" on the Composite Environmental Constraints Map provided previously in this section (Figure 2.27). It is expected that most of the new development will be directed toward these developable areas.

To better understand the land currently available for development, a "constrained development" layer was created (the inverse of the "developable areas"), and overlaid onto the Existing Land Use Map (Figure 2.31). The map depicts how much of any land use category is actually available for development. Actual acreages for each land use category, for both the gross and net (developable) land, are shown in Table 2.5.

It should be noted these developable acreages are based only on land-based constraints. As documented earlier in this section, there are other constraints such as height restrictions or land use restrictions (e.g., encumbrances) that must be considered when determining the best areas for future development/redevelopment.

Table 2.4 - Land Use Acreages

	Total Acres	Constrained Acres	Developable Acres
Professional/ Institutional	2113	863	**1250**
Residential	1240	655	**585**
Troop	46	0	**46**
Community	2569	1626	**943**
Range/Training	1463	1003	**460**
Airfield	690	472	**218**
Industrial	378	95	**284**
TOTAL (MAIN POST AND FBNA)	8500	4714 (55%)	**3786 (45%)**
MAIN POST TOTAL	7696	4421 (57%)	**3275 (43%)**
FBNA TOTAL	804	293 (36%)	**511 (64%)**

Figure 2.29 - Developable Areas

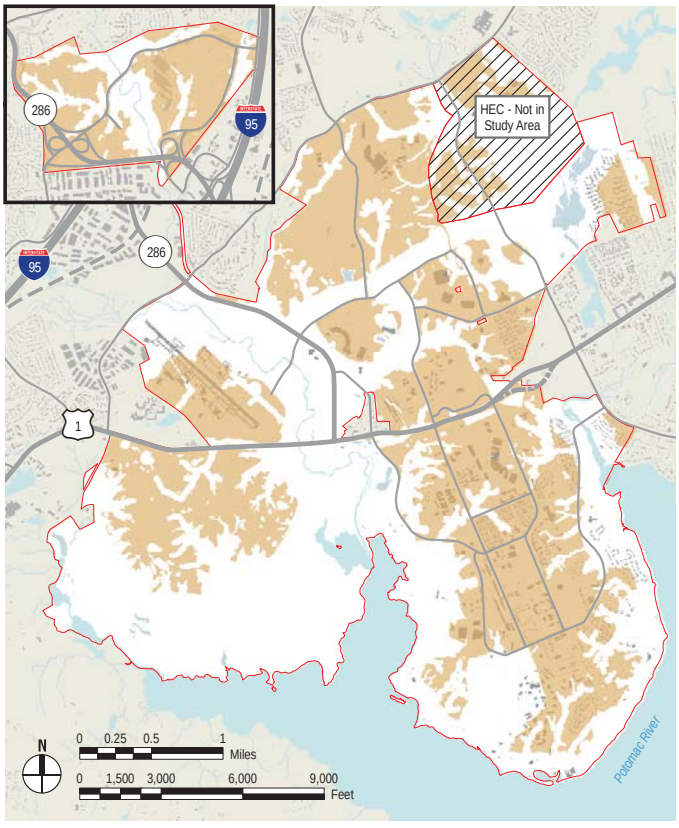
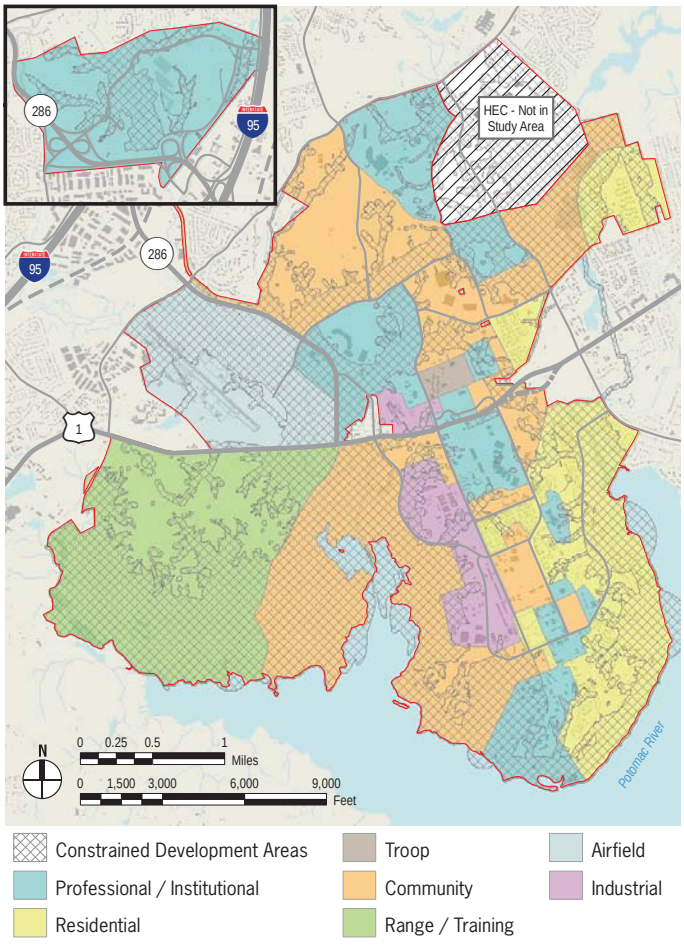


Figure 2.30 - Land Use Map with Development Constraints Overlay

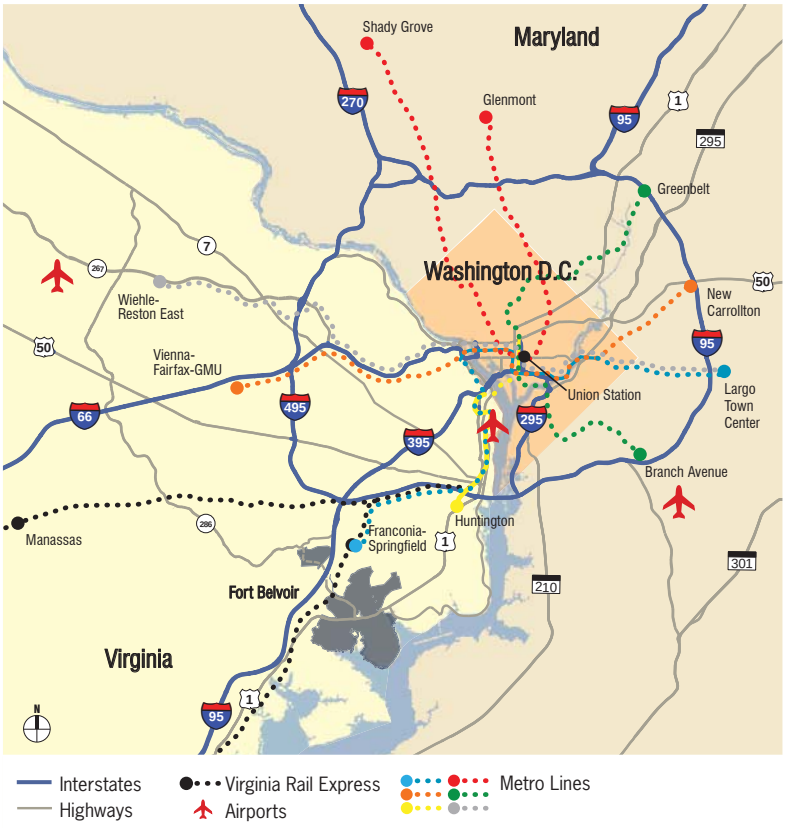


Transportation

The following section reviews existing road conditions for both on-Post and the off-Post regional roadway network, including the Installation's Access Control Points (ACPs), existing public transit services (rail, metros and bus routes) and Army shuttle bus services, parking counts, pedestrian facilities and bikeways. This is a summary of existing conditions. Greater detail on the transportation network is contained in the Transportation Management Plan document.

Fort Belvoir is located amid a rapidly growing suburban area with a heavily congested regional transportation system. Moving personnel on and off the Post every day will become increasingly challenging in upcoming years as regional traffic substantially increases over the next several decades. Fairfax County population alone is expected to increase 28 percent from 2005 to 2030, with an expected jobs increase of 41 percent; both will contribute significant impacts to the regional transportation system. Local and state government agencies recognize that future growth demands in the region will require extensive transportation improvements and have identified needed improvements in their comprehensive plans. Off-site regional transportation improvements within the I-95 and Route 1 corridors and the areas surrounding Fort Belvoir are key to supporting its employees' mobility. The analysis and evaluation of these future regional improvements are beyond the scope of this Installation master plan; however, the Installation continues to work closely with local government officials to advance transportation solutions that will bring positive changes to the area. For further details, see the Regional Transportation Initiatives in Chapter 3.

Figure 2.31 - Regional Transportation



Fort Belvoir supports improvements that will enhance the mobility of travelers throughout northern Virginia and the National Capital Region. Fort Belvoir, in partnership with state and local government, contributed to the construction of significant improvements both on-Post and off-Post to improve roadway capacity. This includes the extension of the Fairfax County Parkway to Route 1, the reservation of public right-of-way on Installation land for the Route 1 widening (on Main Post) and the future Fairfax County Parkway intersection and ramp improvements (on FBNA).

Regional Road Network

The Main Post and FBNA are well-served by their proximity to the regional roadway network (see Figure 2.32). However, a number of these interstate highways and local roadways currently operate above design capacity, thus congestion on these facilities in the vicinity of the Post is a daily occurrence. A summary of the regional public highways that serve Fort Belvoir includes:

- **Interstate 95 (I-95), including Interstate 395 (I-395) and Interstate 495 (I-495, Capital Beltway),** is one of the busiest and most congested transportation corridors in the country. In addition to indirectly facilitating traffic to both Main Post and FBNA, the I-95 roadways serve as major commuter corridors for the entire Washington, D.C. National Capital Region as well as serving long-distance traffic along the Eastern Seaboard. Region wide, it serves commuter traffic from predominately residential counties to the south to major employment centers in Washington, D.C. and Arlington County. Ongoing or planned improvements to I-95 that affect Fort Belvoir include an Express lanes project (formerly referred to as High Occupancy Toll (HOT) lanes) and a flyover ramp, located just east of FBNA, to allow access to the HOV lanes. Both of these projects are discussed in more detail in Chapter 3 of this master plan.
- **Virginia Route 286 (Fairfax County Parkway)** is an east-west highway that was recently widened to four lanes as part of the construction of FBNA and has significantly reduced the travel time and increased accessibility between Fort Belvoir and western parts of Fairfax County. It directly serves both Fort Belvoir sites as the main access to I-95; the roadway bisects northern Main Post and runs along the western and southern boundaries of FBNA. As part of its Transportation Plan, Fairfax County has identified improvements along the entire segment that serves Fort Belvoir.

- **US Route 1 (Richmond Highway)** is a north-south highway that primarily serves local trips but can be utilized as an alternate route to I-95 since it runs parallel to the interstate. Route 1 physically divides Fort Belvoir Main Post into North Post and South Post and is the primary access to the site. This facility is currently four lanes as it passes through Fort Belvoir and is often congested due to heavy demand by both Fort Belvoir and the region. The U.S. Office of Economic Adjustment selected widening Route 1 to six lanes from Telegraph Road to Mount Vernon Road to receive $180 million for construction, anticipated to start in 2013 with completion slated for mid-2016. This widening will significantly increase capacity along Route 1, improving both Fort Belvoir and regional mobility. The project will also provide pedestrian and bicycle facilities as well as accommodations for additional future transit in the corridor. Fairfax County designated Route 1 as an Enhanced Public Transit Corridor to achieve those viable "future transit" options; additionally, there are several transit studies underway to determine what future type of transit can best serve Route 1. With dedicated transit, such as light rail or bus rapid transit in the new center median, as well as supporting facilities such as transfer centers and park and ride lots, Route 1 will transform into a true multimodal corridor. In support of all of these improvements and plans, the Army signed a Memorandum of Agreement (MOA) with VDOT to preserve land in Fort Belvoir to accommodate all elements including the widening, transit corridor, and expanded cross-sections for turn lanes of Route 1.
- **Virginia Route 289 (Franconia-Springfield Parkway)** is an east-west highway that is six lanes along its entire length and includes several interchanges as well as some signalized and non-signalized intersections. It is located just north of FBNA. Potential improvements identified within the Fairfax County Transportation Plan include potential interchanges and longer-term, widening to provide for HOV lanes to access the HOV/Express lanes on I-95.
- **The George Washington Memorial Parkway** is a four-lane facility adjacent to the Potomac River west and south of Washington, D.C. Coupled with Mount Vernon Memorial Highway, Main Post traffic can use this facility if their origin or destination is via Old Town Alexandria.

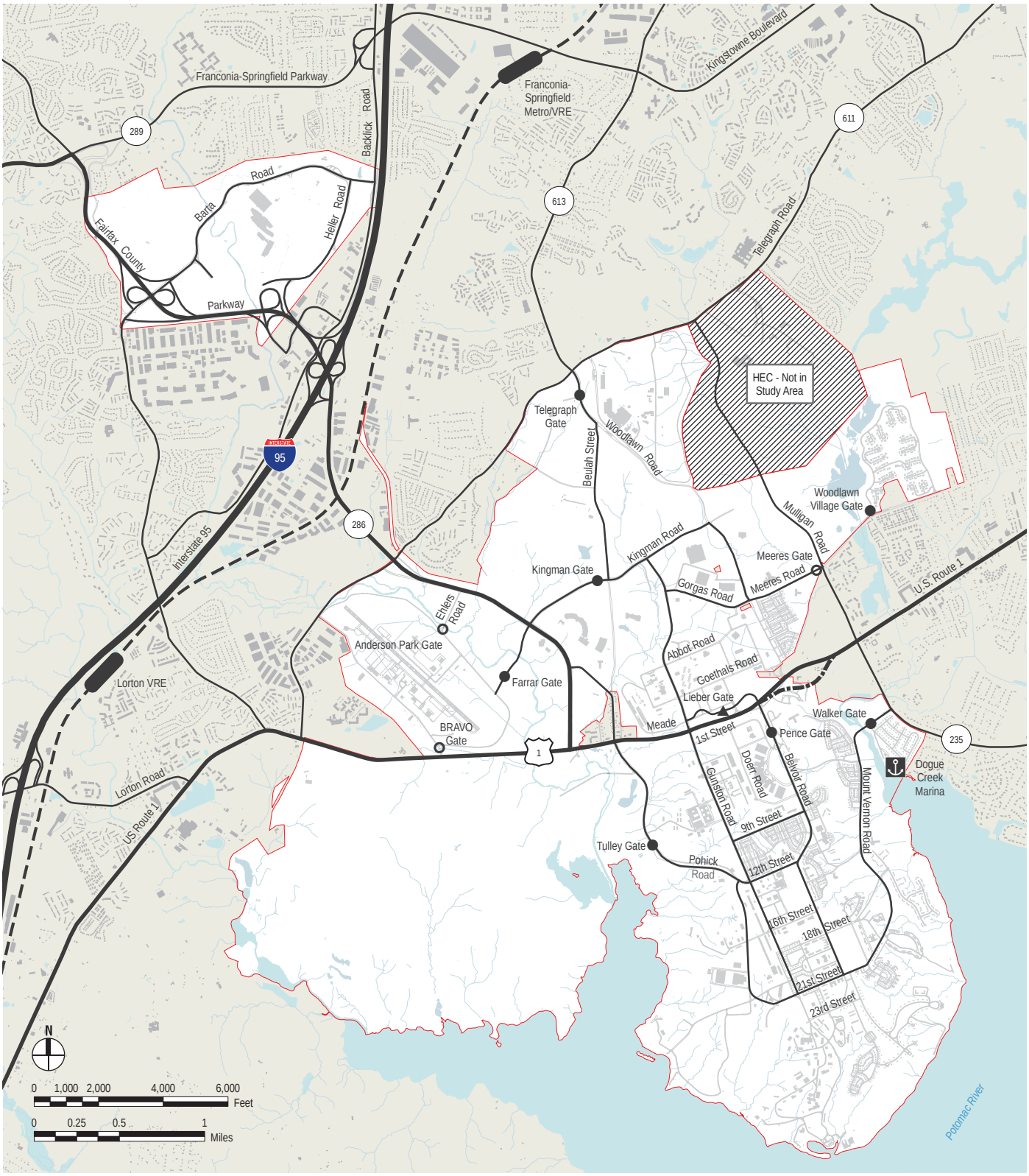
Local roadways that directly serve Main Post include:

- **Virginia Route 611 (Telegraph Road)** generally parallels Route 1 until its terminus south of Fort Belvoir and serves as the northern boundary of Main Post. It links the City of Alexandria to residential areas of Fairfax County, including Fort Belvoir, and serves both local and commuter traffic. Future improvements that affect Fort Belvoir are associated with the construction of Mulligan Road and the Hilltop Village Center.
- **Virginia Route 235 (Mount Vernon Memorial Highway)** forms a loop off Route 1 to the southeast, serving Mount Vernon and the southern end of the George Washington Parkway. This facility is two lanes and is the easternmost boundary of southern Main Post.
- **Virginia Route 613 (Beulah Street)** is a north-south highway that links Telegraph Road and Fort Belvoir to Franconia Road. It is a four-lane highway that serves both local and commuter traffic.
- **Mulligan Road** is a new four-lane divided highway on the eastern edge of Main Post that links Telegraph Road to Route 1 for the general public. The completion of Mulligan Road addressed the community need for movement between Telegraph Road and Route 1 which was made more circuitous when local traffic was barred from using Beulah Street after 11 September 2001. Additionally, Telegraph Road will be widened to four lanes in the vicinity of Mulligan Road. During the process of completing this Master Plan, Mulligan Road was renamed Jeff Todd Way, that name change has not been reflected throughout the text and graphics of this plan.

Local roadways that directly serve FBNA include:

- **Virginia Route 617 (Backlick Road)** parallels I-95 through Springfield and ends at Fairfax County Parkway, where it meets Alban Road. Backlick Road is a four-lane facility next to FBNA and is congested through the Springfield area to the north.
- **Virginia Route 638 (Rolling Road)** serves local and commuter traffic and runs along the western border of FBNA. It runs in a northwest-southeast direction between Braddock Road and the intersection of Pohick/Alban Road. This facility is currently two lanes.

Figure 2.32 - Installation Road Network



Installation Road Network

The existing on-Post roadway network was upgraded during the recent BRAC 2005 and supports the current workforce. Chokepoints occur at the connections where the Installation roads meet the regional roadways. Other than congestion at the ACPs during peak hours, there is no major congestion within the Installation. As part of BRAC, infrastructure throughout the Post was improved including a number of roadway-related enhancements such as widenings, turn lanes, signals, and a new roundabout. These improvements increased Installation roadway capacity to accommodate current and some future demand. Construction of any new facilities on Fort Belvoir will require minor on-Post intersection/roadway improvements such as new signals, signal timing improvements, and minor intersection and/or site access turn lane improvements. These types of site-specific roadway enhancements will be more operational improvements for access, not capacity, and will be determined based on project type, size, locations, and timing for completion.

Route 1 physically bisects Main Post (Figure 2.33) into North Post and South Post. Gunston Road is the major north-south roadway connecting North and South Posts and is the only roadway connection that crosses over Route 1. Gunston Road was recently widened as part of the internal improvements to accommodate the BRAC Action. It is a four-lane section from 12th Street to Kingman Road with continuous left turn lanes between Abbot Road to 12th Street. Additionally, the four-lane section of Gunston Road includes dedicated on-street bicycle lanes.

In addition to Gunston Road, North Post circulation is primarily provided by several two-lane facilities: John J. Kingman Road, known as Kingman Road, and Beulah Street. Woodlawn, Meade, Goethals, Abbot, Gorgas, and Meeres Roads provide internal circulation within North Post from Gunston and Kingman Roads.

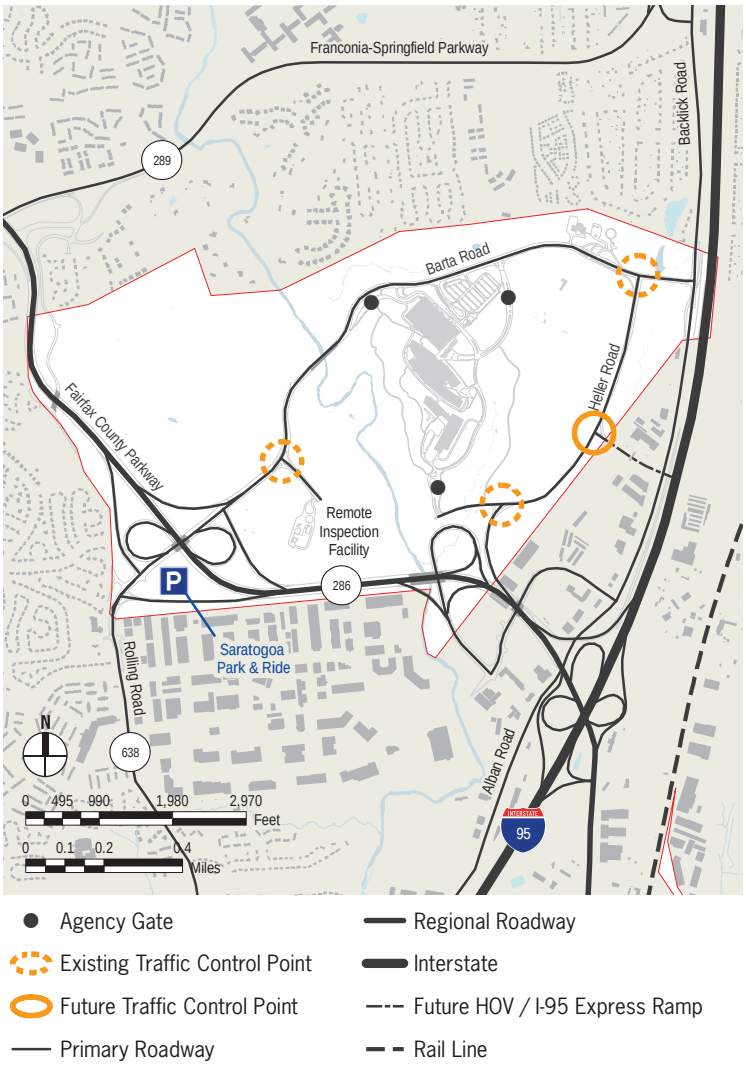
South Post circulation is provided by two- and four-lane facilities in a grid network throughout the Medical Campus, Town Center, and Historic District. Two roadways – Belvoir Road and Gunston Road – provide the main north-south connections, while a series of numbered roadways provide the east-west grid. Circulation from Route 1 to this grid network on South Post is provided via three roadways: Pohick Road and Tulley Gate to the west, Belvoir Road and Pence Gate in the center, and Mount Vernon Road and Walker Gate to the east.

Circulation within FBNA is provided by a partial loop roadway that is comprised of Barta Road and Heller Road (Figure 2.34).

Access Control Points

Fort Belvoir regularly operates eight Access Control Points (ACPs) – six onto Main Post, one into Woodlawn Village, and one onto Davison Army Airfield (Figure 2.34). FBNA access is monitored at four Traffic Control Points and mission partner gates within the site (Figure 2.35). These ACPs do not include numerous mission partner-operated gates, such as monitoring access to secure facilities, within the Installation. Currently, Tulley Gate, Pence, and the Telegraph Road ACP are completely compliant with Army UFC 4-022-01 criteria. The majority of the gates operate at or above operating capacity during peak inbound (morning) periods; however, this can change in the near future with the expected incorporation of automated entry. To use the non-visitor ACPs, at least one occupant of the vehicle must present valid DoD identification in order to be processed through the gate.

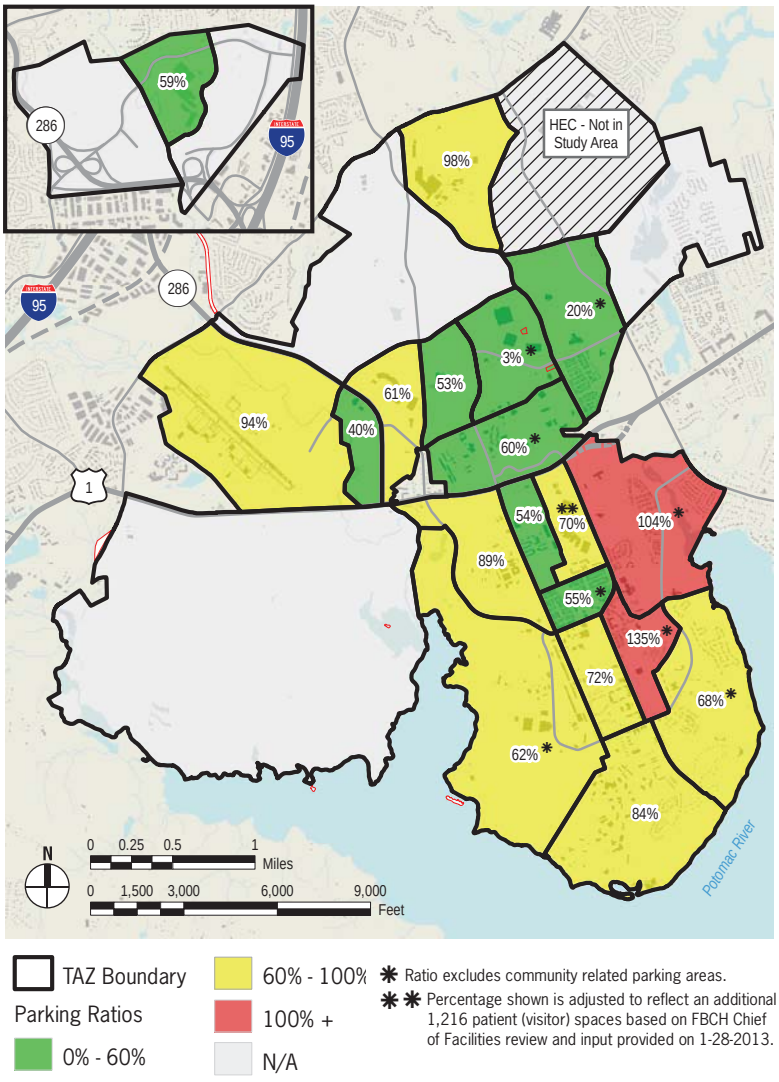
Figure 2.33 - FBNA Road Network



Design plans are completed for a future Lieber Gate ACP and roadway that is located on the northern side of Route 1 at the existing signalized intersection of Belvoir Road. Plans will complete the four-leg intersection and provide full access between Route 1 and Gunston Road on North Post – a connection that is not currently provided. Currently, traffic from Route 1 that is destined to North Post must travel through South Post via the bridge on Gunston Road. Opening Lieber Gate will reduce traffic on South Post roadways as well as congestion along regional roadways at the ACPs.

Traffic congestion at the ACPs can be reduced by increasing the number of vehicles that can be processed through each inspection lane. Recent work completed in conjunction with BRAC 2005 improvements provided necessary infrastructure to support Automated Installation Entry (AIE) systems at Fort Belvoir. Providing entry to pre-approved vehicles via radio-frequency identification (RFID) equipment (similar to the EZ-Pass system) will significantly reduce vehicle processing times at the Main Post gates. This reduction in processing times will reduce the lengths of the queues that form at the gates, thereby minimizing the potential backups onto off-Post roads. In March 2014, testing and phase-in began at Tulley Gate for the AIE system.

Figure 2.34 - Parking Analysis



Parking

Meeting the demand for parking is an integral part of planning. Determining and proving the correct amount of parking in an effective, efficient manner is a challenging task. Fort Belvoir realizes the need to balance the parking demand with commuting alternatives that help reduce the demand. Army guidance authorizes administrative parking at 60 percent of the personnel (1.67 employees per space). NCPC guidance allows slightly more parking, 67 percent of the personnel (1.50 employees per space). Once the HOV ramp is established on FBNA, the parking requirement is reduced to 50 percent parking for employees (2 employees per space). This ratio will only apply to new development in order to meet NCPC requirements for federal facilities that have HOV access.

The parking ratios for Fort Belvoir were determined by comparing the number of parking spaces (constructed as of Fall 2011) to the number of employees based on agency building assignments. Residential parking, government stored vehicles and motor pool/service parking spaces are counted separately in the inventory and are not included in the parking ratio analysis. Additionally, the parking analysis deducts community parking (e.g., PX/Commissary, child care, theater uses) and parking for transient populations (visitors, students) from the inventory as these uses are not governed by the Army 60 percent allowance In addition, the analysis does not reflect approximately +/- 500 personnel who are not included because their assigned building location has not been provided by the Installation.

Further details regarding parking analysis methodology and field survey results can be found in the *Fort Belvoir Transportation Management Plan (TMP)*.

The ratios shown in Figure 2.35 reflect 3 conditions:

- 0-60 percent parking ratio, (green areas) that generally indicate areas that are compliant to the Army parking standards, subject to the implementation of the parking management plan described in the TMP
- 60-100 percent parking ratio (yellow areas) that exceed the 60 percent parking allowance and where additional development or populations can be added to bring the area into conformance
- 100 percent plus parking ratios (red areas) indicated surplus parking areas that are targeted for additional development

It is recognized that Fort Belvoir supports both regional and unique functions with needs that compete for parking spaces on the Installation. They include: community functions such as the PX/Commissary and the golf course; medical functions such as the Fort Belvoir Community Hospital; student populations such as DAU; reservists who serve outside of normal business hours; visitors to mission partners; and government vehicles that are stored on-site. The TMP includes an Implementation Plan that describes specific strategies to designate and demarcate community and visitor spaces as part of an comprehensive parking management plan.

Transit

There are a variety of alternative transportation options in and through Fairfax County, with several serving Fort Belvoir commuters in some capacity: rail transit does not directly connect to Fort Belvoir while buses serve the Post both directly and indirectly. Fort Belvoir and its agencies provide connecting services in the form of shuttles, but Post personnel still face challenges in using transit as a viable commuting option due to the sometimes fragmented nature of the services (i.e., multiple transfers, long transfers, and lack of mid-day mobility options) if they do use transit. Regional, state, and local agencies, in addition to Fort Belvoir, recognize that the high cost of road improvements and the cost of land that must be set aside for roadway widening is neither a desirable nor a sustainable way to provide mobility. The way forward lies in becoming a multi-modal region and Installation by providing an integrated series of options for transit. As part of that shared vision for the future, the installation is reserving the historic rail corridor as a transit route and/or bikeway that would connect the Installation to Franconia-Springfield Metro/VRE station via Cinder Bed Road. The re-use of the Fort Belvoir Historic Railroad Corridor/Cinder Bed Road (Figure 2.36) for future transit use is presently being considered as part of the Fairfax County's Transit Network Study and by VRE as part of their system plan update. Additional information regarding this corridor can be found in the Belvoir TMP. Following is a brief description of the transit options that currently serve Fort Belvoir.

Rail

While no rail transit service is directly provided to Fort Belvoir, a rail line serving both WMATA's Metrorail and the VRE is less than a mile from both the Main Post and FBNA boundaries. Additionally, each service has rail stations within a few miles of Fort Belvoir (Figure 2.36).

Congressmen Jim Moran and Gerry Connolly introduced The Northern Virginia Metrorail Extension Act (H.R. 907) in the U.S. House of Representatives on February 28, 2013 to authorize project developments for the extension of Metrorail to western Fairfax County; along the Route 1 corridor, including Fort Belvoir, in Fairfax and Prince William Counties; and along the I-95 corridor, including FBNA, through Woodbridge to Potomac Mills in Prince William County.

Bus and Shuttle Service

Several bus routes directly serve portions of Fort Belvoir; several more operate within the vicinity of Fort Belvoir, either terminating immediately outside the boundaries of the Post or passing nearby. Additionally, government-operated shuttles provide non-competing services. Figure 2.37 illustrates existing bus and shuttle services in this section of Fairfax County, provided by the Fairfax Connector and WMATA Metrobus.

- Many recent changes to service, such as the Fairfax Connector Route 335, have been implemented as a result of the 2005 BRAC increases and Fairfax County's recommendations in their comprehensive Transit Development Plan. Fort Belvoir actively coordinates with Fairfax County as well as WMATA to

Figure 2.35 - Potential Connection of Abandoned Rail Line to Regional Transit Corridor

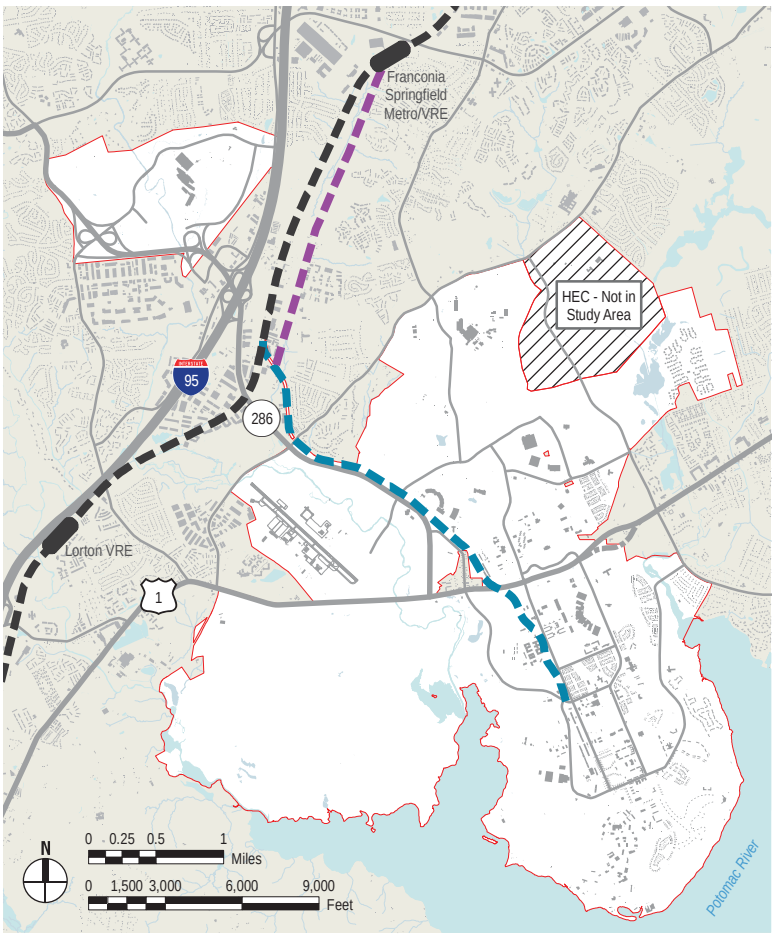
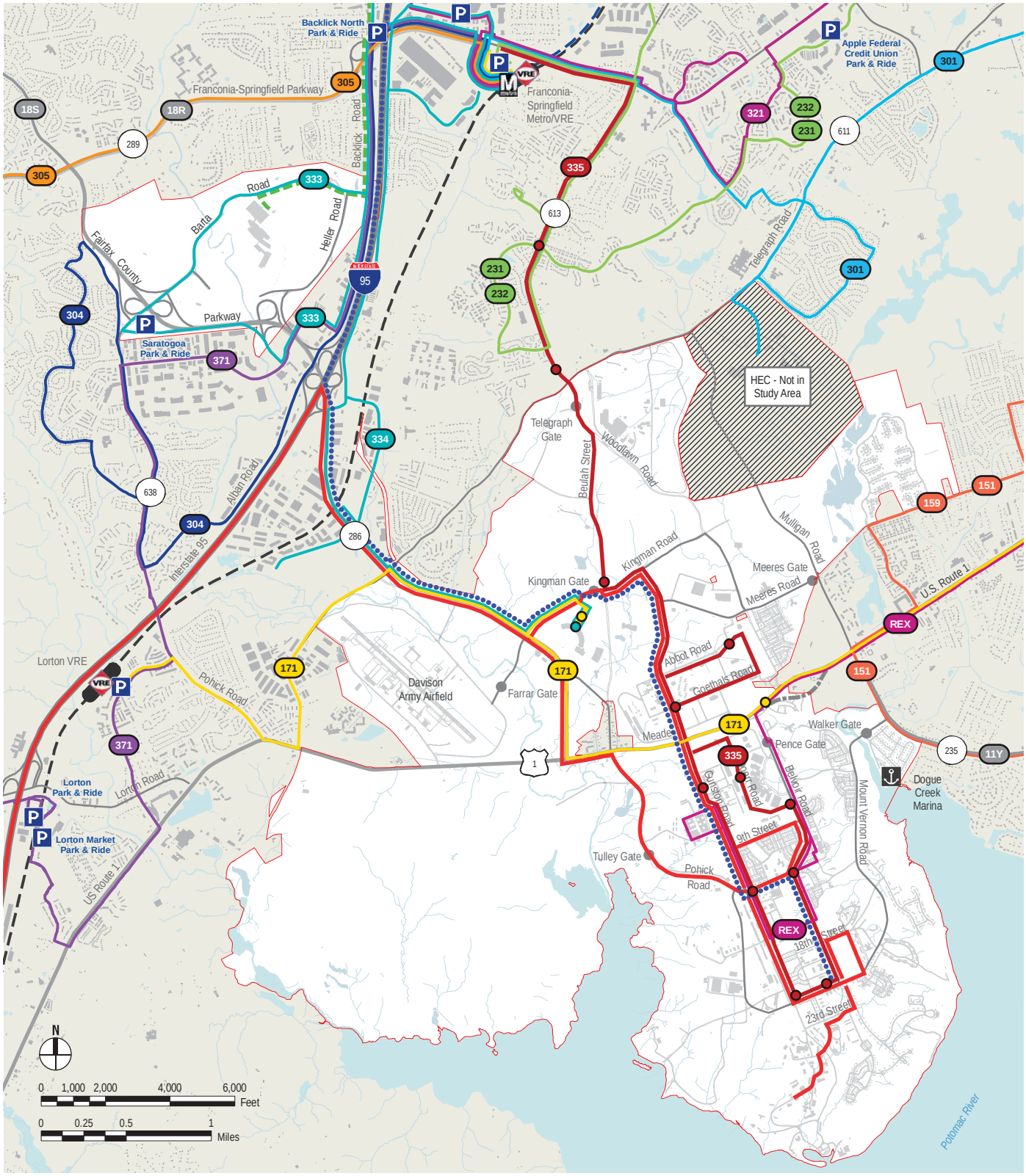


Figure 2.36 - Commuter Transit



Train Station
Park and Ride Lot
VRE Rail Line
Metro Blue Line

Bus Service (On Post All Day)
REX 334
333 171
FBNA Shuttle

Bus Service (On Post Peak Hours Only)
335
Private Bus Company

Bus Service (On Post Mid-Day Hours Only)
Route 18 OAA Shuttle

Bus Service (Off Post All Day)
11Y 151 232 305
18R 159 301 321
18S 231 304 371

actively increase and provide accurate service to its personnel.

- Main Post and its mission partners are currently served directly by WMATA Metrobus and Fairfax Connector routes. Currently, FBNA is not currently a destination for any public bus routes.
- Numerous routes currently operate in the vicinity of both Main Post and FBNA without serving the Post; they represent a potential resource for expanding bus transit service to Fort Belvoir.
- Agency-operated and funded shuttles provide service from locations within the Post to the nearby transit stations. The FBNA-operated shuttle connects to the Franconia-Springfield Metrorail/VRE Station and to the Backlick Road VRE station. The Office of the Administrative Assistant provides a shuttle from Main Post to the Pentagon (mid-day service only).
- In addition to public bus service, a private bus company currently provides Fort Belvoir-dedicated commuter bus service from commuter lots in the Fredericksburg/Stafford area. This once-daily service provides direct, non-stop service through Kingman and/or Tulley Gates with stops internal to Fort Belvoir as demand dictates.

Most of the major employment centers on Post have pedestrian accessibility to transit (shuttles) (Figure 2.38). Where the external transit routes (shown in green) and the internal shuttle routes (shown in blue) overlap are considered highly accessible by alternative transportation modes. And while the ten minute walk radius around the two town centers do not reach many of the major employment centers, the shuttles can provide access to these locations. One area that lacks accessibility to internal shuttle and community services is DAAF.

Pedestrian/Bicycle Network

Fort Belvoir has a fairly well-developed network of pedestrian trails and more recently has completed the construction of dedicated bicycle lanes on several primary roads (Figure 2.39) as part of BRAC 2005. The primary roadways include both sidewalk and on-street bicycle accommodations on Belvoir, Gunston, and Pohick Roads, and 9th Street on Main Post, and Heller Road and Barta Road on FBNA. Construction of additional sidewalk and bicycle facilities to provide a comprehensive pedestrian circulation network will be included as part of any future roadway improvements and new projects in accordance with the Master Plan and Installation Planning Standards.

The Installation's network of sidewalks, trails, and bicycle lanes are planned to connect to the Potomac Heritage National Scenic Trail (PHNST) subject to agreements between the Installation and the National Park Service. The exact alignment of the PHNST is dependent on meeting the physical security requirements of the Installation boundary and the location of the planned perimeter fence. The PHNST is a planned multi-purpose hiker/biker trail that connects Pittsburgh to Mount Vernon, and will continue to the northern neck of Virginia. In addition, the Installation's network of pedestrian and bicycle lanes will tie into a regional network of similar facilities as shown on Fairfax County's Trails Plan, connecting on-Post pedestrian facilities with off-Post existing and planned facilities. This network will further support and encourage alternative travel modes that will benefit both Fort Belvoir and the local community. FBNA is already connected to the Franconia-Springfield Metro/VRE station via an existing trail along the Fairfax County Parkway (Route 286).

Figure 2.37 - Pedestrian Accessibility to Transit and Community Centers

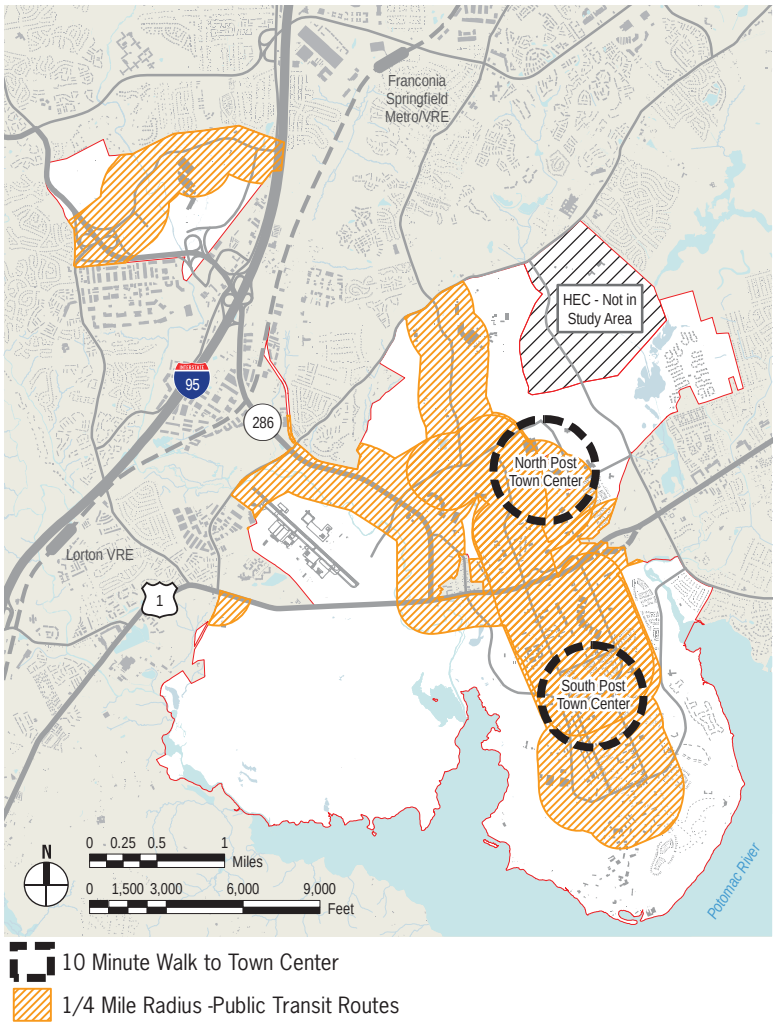
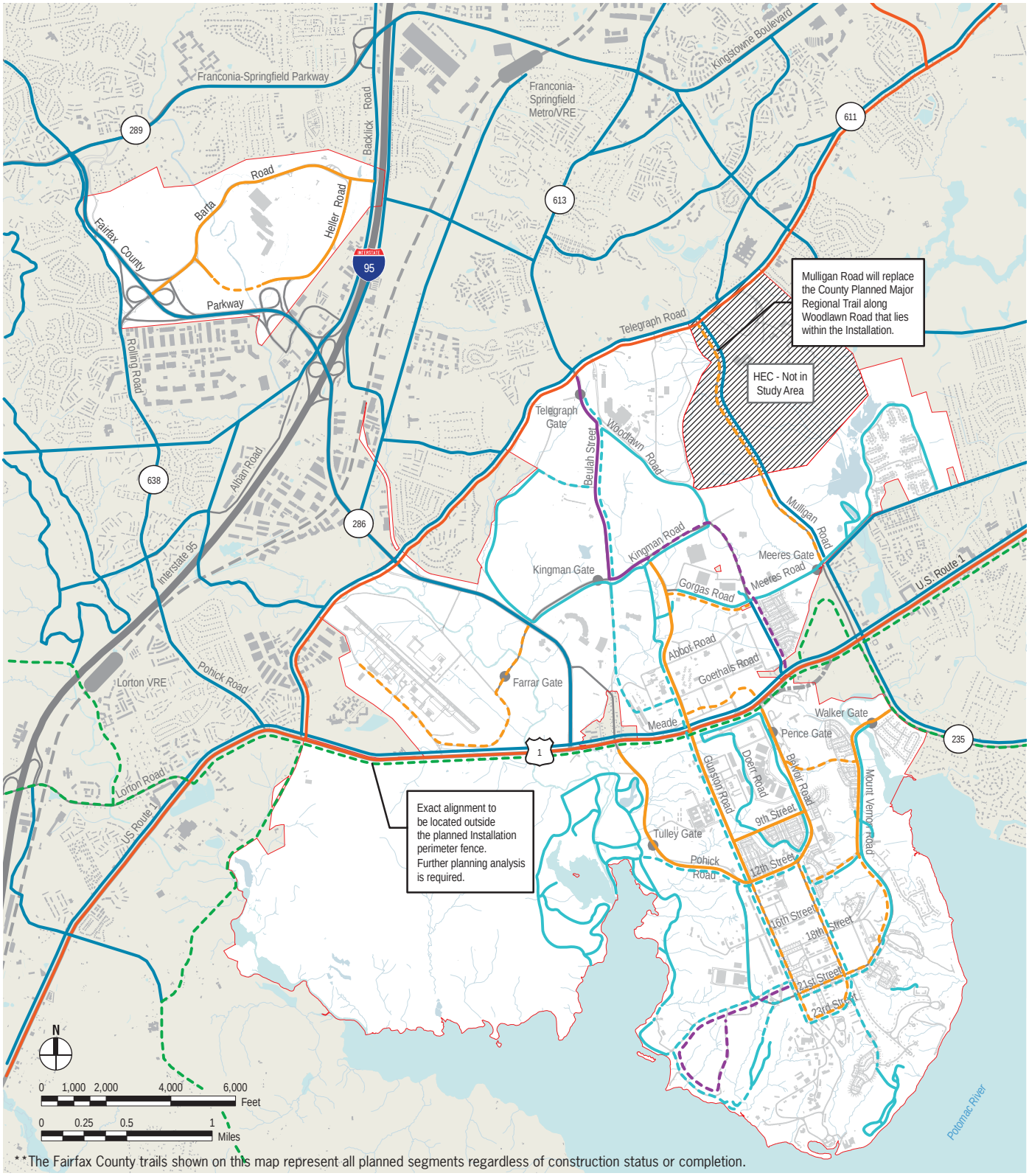


Figure 2.38 - Trails and Bicycle Lanes



**The Fairfax County trails shown on this map represent all planned segments regardless of construction status or completion.

- Fort Belvoir Trail (Existing)
- Fort Belvoir Trail (Future)
- Fort Belvoir On-street Bicycle Lane (Existing)
- Fort Belvoir On-street Bicycle Lane (Future)
- Fort Belvoir Shared Bicycle Lane, Sharrow (Existing)
- Fort Belvoir Shared Bicycle Lane, Sharrow (Future)
- Potomac Heritage National Scenic Trail & Washington-Rochambeau Revolutionary Route (Future)
- Fairfax County Paved Trail
- Fairfax County On-road Bicycle Route

Water

The Dogue Creek Marina is located on Main Post and is directly accessible to the Potomac River, a navigable waterway that feeds into the Chesapeake Bay. The marina is maintained and operated for strictly recreational use by military, military retirees and DoD civilians. There are no commerce, commuter, or port facilities at this site. There are ongoing regional pursuits to assess the feasibility of a Commuter Ferry that will operate to government sites along the Potomac and Anacostia Rivers, of which the Main Post site can be a candidate.

FBNA is not directly accessible via any navigable streams or waterways. The two closest water ports to Fort Belvoir are: the Helen Delich Bentley Port of Baltimore, located approximately 50 miles overland, and the Port of Virginia Norfolk International Terminals, located approximately 175 miles overland in the Hampton Roads area where the Chesapeake Bay opens into the Atlantic Ocean. Both ports provide seaport facilities for both passengers and cargo.

Air Transit

Davison Army Airfield (DAAF) is an operational and training facility that is located north of Route 1 and west of Fairfax County Parkway. Currently, DAAF provides operational support airlift to the Army and supports the Post with both helicopter and fixed wing aircraft, including travel between military installations. Joint Base Andrews Naval Air Facility, located approximately 25 miles to the northeast adjacent to the Capital Beltway in Maryland, is the closest military installation with major air passenger and cargo facilities.

Otherwise, several commercial and passenger airports serve the region (Figure 2.40). Closest to Fort Belvoir is Reagan National Airport (DCA), located approximately 15 miles to the north in Arlington, Virginia along the George Washington Memorial Parkway, just across the Potomac River from the Capital. Washington Dulles International Airport (IAD) is located approximately 35 miles to the northeast in Virginia, and the Baltimore-Washington International Thurgood Marshall Airport (BWI) is located approximately 50 miles to the northeast just outside of Baltimore, Maryland.

Transportation Planning Considerations

Based on the existing conditions described in this Transportation section, the following factors shall be considered as the future development plans are developed:

- **Accessibility from work locations to bus/shuttle services and community services.** Providing all areas of the Post with access to bus/shuttle services and community services.
- **Connectivity of alternative transportation options.** Both Main Post and FBNA are currently served by several transportation modes, but the lack of connectivity between these modes can be frustrating to commuters. As multimodal options increase, opportunities for transit/transfer centers within and near the Post that serve more than one mode of transportation shall be explored.
- **Enabling safe travel for all users.** As improvements are made within Post roadways, the streetscape shall consider all network users including pedestrians, bicycles, transit, and vehicles.
- **Parking is guided by the Army Technical Instructions and the Comprehensive Plan for federal facilities located in the National Capital Region.** As new development occurs, facilities with surplus parking above the required allocations will potentially need to share parking to meet guidance and comply with the TMP parking requirements for 60 percent employee parking.
- **ACP facilities are established.** With the exception of the new Lieber Gate, the location and number of ACP facilities are currently set and not anticipated to change based on current 2030 growth projections.
- **Linking North and South Post.** With a single connection over Route 1 between North and South Post, there is no redundancy in a critical crossing that facilitates movement and association across Route 1.
- **Relationships with outside agencies.** Improving mobility for Fort Belvoir personnel often falls outside the direct authority of Installation leadership, for example increasing public transit options or improving off-Post roadways. Fort Belvoir can be an active partner and build relationships with regional stakeholders to influence mutually beneficial outcomes and be able to better anticipate and incorporate upcoming initiatives.

Figure 2.39 - Air Transit

Figure 2.40 - ISR Q-Rating Distribution Chart by Building SF

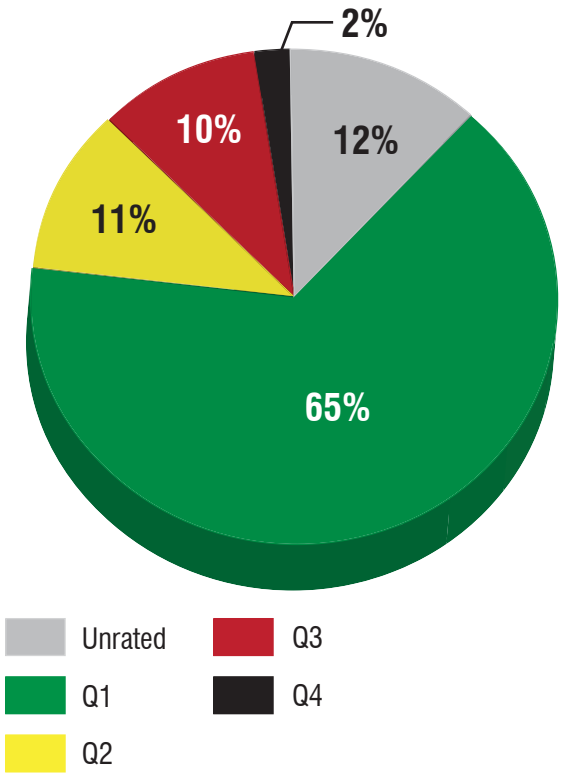


Table 2.5 - ISR Quality

Rating	Definition	Number of Buildings	Total SF
Q1 (Good)	Minor facility condition deficiencies and no significant facility configuration deficiencies, with negligible impact on the capability to support the mission partner organizations' required missions.	153	10.3 M
Q2 (Fair)	Some facility condition deficiencies and/or configuration deficiencies that have limited impact on the capability to support the mission partner organizations required missions.	68	1.7 M
Q3 (Inadequate)	Significant facility condition deficiencies and/ or configuration deficiencies that impair the capability to support some of the mission partner organizations required missions.	85	1.6 M
Q4 (Poor)	Major facility condition deficiencies and/or configuration deficiencies that present significant obstacles to the mission partner organizations accomplishment of required missions.	33	0.4 M
Not Rated	Indicates the facility has not been rated.	300	1.9 M
Total		**639**	**15.9 M**

** Note: Since many buildings have multiple Q-ratings, the number of buildings is based on the dominant Q-rating for that facility.*

Buildings

This section describes the current state of the buildings on Fort Belvoir. It reflects which buildings are functioning properly to meet mission operations, and where there are deficiencies in building quality and configuration. It identifies potential areas on-Post that need modernization with future development (Figure 2.42).

Building Quantity and Quality

Building quality is communicated through the Army Installation Status Report (ISR) and the use of Q-ratings. The Q-ratings are based on a ratio of restoration cost estimates ("cost to fix") to facility plan replacement value (PRV). All military services report Q-ratings using the same Department of Defense (DoD) methodology.

This rating system is used to model and justify funding levels for the Installation. It also indicates where facilities are inadequate and may negatively affect the Army's overall mission. The ISR rating provides a standard, Army-wide system to support the decision making process as it relates to operations, sustainment, modernization, revitalization, and re-stationing. Typical issues are older buildings being unable to meet the demands of modern work places with their systems being pushed beyond their limits or configuration of spaces is inappropriate and inadequate as missions change over time.

The Fort Belvoir Real Property Inventory (RPI) identifies approximately 2,400 facilities on the Installation. This includes housing buildings (1,196) and their associated garages (553). For Fort Belvoir's building analysis, the family housing units and their associated garages are not included in the numbers presented in Table 2.6 and Figure 2.41. The family housing facilities are not rated and are currently within a 50-year lease with Fort Belvoir Residential Communities LLC.

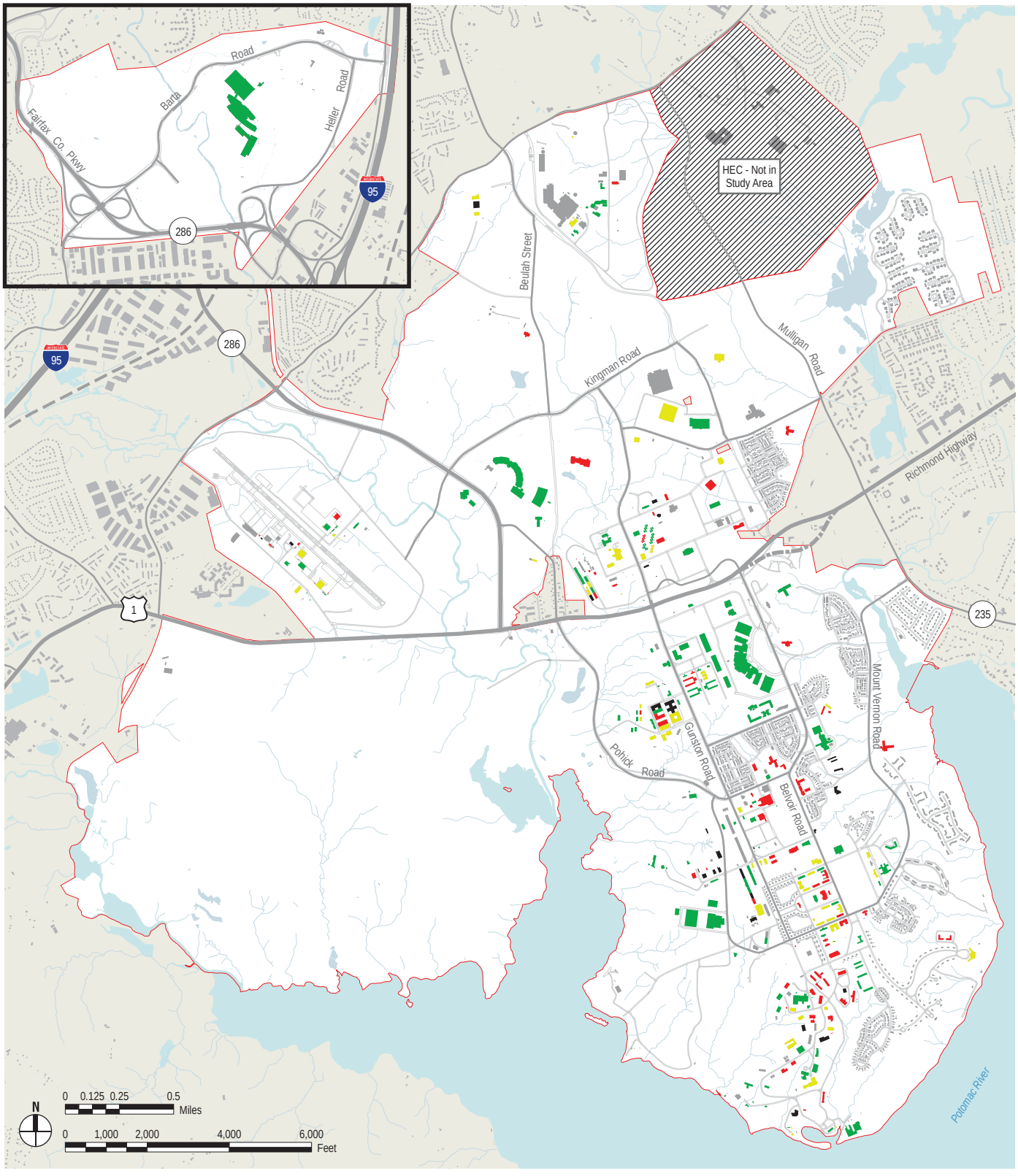
More than half of Fort Belvoir facilities are in good condition and have the capability to support the required missions. Not exclusively, but many of the buildings rated inadequate or poor are located on South Post (Figure 2.42). South Post was the part of the Post that was developed first.

Older buildings take considerable effort and funding support in maintenance and upkeep. As funding decreases and maintenance budgets tighten, it has become increasingly more difficult to maintain buildings at minimum habitable standards. Advanced age and lack of funding over a number of years leads to an increased rate of deterioration.

Planning Considerations: Buildings

Redevelopment options shall focus on areas with older buildings in poor conditions and expansive parking lots.

Figure 2.41 - Building Conditions

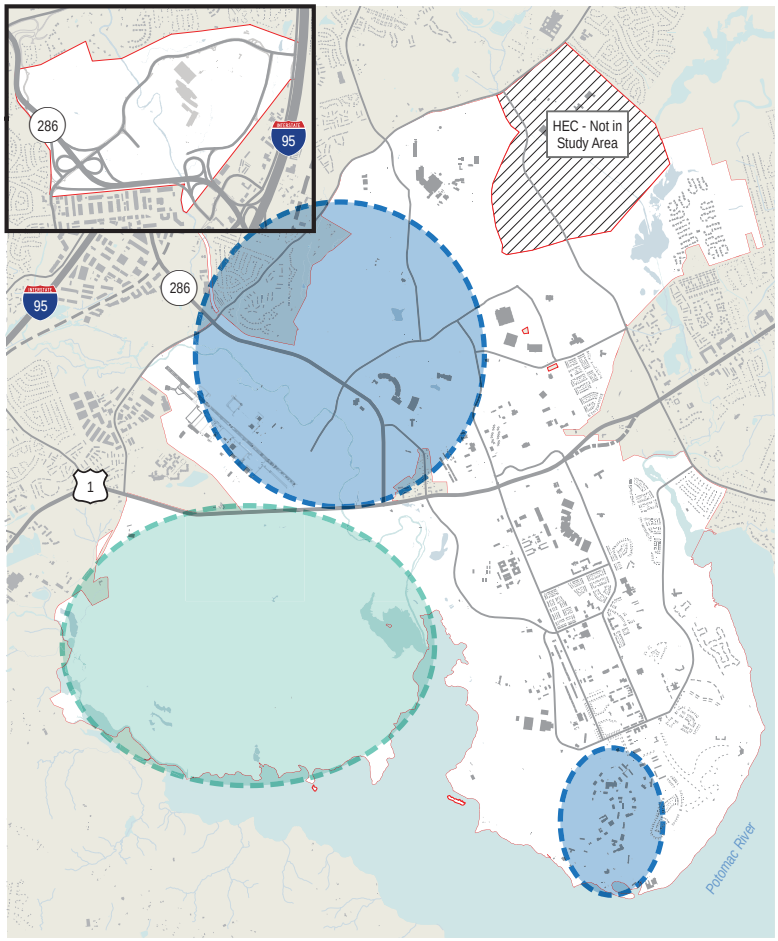


Utility Systems

The Fort Belvoir utility systems can be generally characterized as an aging, moderately well maintained system. Parts of the Post infrastructure date from the 1930s and 1940s, and as such are nearing the end of their useful life. BRAC-related projects have constructed or replaced infrastructure in several areas of the Installation. This section generally discusses each utility system and provides some considerations in regard to planning for each utility.

The Fort Belvoir Main Post water distribution and sanitary collection systems were privatized in March 2009 and are maintained and operated by American Water Military Services (AW) under a 50-year lease. AW's contract currently excludes the infrastructure improvements constructed in 2008-2011 to serve the BRAC facilities at Main Post and FBNA. However, Fort Belvoir intends to execute a contract modification to transfer these facilities to AW. The systems at ADFE and Humphreys Engineering Center are not included in AW's contract, but remain under government control. DPW is preparing a waterworks permit through the Commonwealth of Virginia for a separate consecutive water system at ADFE.

Figure 2.42 - Water System Deficiency



Installation Boundary

HEC Installation Boundary

Water system modifications required for fire protection and water quality

No water lines present

Additionally, Fort Belvoir has prepared a Comprehensive Energy and Water Management Plan to develop actions to meet the requirements of:

- Energy Policy Act of 2005
- Executive Orders 13423 and 13514
- Energy Independence and Security Act of 2007
- National Defense Authorization Act (NDAA) 2007

Water

Supply. Fairfax Water, under multiple wholesale customer agreements, delivers potable water to Fort Belvoir Main Post and FBNA. The Post has purchased capacity of 7.6 million gallons/day (MGD) (peak flow), 4.6 MGD for Main Post and 3.0 MGD for FBNA. When the demand reaches 80 percent of the purchased capacity, Virginia Department of Health (the regulating authority) requires a plan to be submitted for a system upgrade. The purchased capacity covers both Main Post and FBNA. Current demand is estimated at approximately 2.3 MGD at Main Post and 1.0 MGD at FBNA.

Distribution. The Fort Belvoir Main Post water system is maintained and operated by AW under a 50-year lease. The total average water usage by the Post is 2.0 MGD. About 1.0 million gallons are held in emergency storage in AW owned tanks. Water pressure is aided by a pump station located near the Telegraph Road connection and by four water storage tanks with a combined capacity of over three million gallons. The majority of the distribution system was installed in the 1940s and 1950s. In the first five years of the privatization agreement, AW will replace all water pipes that are over 50 years old, as well as selected newer pipe that is known to be in poor condition (a total of approximately 150,000 LF). A graphic depicting the American Water Five-Year Replacement Program for the water system can be found in Appendix I. Nearly all water pipes on South Post will be replaced. AW will also provide repairs, replacements and upgrades to all the existing water storage tanks on-Post. Infrastructure improvements to serve the new NGA facilities at FBNA have included a completely new water distribution system and a new water storage tank is proposed at FBNA.

Operational Issues. The primary concerns with the water system are inadequate fire protection and high water age in some portions of the system. High water age (water that has been in the system for over 72 hours) can cause odor and water quality issues and decreased disinfectant (chlorine) residuals. These are particular concerns at Davison Army Airfield, the DLA area in Upper North Post, and the 300 Area in South Post (Figure 2.43).

Sewer

Capacity. Fairfax County trunk sanitary lines traverse both FBNA and Main Post of Fort Belvoir and convey wastewater to the County's Lower Potomac Treatment facilities. The Lower Potomac Treatment facility has a plant capacity of 67 MGD and receives an average daily flow of 45 MGD. The Post purchased 3 MGD capacity (average flows; 6 MGD peak flows) in collection/treatment from Fairfax County, exclusive of FBNA and HEC. The capacity is based on a quarterly running average with a "not to exceed" peak limit of 6 MGD. The post reportedly uses only 1.1 MGD of the purchased capacity. Preliminary estimates of new loads from BRAC mission partners indicate that the total peak flow at FBNA will approach 1 MGD; peak flow from Main Post will approach 2 MGD; for a total peak flow of approximately 3 MGD of the 6 MGD purchase capacity. The Installation shall monitor sewage flows so that additional capacity can be purchased in a timely fashion, if required.

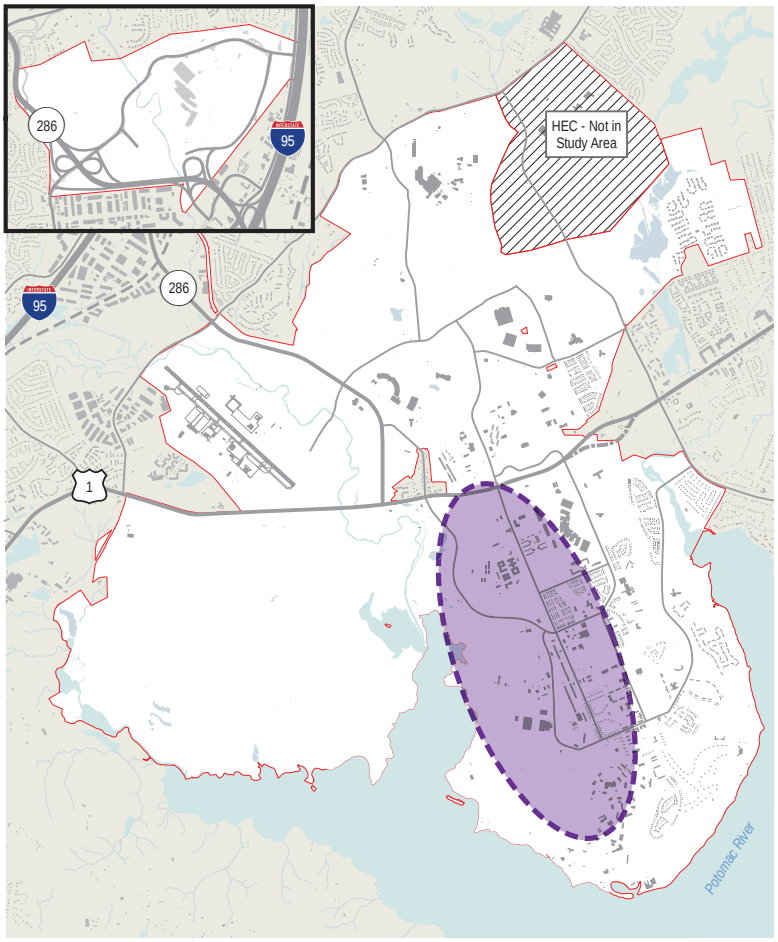
Collection. The Fort Belvoir Main Post sanitary system is maintained and operated by AW under the same 50-year lease as the water system. In the first five years of the privatization agreement, AW will slipline or replace all sanitary sewer pipes that are over 50 years old, as well as selected newer pipe that is known to be in poor condition (a total of approximately 100,000 LF). A graphic depicting the American Water Five Year Replacement Program for the Sewer System can be found in Appendix I. AW will also provide repairs, replacements and upgrades to the existing sanitary pump stations on Post. However, AW's repair and replacement program has been delayed by utility conflicts, environmental permitting issues including wetland delineations, and tree replacement. Infrastructure improvements to serve the new FBNA facilities provide a network of new sanitary sewers that connect to the existing Fairfax County trunk sewer on Accotink Creek. Fairfax County indicates that this trunk sewer has existing capacity to serve the new facilities as well as the potential growth.

Fairfax County owns and operates two major pumping stations close to the Post, as well as a large-diameter force main running generally parallel to and just south of U.S. Route 1. Due to a premature Rough Cut Capacity Plan (RCCP) pipe failure, Fairfax County is replacing the Dogue Creek force main (running parallel to U.S. Route 1 on the east side of Fort Belvoir). Construction began in late 2011. Federal government-owned collection systems tie to those of Fairfax County at several points along the Dogue Creek trunk line.

Operational Issues. The major sanitary capacity issue that AW has identified is pump station 687, located on the Potomac River at the southwest side of South Post, and the force main which connects this pump station to the Fairfax County sewer main on Route 1. The pump station has three pumps and adequate storage to provide capacity for current flows; but the force main capacity is limited such that only two of the three pumps can be operated simultaneously. The force main does not have adequate capacity for current peak flows. The existing sanitary service will need to be upgraded for a portion of the Installation that connects to pump station 687 (Figure 2.44). The County's Lower Potomac Sewage Treatment Plant has adequate capacity to serve future development at Fort Belvoir.

Operational Considerations. As a means to reduce wastewater discharge, American Water proposed constructing a sewage treatment facility on South Post and using the effluent for irrigation and building mechanical uses. Fairfax County has also proposed the use of treated effluent from the Fairfax County wastewater plant on Route 1. While there are multiple demands for irrigation and mechanical uses on-Post, one challenge to implement such a program is the cost to run distribution lines to the various potential users.

Figure 2.43 - Sewer System Deficiency



Installation Boundary

HEC Installation Boundary

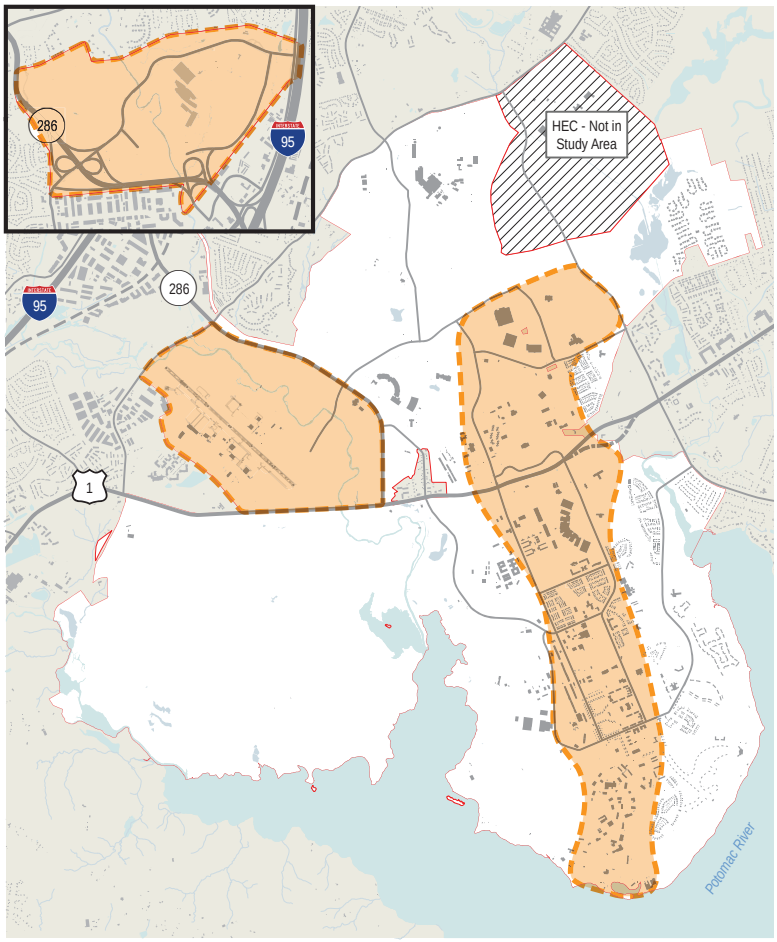
Pump STA 687 Force Main is over capacity. Sewer shed modifications required to provide additional capacity.

Electric Power

Supply. Dominion Virginia Power (DVP) supplies electricity to Fort Belvoir Main Post and FBNA. The electric distribution system on Fort Belvoir Main Post has been privatized since August 2007 under a contract signed by the Installation and DVP. Electric supply has always been privatized. The privatization agreement excluded the electric distribution systems at FBNA, ADFE, Humphreys Engineering Center, and Building 2310.

In the last four years, while the BRAC projects have added a substantial load on the system, DVP has completed a number of projects to provide additional capacity, reliability and redundancy to the distribution system. The distribution system is well-balanced and has adequate capacity to serve existing needs. No system upgrades are planned for either the Main Post or FBNA.

Figure 2.44 - Telecommunications Improvements



Installation Boundary

HEC Installation Boundary

Long-term improvements needed as installation development occurs.

Operational Issues. The primary operational issues pertain to trees and overhead service lines. Undergrounding the electric service in the Gerber Village area, from 12th Street to the 300 Area, and the service feed from the Belvoir substation into North Post will improve system reliability. DVP trims trees along the power lines on a three-year cycle; the next tree trimming is scheduled for fall 2013. DVP meets with ENRD on a quarterly basis to review their ongoing work and to ensure compliance and coordination with Post environmental concerns.

Operational Considerations. DVP has proposed installing solar panels on several buildings at the Post, to assist in compliance with EPACT. Initial installation will be on Buildings 765, 766, and 767, and in the DLA parking lot area. Panels in the parking lot will also serve as carports for parked cars. DVP estimates these panels can generate 2.5 megawatts of power.

DVP and Fort Belvoir have had several discussions on constructing a cogeneration plant on Post. DVP anticipates a 40-acre site will be needed for such a facility. No site has been identified, and no funding is presently available.

Telecommunications

Although some mission partners have separate IT systems, most telecommunications on-Post is provided by Verizon Federal and managed by the Network Enterprise Technology Command (NETCOM). Existing IT facilities are adequate to serve the existing population on-Post. NETCOM currently has an I3MP project underway that is upgrading the network equipment in approximately 80 buildings and installing a minimum amount of fiber between some buildings. Figure 2.45 shows areas where the networks will need to be improved as the population increases with future long-term development.

Steam

Fort Belvoir's existing central steam plant serves a small area in South Post including the old DeWitt Hospital and approximately 20 other buildings. The system is aging and inefficient and requires frequent maintenance. The Post is gradually replacing the steam system with new HVAC systems in individual buildings as buildings are renovated. The Installation expects that the central steam plant will eventually be abandoned.

Natural Gas

Washington Gas supplies natural gas to Fort Belvoir and the surrounding community. The gas company has a robust distribution system in the area that appears capable of providing adequate natural gas for current and anticipated requirements.

Major Utility Corridors and Facilities

Fort Belvoir is currently in the process of developing a comprehensive utility easement map for the Installation based on agreements with each private utility company. The easements will be established based on service access requirements for maintenance and repair. For utility lines, a standard 30 feet wide easement area is recommended to provide for utility replacement and/or line upgrade as needed. Major utility corridors and facilities (Figure 2.46) are defined as:

- Water lines >16 inches and greater
- Water tanks (elevated and ground storage)
- Sanitary sewer force mains and gravity lines >15 inches and greater
- Dominion Virginia Power high voltage electric lines
- Fiber Optic Lines (singular line and/or duct bank and manhole system with numerous fiber optic cables)
- Washington Gas high pressure gas line >4 inches

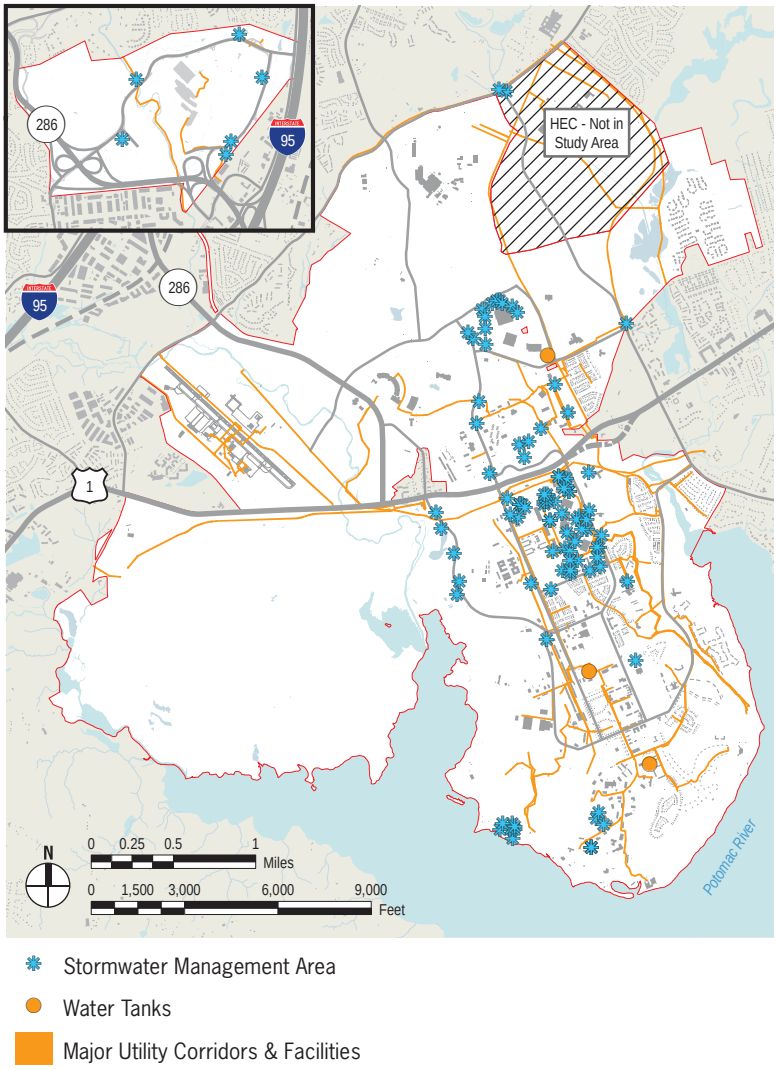
Stormwater

Stormwater on Fort Belvoir is accomplished in accordance with applicable federal, state, local, DoD and Department of Army policy, legislation, regulations and stormwater permits which include the ones listed below.

- Clean Water Act (CWA)
- Virginia Water Control Law
- Energy Independence and Security Act, Section 438 (EISA 438)
- Office of the Under Secretary of Defense Memorandum: DoD Implementation of Stormwater Requirements under Section 438 of the EISA dated January 19, 2010
- Office of the Assistant Secretary of the Army Memorandum: Sustainable Design and Development Policy dated October 27, 2010
- Virginia Erosion and Sediment Control Law
- Virginia Erosion and Sediment Control Regulations
- Virginia Stormwater Management Law
- Virginia Stormwater Management Program (VSMP) Permit Regulations
- VSMP Small Municipal Separate Storm Sewer Systems (MS4) Permit, Permit # VAR040093
- Executive Order 13508 - Chesapeake Bay Protection and Restoration dated May 12, 2009
- Chesapeake Bay Preservation Act
- Chesapeake Bay Total Maximum Daily Load (TMDL) for Nitrogen, Phosphorus and Sediment
- Total Maximum Daily Load (TMDL) for Benthic Impairments in the Accotink Creek Watershed
- Coastal Zone Management Act (CZMA)

Low Impact Design. DoD design standards under UFC 2-100-01 that was adopted 15 May 2012 for Installation Master Planning makes specific reference to low impact development (LID) and stormwater management as one of several key principles for effective sustainable planning. LID practices described in the UFC include such features as bioswales and bioretention.

Figure 2.45 - Major Utility Corridors and Facilities



Drainage and Outfalls. Most stormwater runoff from developed areas on Fort Belvoir is conveyed by short lengths of underground storm pipes to existing natural or improved surface channels. The storm sewer system consists of underground pipes and manmade channels that discharge into various streams and tributaries, and ultimately, to the Potomac River. Fort Belvoir maintains the system, ranging in pipe sizes from 6 inches to 96 inches in diameter, and vary in material including: reinforced concrete, asbestos cement, cast iron, brick, corrugated metal, ductile iron, and high density polythylene (HDPE), and polyvinyl chloride (PVC) that connect with aboveground stormwater management facilities, more recently, underground detention facilities. Runoff drains to seven major watersheds and thence to the Potomac River.

Operational Issues. Most projects constructed in the past 15 years provide stormwater quality and quantity control facilities, and some of the more recent BRAC projects have incorporated enhanced stormwater management (SWM) facilities that include LID measures that improve water conservation and the impacts to downstream outfalls. Stream restoration has also improved the stream channels and their ability to convey stormwater runoff. Most of the older developed areas of Fort Belvoir have not provided SWM and uncontrolled runoff has resulted in significant erosion problems in several areas on Post. As a result, the conditions of Fort Belvoir's watersheds and streams are directly affected by the types of SWM facilities and measures designed to minimize stormwater runoff.

Operational Considerations. New SWM regulations have placed a much greater emphasis on water conservation and water quality best practices. As a result of new projects (post-BRAC) that have built enhanced SWM facilities, with LID measures, and/or provided stream restoration to improve outfalls to a more natural condition, certain watersheds are better suited to support new development; however, other watersheds with existing uses with no SWM systems, draining to inadequate drainage outfalls are much vulnerable to new development. These watersheds may be characterized as having expansive surface parking lots, poor stormwater conveyance systems, and minimal open spaces to act as natural buffers. Table 2.1 identifies existing SWM infrastructure adequacies by watershed. In watershed areas with inadequate to poor infrastructure, more innovative SWM solutions and/or off-site drainage improvements may be required prior to development.

Existing Facilities. Fort Belvoir records, through June 2013, reflect 97 SWM facilities (see Figure 5.9) that provide more than 300 acres of water quality and/or quality control treatment. A wide variety of conventional SWM and LID measures have been established based on project needs, downstream channel conditions and best practices. Specific SWM facility types include the following:

- Bioretention Filters and Basins
- Sand Filters
- Natural Open Space (tree save areas)
- Cisterns (stormwater used for irrigation)
- Filtering Structures
- Green Roof
- Extended detention dry ponds and underground detention vaults
- Permeable and Porous Pavement
- Wet ponds
- Underground Infiltration Systems
- Vegetated Swales

Planning Considerations: Utilities

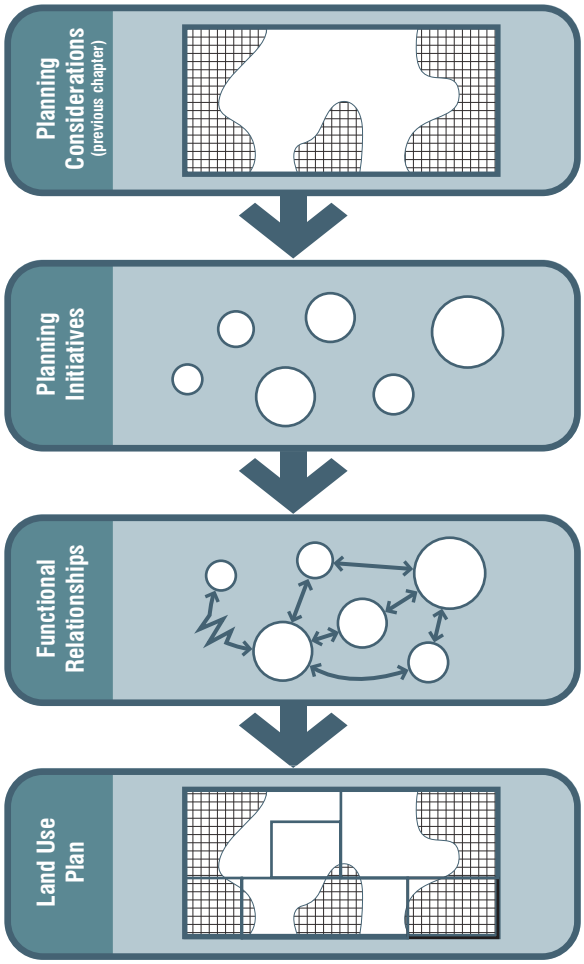
- In the short term, the existing steam plant and lines will be left in place. When the steam plant is decommissioned, any remaining existing steam lines will be abandoned in place. Consideration shall be given to reuse of the steam plant for other functions, or it shall be demolished to allow for use of the site.
- In some cases, tree replacement mitigation areas are being located either where new water and sewer lines have recently been constructed, or where new lines will be built in the near future. Coordination of tree planting with AW and other utilities can alleviate potential conflicts.
- To minimize additional encumbrances of land for utilities, establishing efficient, common utility corridors shall be considered for future development.
- Future planning will need to consider the potential construction of a cogeneration plant on Post. It is anticipated that this type of facility will require a 40-acre site.
- Major Utility Corridor and Facilities that are generally considered fixed in terms of their location and alignment, and cannot be relocated. A 30-foot wide corridor is reserved for service access, maintenance, repair and replacement. New buildings and parking decks shall not be located in these corridors; however, surface parking lots may be acceptable based on the type of utility and depth of line with certain engineering considerations.
- Future development will need to carefully consider SWM facilities and outfalls that minimize impacts to adjoining streams and improve the watershed. Existing surface and underground SWM facilities are generally to be avoided. However, future development may require expansion and/or relocation of these facilities to comply with stormwater management regulations and/or obtain better space utilization for master planning.

Land Use Plan 3

Overview

This chapter presents an updated land use plan for Fort Belvoir. The first step began in the previous chapter by documenting the impacts to land planning on Post. Having that background knowledge then leads into the process of analyzing the current planning trends, and an examination of how these trends take form in terms of land use areas. The process occurs in the following sequence:

Figure 3.1 - Process diagram showing planning analysis steps to achieve the proposed land use plan.



Planning Considerations

The previous chapter discussed planning considerations regarding the existing environmental, land use, transportation, facilities and utilities. Having an understanding of these constraining issues helps to inform how best to develop the land.

Planning Initiatives

By first examining what kind of planning initiatives are currently happening, we gain an understanding of the types of development issues that are occurring on the Installation and adjacent to it. This information helps determine if land use expansions or reductions are needed or if land use changes are needed to reduce potential conflicts from future planning initiatives.

Functional Relationships

Next is an analysis of functional relationships between the many types of uses that occur on the Post. The analysis explains adjacencies between uses and whether strong connections exist or strong separation is necessary.

Land Use Plan

The last step is to formalize the analysis and concepts into a plan that clearly delineates the Installation into distinct land uses. It is the synthesis of previous analysis into actual form. The proposed plan establishes the optimal organization of uses on the land and how best to allocate land resources to their best and highest use. The ultimate goals are to:

- Ensure effective mission support.
- Institute means to support and sustain Army readiness.
- Identify compatible/incompatible activities.
- Achieve economies of scale, visual order, and functionality.
- Use limited resources to achieve maximum demand.
- Meet power projections.
- Establish a basis for efficient circulation and facility operation.

Regional Planning

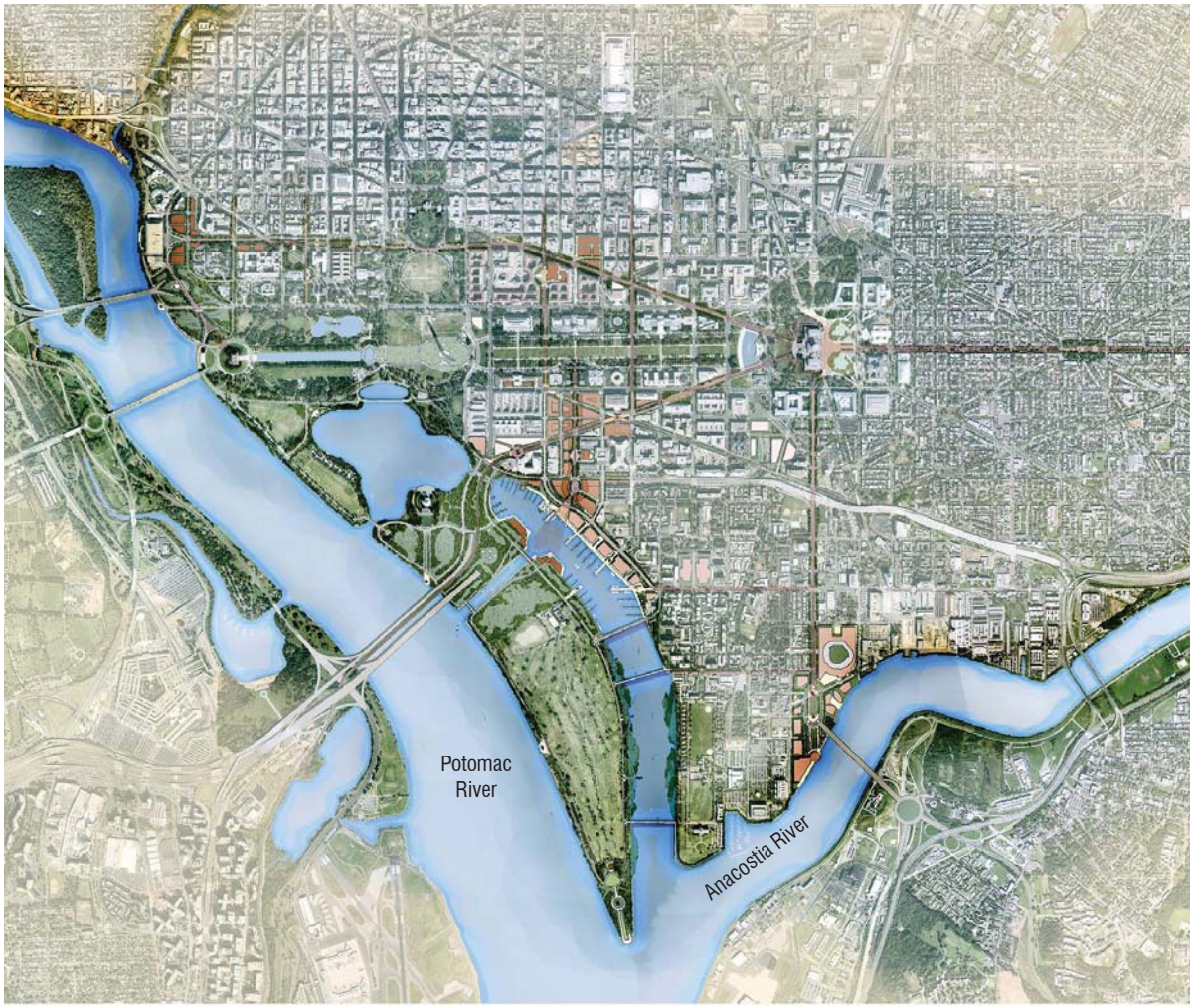
National Capital Planning Commission Comprehensive Plan

The Comprehensive Plan for the National Capital Region (NCR) (Figure 3.2) provides a policy framework to manage federal operations and activities within the Washington metropolitan area. This "statement of principles, goals and planning policies for the growth and development of the national capital" was prepared by the National Capital Planning Commission (NCPC), adopted 5 August 2004, and is enforced by NCPC. The Comprehensive Plan consists of two parts: Federal Elements and District of Columbia Elements. The Federal Elements part of the plan addresses federal properties and interests in the NCR, which includes Fort Belvoir. The Federal Elements include guidelines for Transportation, Parks and Open Space, Environment, Visitor Facilities, and Preservation and Historic Features. Army Regulation 210-20 governing Real Property Master Planning states that garrisons will work with local and regional planning agencies to minimize impacts of installation operations and development; maintain awareness of, and respect for, the future growth patterns and development of the surrounding communities; and seek mutual compatible land uses, and zoning considerations to maintain the operational capability and future viability of the installation. By following these policies of the Comprehensive Plan, Fort Belvoir is better able to plan for the best possible development outcomes when submitting projects to NCPC for review and approval.

Planning Considerations: NCPC Comprehensive Plan

NCPC has review authority concerning Fort Belvoir's master plan. This authority helps to ensure that the Post is compliant and consistent with the over-arching planning principles mandated by NCPC in its efforts to maintain and improve the quality of life for the NCR.

Figure 3.2 - Downtown Washington D.C. plan from The Comprehensive Plan for the National Capital Region.



Metropolitan Washington Council of Governments

Region Forward is a vision for a more accessible, sustainable, prosperous, and livable NCR. It was developed by the Greater Washington 2050 Coalition, a group of public, private, and civic leaders created by the Metropolitan Washington Council of Governments (MWCOG) in 2008 to help the region meet future challenges like accommodating two million more people by 2050, maintaining aging infrastructure, growing more sustainably, and including all residents in future prosperity. MWCOG has also established a group called the Region Forward Coalition, which will use Region Forward to measure progress, prioritize needs, and jumpstart projects that will help meet the COG's 2050 vision.

Planning Considerations: Metropolitan Washington COG

Since Fort Belvoir is along the I-95 corridor and U.S. Route 1, the Region Forward Plan will help guide development decisions on- and off-Post as the region's population increases.

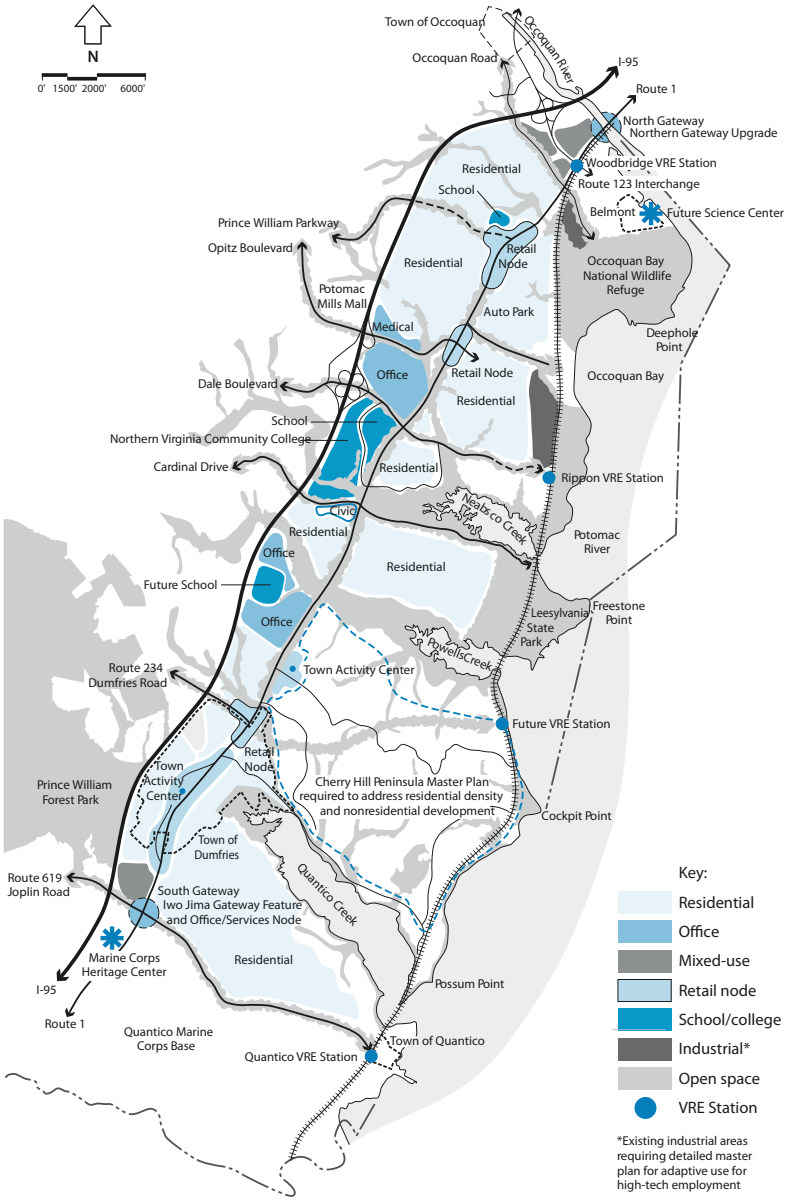
Prince William County Comprehensive Plan

The Prince William County Comprehensive Plan (Figure 3.3) seeks to better manage and direct future growth, particularly along the I-95 and Route 1 corridors. Major objectives are to build communities of quality; reverse the job/housing imbalances; create jobs and provide a diverse choice of housing opportunities; and enhance the environment. The plan encourages future growth to be concentrated into mixed-use centers with multimodal transit opportunities. Centers shall be compact, walkable, transit-friendly, and foster a sense of place. Recommended locations include: North Woodbridge; Potomac Center; and the Triangle Area. Planning studies of these areas include a mix of uses such as retail, office, and residential; higher densities; and integrated multimodal transit options.

Planning Considerations: Prince William County Comprehensive Plan

Fort Belvoir is located north of Prince William County along the I-95 corridor. Future development within the County will impact Fort Belvoir in two ways: 1) it will provide additional housing and commercial options for residents and employees and 2) it will increase congestion on already strained transportation corridors.

Figure 3.3 - The Prince William County planning initiatives of the Route 1/I-95 corridor.



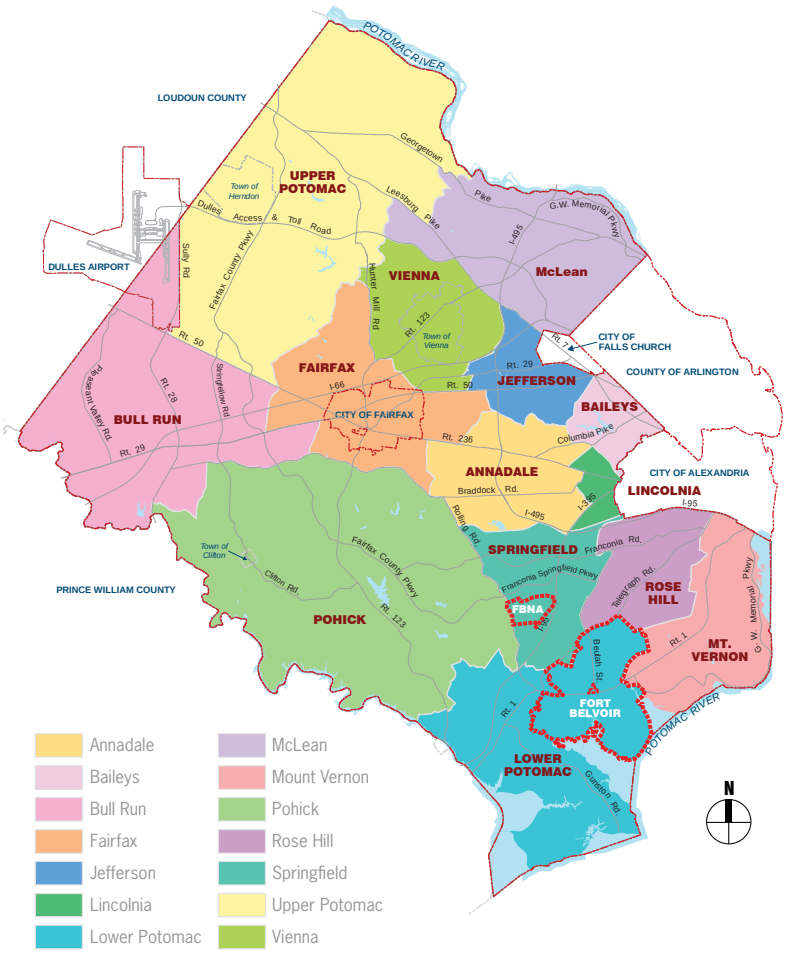
An Advisory Services Panel Report: Potomac Communities Prince William County, Virginia, Urban Land Institute, 2008.

Fairfax County Comprehensive Plan

The Fairfax County Comprehensive Plan, 2013 Edition (as amended), reflects the planning strategies that will control the growth anticipated to be coming to this region. Fort Belvoir's location in the southeastern section of the County places it next to five planning districts, which are illustrated in Figures 3.4 and 3.5. Planning initiatives for each of these districts are summarized on the following pages.

In 1969, the Board of Supervisors amended the Zoning Ordinance creating thirteen Historic Overlay Districts to provide regulations over and above the regular zoning protection. Regulations within the districts are intended to protect against destruction of or encroachment upon such areas, structures, and premises; to encourage uses which will lead to their continuance, conservation, and improvement in a manner appropriate to the preservation of the cultural, social, economic, political, architectural, or archaeological heritage of the County; to prevent creation of environmental influences adverse to such purposes; and to assure that new structures and uses within such districts will be in keeping with the character to be preserved and enhanced. Figure 3.5 shows the historic overlay zoning districts that are on or adjacent to Fort Belvoir.

Figure 3.4 - Fairfax County Planning Districts

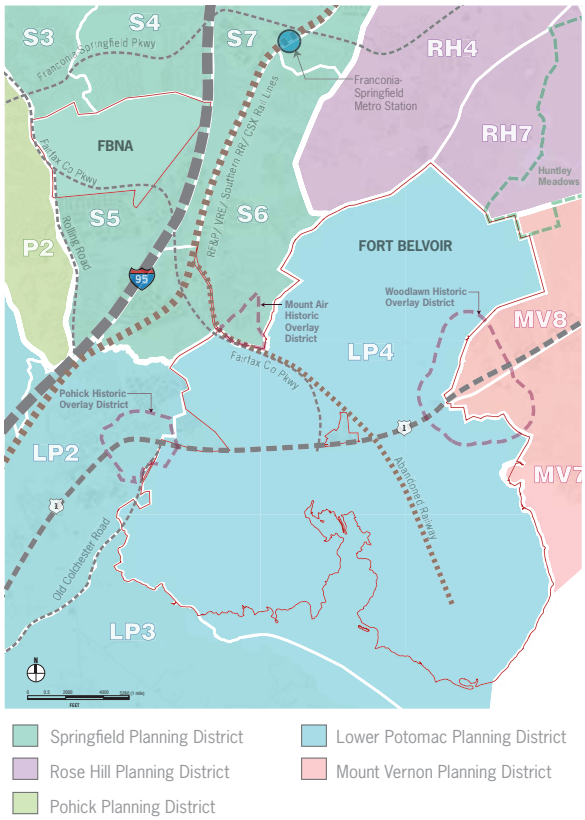


The Comprehensive Plan also addresses regional transportation initiatives, and parks and recreation areas adjacent to Fort Belvoir. The transportation initiatives will impact Fort Belvoir to ease traffic congestion in the area and provide alternative options for commuting to and from Fort Belvoir. The parks and recreation section identifies facilities in the region that create a greenway system that connects to Fort Belvoir. These can be utilized by Fort Belvoir's employees and residents.

Lower Potomac Planning District: This district has a wide range of land uses and development densities. The highest concentration of uses and densities is focused around the transportation corridor formed by I-95, Route 1, and various rail lines. Beyond these areas, this character becomes predominantly suburban and rural.
As projected growth and development continues, most of it will be directed along the transit corridors to create suburban centers of activity. Areas of low density residential should maintain their stable character as well as preserving sensitive natural habitat and agricultural resources.

Springfield Planning District: This district is defined primarily by its commercial areas and residential neighborhoods. Areas of concentrated retail and office activities occur along the I-95 corridor and rail right-of ways. Future commercial development will be focused in areas where they currently exist, with an emphasis on revitalization and redevelopment toward higher densities

Figure 3.5 - Planning Districts, Sectors and Historic Overlays Districts on and adjacent to Fort Belvoir



and transit-oriented growth. Notable focus areas include: Franconia-Springfield Transit Station Area; Springfield Community Business Center; Fort Belvoir North Area (FBNA) (Figure 3.6). The I-95 Corridor Industrial Area (Figure 3.7) entails several land parcels adjacent to Fort Belvoir that are undergoing considerable development. The surrounding residential neighborhoods should retain their suburban character as a means of protecting stable areas and offering opportunities for environmental preservation.

Mount Vernon Planning District: This district is characterized by a dichotomy of low-density housing and parklands to the east, and high concentrations of uses and densities along Route 1 to the west. Future plans hope to capitalize on the Route 1 corridor by balancing residential and commercial growth with improved multi-modal transportation systems. Areas to the east will retain their current character to protect stable communities and protect valuable natural resources.

Rose Hill Planning District: This district is substantially developed with suburban residential neighborhoods. The Kingstowne development represents the highest concentration of commercial development with a mix of retail, office, and high-density residential. Future plans aim to protect existing stable residential areas, and focusing growth in the commercial business centers such as Kingstowne.

Pohick Planning District: This district is characterized by low-density residential neighborhoods with supporting commercial and institutional uses. Planning strategies will maintain the current low density character. A substantial portion of the district is located in the Occoquan Reservoir watershed, which is one of Fairfax County's major sources of water.

Planning Considerations: Fairfax County Comprehensive Plan

- **Due to its adjacency to Fort Belvoir, the I-95 Corridor Industrial Area (Figure 3.7) may experience pressure to develop from industrial uses to mixed-use, office, and commercial uses. For some subareas, the Comprehensive Plan allows the County Board to approve rezoning requests for more intensive mixed use as an option, provided development criteria such as parcel consolidation can be met. Alternatively, without parcel consolidation, the Plan allows office and possible hotel use at lowest intensities.**
- **Future development adjacent to Fort Belvoir can potentially encroach upon the Installation, creating additional security concerns.**
- **Unless alternative transportation initiatives are implemented, an increase in population within these planning districts will increase congestion and affect employees commuting to and from the Installation.**

Figure 3.6 - Springfield Planning District

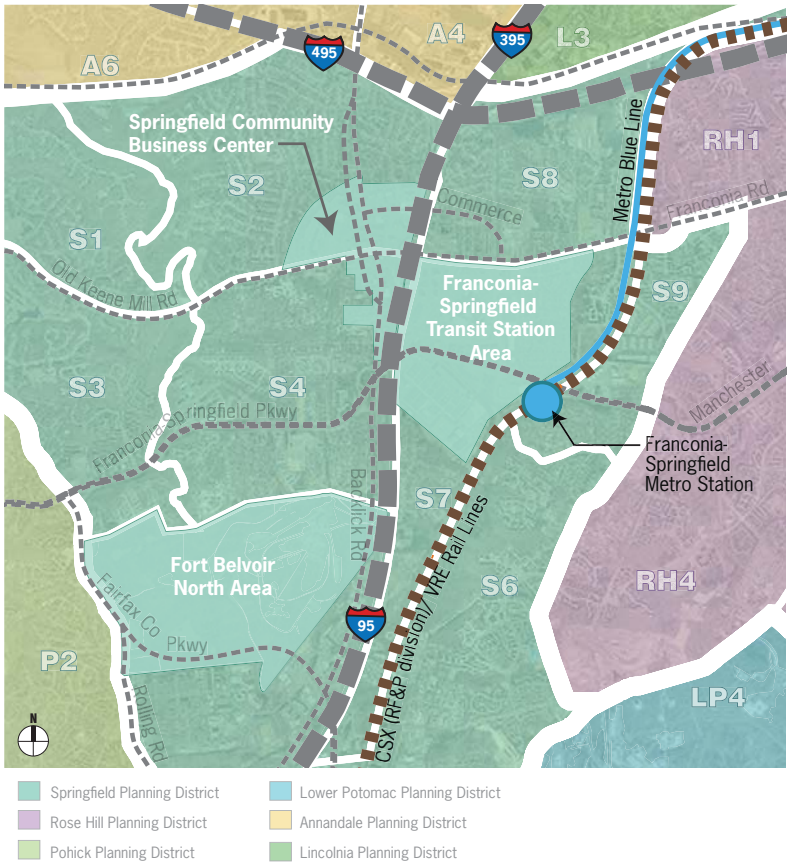


Figure 3.7 - I-95 Corridor Industrial Area

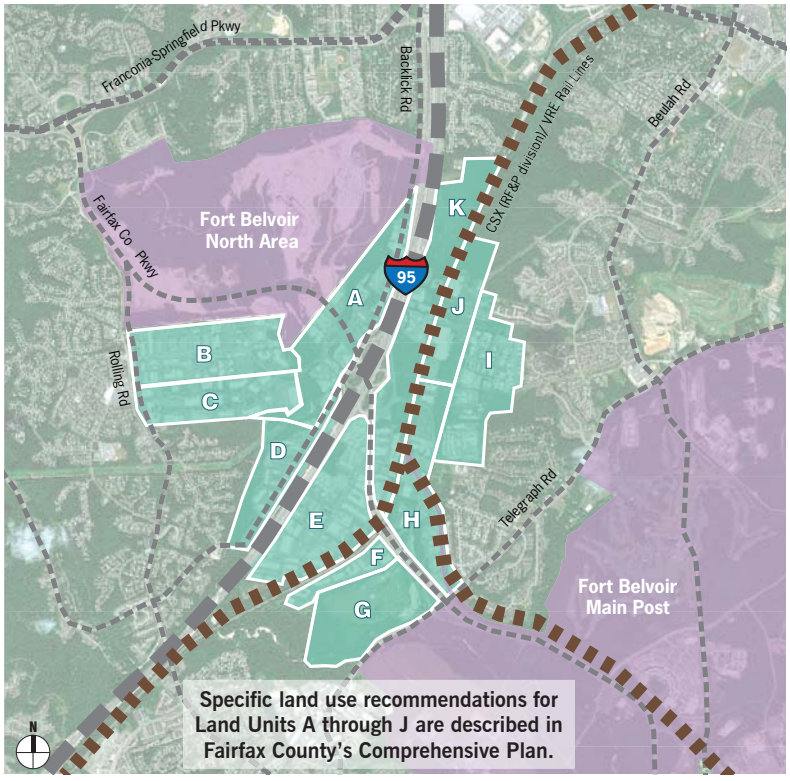


Figure 3.8 - Notable developments near Fort Belvoir

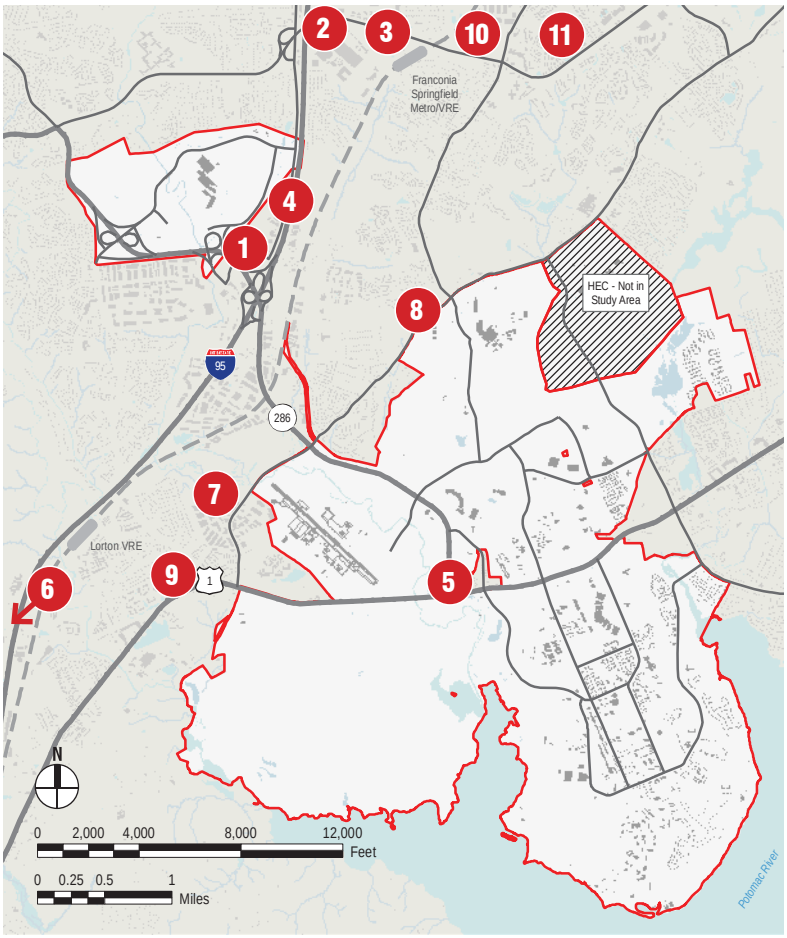


Figure 3.9 - Patriot Ridge Site Plan and 3D Model Rendering

Planning Initiatives

Fairfax County Board approved 14 landowner nominations to amend the Comprehensive Plan as part of the 2008 BRAC Area Plans Review (APR) cycle. During this cycle, 14 nominations to amend the Comprehensive Plan were adopted. Three changes to the Plan allow for rezoning from industrial to higher intensity office use. Of the 14 adopted changes, seven are in the vicinity of FBNA and the General Services Administration (GSA) warehouse. The approvals will vary with floor area ratios (FAR) ranging from 0.5 FAR to 1.5 FAR subject to meeting certain development conditions. Floor area ratios are the ratio of a building's total floor area to the size of the parcel of land upon which it is built. When completed, the land use changes will result in more intensive development with concentrated employment centers that will replace existing low density office and warehouse uses with higher density office and commercial uses.

In addition to the above 2008 APR Plan Amendments, the Board of Supervisors adopted Authorized Plan Amendments and Special Studies including (Figure 3.8):

1. **Patriot Ridge**. The development is 15 acres located adjacent to the NGA visitor gate and approved for up to 978,000 SF (see Figure 3.9). The site plan consists of four high rise office buildings designed to meet government security standards. Also included are two parking garages. The first building, totaling 240,000 SF, was completed in 2011 and includes retail space.

2. **Springfield Mall.** The 80-acre mall is planned for redevelopment as a mixed-use town center. With full consolidation, intensity can reach up to 1.82 FAR. The Springfield Town Center envisions 2.1 million GSF of retail space and 6 million SF of hotel, office and residential uses.

3. **Springfield Connectivity Study** includes 800 acres and provides area-wide guidance for urban design, streetscape and placemaking concepts. Portions of the Springfield Community Business Center (CBC) north and south of Old Keene Mill Road are recommended for redevelopment as an urban village and commuter parking facility, respectively. Springfield Metro Center and Springfield Center Industrial Park parcels are being reviewed for rezoning to a mixed-use, Planned Development Commercial (PDC) zoning district. The GSA Warehouse Framework Plan (Figure 3.10) was adopted as a component to the Springfield Connectivity Study. The study includes a concept plan for the GSA facility located adjacent to the Franconia-Springfield Metro Center. The plan calls for the redevelopment of the warehouse use to a higher intensity multimodal transit-oriented development.

4 **Loisdale Road Special Study** includes 120 acres of Industrial land use up to 0.35 FAR. This includes options for vehicle sales and service center and office use with conditions. The Board approved rezoning two parcels from R-1 to C-8 to allow for development of 200,000 SF of office.

5 **The Village of Accotink** includes 27 acres located on U.S. Route 1 and Pohick Road. The proposed plan includes up to 470 multi-family units with some single-family attached; retail use up to 55,000 SF; and up to 16,000 SF in office space in place of equal amounts of residential SF. Future redevelopment will require right-of-way dedication to support the planned six-lane widening of Route 1.

6 **Laurel Hill, Lorton-South Route 1 Subunit B2 and Lorton Corne**r includes over 3,200 acres of land use recommendations for the redevelopment of the old prison site and expansion of INOVA medical facilities in Lorton.

7 **Belvoir Business Park** contains a major Fed-Ex distribution facility. A portion of the site is planned for office and/or industrial use.

8 **Hilltop Village Center**, a 33-acre site at the intersection of Beulah Street and Telegraph Road, was rezoned in 2008. The first phase of the Village Center will include a 150,000 SF high-end grocery store located at the corner of Telegraph Road and Beulah Street. The store is currently under construction and scheduled to open in 2014. Current plans also propose 94,000 SF of specialty retail, banks; office space totalling over 100,000 SF; and 953 parking spaces (Figure 3.11). The site is planned as an integrated mixed-use development.

9 **Northern Virginia Industrial Park**. A Fairfax County Comprehensive Plan Amendment allows 69 acres of land on Telegraph Road West to become a mix of office, hotel, retail, civic, and light industrial uses. The County Board also amended the Transportation Plan to show Telegraph Road planned for six lanes (formerly four lanes) from Richmond Highway to Fairfax County Parkway.

Other notable projects that have either been recently completed, have begun construction or are pending site plan approval and include:

10 **Metro Park**, a 37-acre site with 1.3 million SF in eight office buildings.

11 **Kingstowne Town Center,** a 150-acre, mixed-use commercial development with 230,000 SF of retail space. It is part of a 1,200-acre planned community with a capacity of 2 million SF of office space and 6,300 residences.

Planning Considerations: Regional Planning Initiatives

Development along the I-95 corridor adjacent to Fort Belvoir will bring both opportunities and challenges for residents and employees in the near future. New growth in the region will provide additional resources such as housing, retail/commercial centers, and commuter parking lots that the employees and residents can utilize. However, with the development of additional office space in the region, an increase in population during business hours will affect the transportation systems and roadways with additional congestion. Adjacent development to the Installation boundary can potentially have encroachment impacts as well as create security concerns.

Figure 3.10 - General Services Administration (GSA) Warehouse Framework Plan

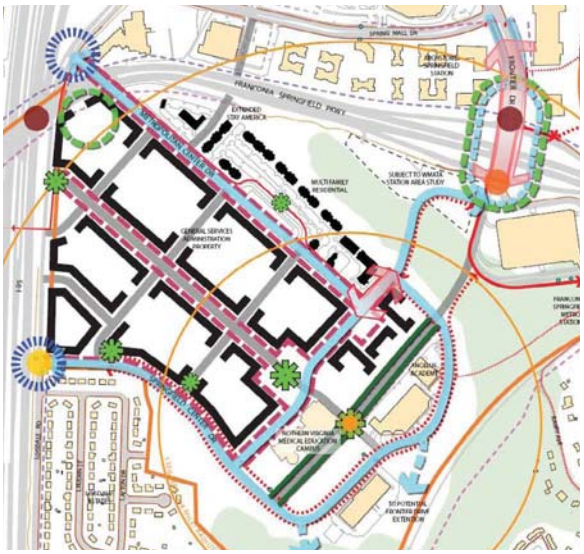


Figure 3.11 - Hilltop Village Center Site Plan

New RC Housing Area

Artist's rendering of the National Museum of the United States Army

South Post Town Center development along 12th Street

Fort Belvoir Programmed Projects

Planning initiatives that are occurring on the Post will have an impact on the future use of land. For this report, Fort Belvoir's planning initiatives defined major infrastructure and facility projects that are being built or are planned to be built within five years. Because there are very few undeveloped land parcels (five acres or more) on the Main Post, future development will be directed more toward redevelopment of existing aged and underutilized sites and buildings, which are apparent in the planning initiatives. These initiatives need to be understood and incorporated into the overall planning strategies of the master plan. They include:

Residential Initiatives

- **Residential Communities (RC):** This is a 50-year public-private partnership established in 2003 to redevelop all of the family housing on Fort Belvoir.

Community Initiatives

- **National Museum of the United States Army (Museum):** This new 200,000-SF facility will tell the story of the U.S. Army and become a regional/national attraction.
- **Expansion of the South Post Town Center:** A desire exists to build upon the successful mixed-use development on 12th Street to accommodate the growing need for community facilities. The potential program will include a mix of shops, restaurants, housing, and other community services.
- **PX/Commissary:** Army and Air Force Exchange Service (AAFES) and Defense Commissary Agency (DeCA) are constructing new facilities to create a regional shopping center including an open-air, pedestrian-oriented complex featuring restaurants, entertainment, retail, and other community services. The new 270,000 SF PX opened in June 2013, and current plans call for the new Commissary to be completed by 2015.
- **Various Community Facilities:** There are numerous support facilities under construction, including child development centers, fire stations, fitness centers, and Family and Morale, Welfare and Recreation (FMWR) facilities. A new travel camp and park at Tompkins Basin opened in May 2013.

Professional/Institutional Initiatives

- **Defense Logistics Agency (DLA):** Campus Expansion to accommodate mission growth including a visitor processing center, administrative office building, and parking structure.
- **29th Infantry HQ:** New development will provide administrative office building, vehicle hardstand, and storage yard on a site south of McRee Barracks.

- **911th Engineering Complex:** Consolidation of remotely scattered facilities to one location north of Accotink Village.
- **Defense Acquisition University (DAU):** Redevelopment of this campus to consolidate operations. The plan proposes infill development on existing surface lots and consolidating parking into a structure.
- **INSCOM:** Expansion of the current facility to accommodate mission growth. INSCOM will double the size of its HQ building and site program to approximately 622,000 square feet.

Industrial Initiatives

- **249th Battalion HQ:** a new facility for administrative offices and hardstand/storage yard will be sited on South Post along Theote Road.
- **Department of Logistics (DOL):** DOL is consolidating their facilities into a centralized location around Building 766 that will provide a modernized and efficient complex.

Airfield Initiatives

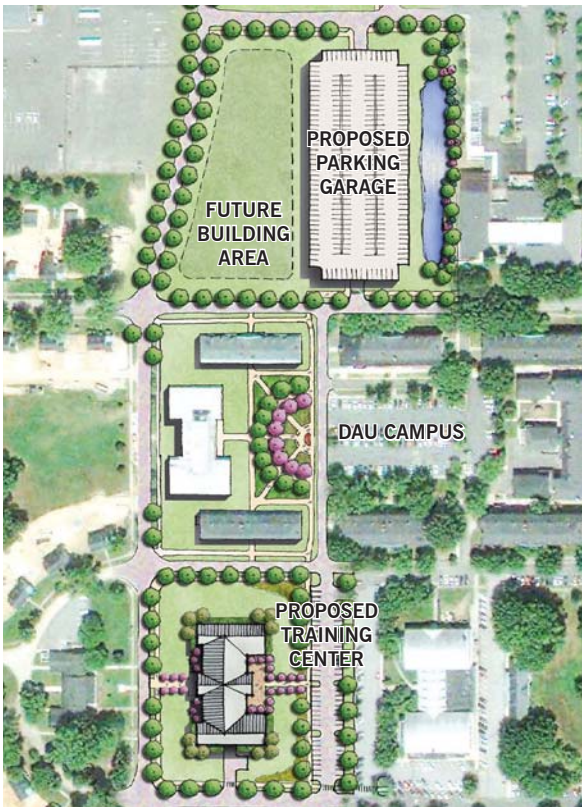
- **Davison Army Airfield (DAAF):** The DAAF Area Development Plan (ADP) recommends several improvements including: runway, taxiways, and ramps to better accommodate modern aircraft and meet current design standards; new hangars to replace aging facilities sited in appropriate locations for mission operations; consolidation of tenant operations into one location; and provisions for additional services that are currently lacking in the area. The ADP was prompted by the development of the new control tower.

Infrastructure Initiatives

- **Lieber Gate:** This fully monitored entrance will provide a new access control point to North Post from U.S. Route 1. It will align with Belvoir Road/Pence Gate and connect with Gunston Road.
- **Infrastructure Improvements:** In order to accommodate projected and future population growth, road infrastructure and basic systems for delivering utilities must be replaced and extended. Utility systems have been privatized.

Planning Considerations: Fort Belvoir Planned Projects

- **Residential** development has stabilized and will not experience much change in the near-term or long-term.
- **Community** uses are expanding and growing to meet demand and to provide better services by replacing upgrading older facilities. This will occur both in the near-term and long-term
- **Professional/Institutional** uses are increasing as large campus mission partners expand, and new organizations relocate to the Post. It is assumed that this will continue for the long-term.
- **Industrial** uses must make the most of the limited space allocated to this function. This will primarily be done by replacing obsolete buildings with modern, efficient facilities.
- **Airfield** is undergoing a initiative of replacing aging buildings and infrastructure with new facilities to meet modern mission requirements.
- **Ranges/Training** uses are not projected to expand or contract in the near or long term.
- **Utilities and infrastructure** is undergoing considerable expansion and upgrades as new development and population increases create a demand for higher services.



Defense Acquisition University Site Plan

Transportation Initiatives

There are notable transportation projects currently under construction, or are ongoing that serve Fort Belvoir (Figure 3.12). These roadway and intersection improvements will improve mobility throughout the region and ease congestion along major roadways. Summarized below are the most notable projects that will have impacts to Fort Belvoir.

1. **U.S. Route 1 Widening** is a project to expand this congested corridor to a six-lane highway from Telegraph Road to Mount Vernon Memorial Highway. The project will provide pedestrian and bicycle improvements as well as accommodations for future transit. Fairfax County has identified Route 1 as an Enhanced Public Transportation Corridor – a facility in which major transit, such as light rail or bus rapid transit, and associated service centers will be incorporated in future plans. In support of this, a Route 1 Transit Study is ongoing to determine alternatives to improve/incorporate new transit service along the corridor. These initiatives show support of regional mobility as more than dependence on single occupant vehicles.

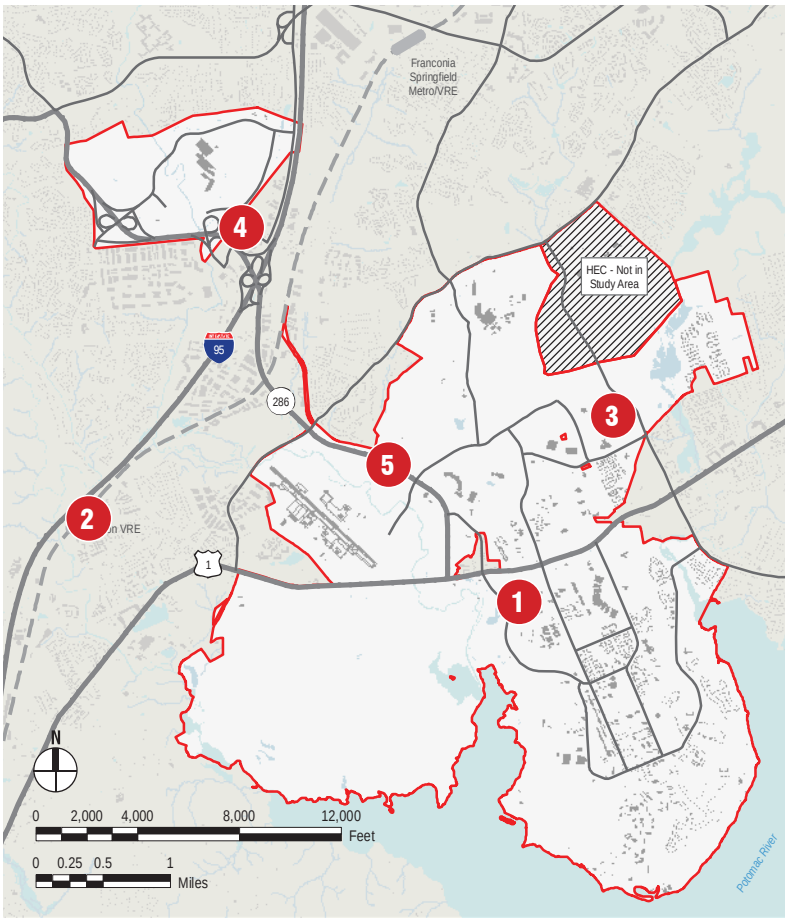
2. **Interstate 95 (I-95) Express Lanes**, is a project to extend these lanes south from Edsall Road in Fairfax County into Stafford County to expand existing facilities, and integrate Express lanes to the system. Both Main Post and FBNA will be served by these new facilities. Vehicles carrying three or more people will be allowed to use the Express lanes without charge. Others can access the Express Lanes by paying a toll.

3. **Mulligan Road**, is a new four-lane divided highway on the eastern edge of Main Post that will link Telegraph Road to U.S. Route 1 for general public use. The project includes widening a portion of Telegraph Road from two lanes to four lanes, thus providing an alternative access from Route 1 to Fairfax County Parkway. No direct access or gates from Mulligan Road will access the Post. The completion of Mulligan Road, expected in 2014, will also serve the new Hilltop Village Center, that will feature a major grocery store. This project will complete the remaining 4-lane widening of Telegraph Road from Mulligan Road to Beulah Road.

4. **FBNA HOV Bridge**, will provide a direct connection between FBNA and the HOV/Express lanes on I-95. Future project parking allowance for administrative facilities will be reduced from 60 percent to 50 percent once the improvement connection is complete.

5. **Fairfax County Parkway Intersection**, the Army will construct such improvements to the Fairfax County Parkway, namely a proposed signalized intersection for an access road to the NMUSA between existing signalized intersection at Kingman Road and the raised interchange at Telegraph Road to provide safe access by the public to NMUSA.

Figure 3.12 - Notable transportation projects near or on Fort Belvoir



Planning Considerations: Transportation Initiatives

- Fort Belvoir will need to provide additional land for the right-of-way to widen Route 1. However, this project will ease congestion traversing the Installation.
- I-95 Express lanes can be utilized by employees as an additional commuting option to/from the Post, and provide direct access to/from FBNA with the HOV Bridge.
- Right-of-way access provided for the Mulligan Road project will allow another alternative route that will connect Route 1 and Telegraph Road, improving traffic flow for Fort Belvoir and non-Post commuters.
- The opening of Mulligan Road provides a new regional pedestrian corridor that replaces the U.S. Route 1 Bike Route on Woodlawn Road (that closed on 11 September 2011). See the Fort Belvoir TMP for more information.

Parks and Recreation Areas

An extensive system of parks and refuges surround Fort Belvoir creating a defined network of greenways (Figure 3.13). These are important resources for natural habitat of plant and animal species.

In February 2004, the Fairfax County Park Authority Board presented a 10-year Capital Improvements Plan (CIP) that identified and prioritized near-term, intermediate and long-term park improvements needed through 2013. The foundation for the plan was a needs assessment of Fairfax County residents. A few main points from the study are included below:

- The park system is extensively used -- 8 of every 10 households visited a Fairfax County park in the year prior to the study.
- County residents devote more than one million days annually to participation in the 17 activities included on the needs assessment survey. Table 2.2 shows activities with the highest participation rates.
- The parks and recreational needs of the community are extensive -- amounting to over $350 million over the next 10 years for new facilities, renovation of existing parks, and land acquisition and preservation.

Table 3.1 - Activities with Highest Participation Rates

Activity	Population Participating
Hiking/Walking on Trails	45%
Visiting Historic Sites	38%
Picnicking	36%
Biking Paved Surfaces	33%
Swimming / Recreational	32%
Visiting Nature Centers	29%
Fitness-Cardio Equipment Use	27%
Gardening	27%
Walking / Exercising Dog	26%
Fitness Weight Training	24%
Visit Horticultural Centers	23%
Playing at Playgrounds	22%

Source: Needs Assessment, Fairfax County Park Authority, February 2004

Planning Considerations: Parks and Recreation Areas

- Future development shall adhere to preserving and enhancing natural resources on the Post as they are strongly interconnected with the regional habitat and park system.
- Future plans shall also strive to expand bike and pedestrian pathways, and their connections with the regional pathway network.

Figure 3.13 - Fairfax County Parkland

*Note: This map is intended for reference purposes only. Fairfax County does not provide any guaranty of the accuracy or completeness regarding the map information. Courtesy of Fairfax County GIS and Mapping Services.

Ideal Functional Relationships

Fort Belvoir's ideal functional relationship diagram (Figure 3.14) visually shows how functions on the Installation relate to one another. It depicts strong and minor connections as well as those functions that relate to the region. The bullets below summarize how the functions interact on- and off-Post.

Professional / Institutional

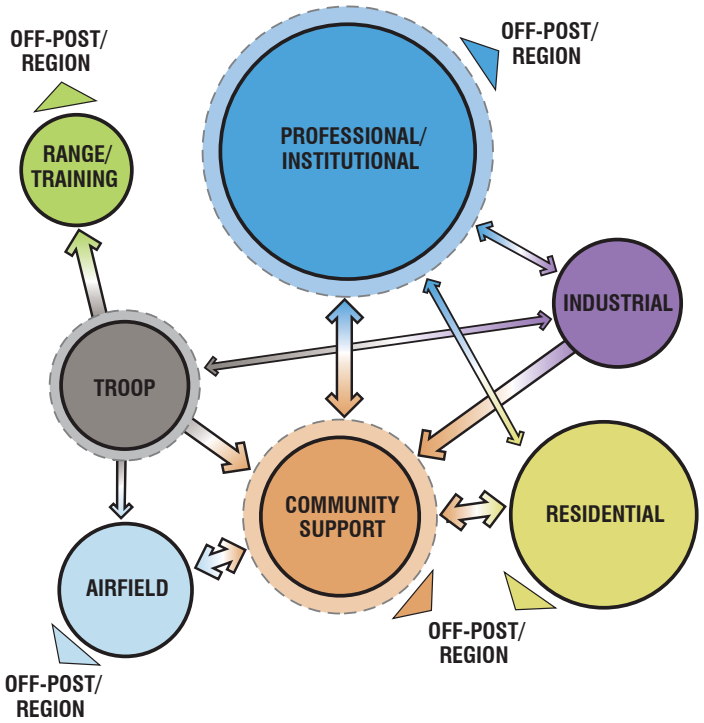
- Professional/Institutional functions comprise the largest component (36 percent) of Fort Belvoir's mission. The Post provides a secure environment for offices, laboratories, training spaces, and similar functions for federal organizations.
- The Professional/Institutional functions have strong relationships with Community Support functions. The employees of the organizations utilize the community services (i.e., food service, retail, etc.) on-Post.

- The Professional/Institutional functions have a minor connection to the Industrial and Residential functions. The Industrial functions provide storage and warehouse facilities that support their missions. Some military employees of professional/institutional organizations live in on-Post housing within the residential neighborhoods.
- Most of the Professional/Institutional functions have strong ties to the National Capital Region due to the broad population who are employed at the Post or using its services.
- It is expected that with the growth of Fort Belvoir, additional Professional/Instructional functions will continue to move to Fort Belvoir, and existing organizations will continue to grow.

Community Support

- Community Support functions serve as activity nodes on Post and include retail/commercial centers, recreation facilities, food service facilities, community centers, museums, and community service facilities.
- This group has strong connections to most of the other functions on Post by providing services to the military, employee, resident, visitor and regional population.
- As the projected population increases, the demand for these functions will increase and additional facilities will be needed on Post.

Figure 3.14 - Ideal Functional Relationships Diagram



Industrial

- Industrial functions provide maintenance, storage, and support facilities.
- Limited space is available in the currently defined Industrial area which limits future development within this land use.
- As redevelopment of Fort Belvoir occurs, the Industrial functions will remain in their current location; however, these facilities will become efficient and compact in design as new facilities replace antiquated and out-of-date facilities.

Troop

- The Troop functions have a strong relationship to the Range/Training function as they utilize this for mission training and operations preparation.
- These functions also have a strong relationship with the Community Support functions for food and retail services.
- The Troop functions have a minor connection to the Airfield as the troops utilize the facilities for mission training and operations if required.

Residential

- The Residential functions on Fort Belvoir provide housing for military families that either work on Post or within the region through the privatized Residential Communities Initiative (RCI) program.
- The residents utilize the Community Support functions on Post heavily and have the strongest relationship to these areas.
- Residential functions also have strong relationships with off-Post services that are not easily accessible or available on Post.

Airfield

- Airfield functions serve aviation needs for federal employees and training. They have minor connections with the Troop functions that use the facilities on a daily basis.
- Because the Airfield functions are isolated, this will help to protect mission and safety (clearance zones and security). However, support services (food establishments, etc.) are minimal.

Ranges/Training

- The Ranges/Training facilities provide land-based training areas within the National Capital Region including small live fire facility and ROTC training facilities. In recent years the training missions on Fort Belvoir have decreased or relocated to other installations.

Planning Considerations: Functional Relationships

The Ideal Functional Relationships Diagram (Figure 3.14) depicts the ideal functional relationships for the Post in an unconstrained condition. As expected, when on the ground constraints and conditions are factored in, the ideal is difficult to meet (Figure 3.15). Summarized below are the key points of the how the existing plan is meeting the pertinent adjacencies, and what changes should be considered in the future land use plan:

- **Professional/Institutional** functions are located in seven primary areas on Post. Most of the functions that reside in these areas operate independently of each other, and some require additional perimeters of security. All share a strong need for community services, particularly during the lunch hour. However, due to reasons such the additional security some of these areas are isolated from community functions. One resolution to this is to provide mobile community services that can be deployed to these locations.
- **Community Support** is the one function that is shared by all and has the most demand for access and adjacency requirements. Centralized "town centers" allow a high concentration of public functions to be adjacent to residential, troop and professional land uses. When adjacencies are not possible, mobile services can be deployed to designated areas to provide services at the customers' location. Community functions such as the future National Museum of the U.S. Army, golf course, PX, Commissary, and Tompkins Basin recreational area have an important connection to the regional population who desire access to these amenities. All but Tompkins Basin have proximity to Installation gates. There is no resolution for this as Tompkins Basin recreational amenities is geographically specific.
- **Industrial** functions are contracting as functions are undergoing consolidation and modernization into more efficient facilities. The industrial areas have proximity to main gates and access to regional roads which is important for large vehicle traffic to these areas.
- **Troop** functions are expanding as aging facilities are replaced and missions are growing. The Warrior Transition (WT) program is a recent introduction that has brought troop functions to the South Post. Access between troop housing and where the troops work is not ideal. As on-Post internal transit options are improved, this will help resolve this issue. For WT facilities on the South Post, access to the Hospital and public amenities is the most important, and that connection is beneficial.

Planning Considerations: Functional Relationships (continued)

- **Residential** functions benefit from close adjacencies with, and strong connections to, recreational and community facilities. Woodlawn Village, located on the easternmost edge of the Installation has no direct access to the rest of the Post without going through the Installation's main gates. There is no alternative to provide a direct connection.
- **Ranges/Training and the Airfield** by the nature of their activities require separation from other functional areas. These functions will remain in the same location on Fort Belvoir to keep noise and encroachment minimal. They also have optimum environment for land-based navigational training. Access to community support functions can be provided as mobile services that are deployed to these locations.

Figure 3.15 - Land Use Relationships

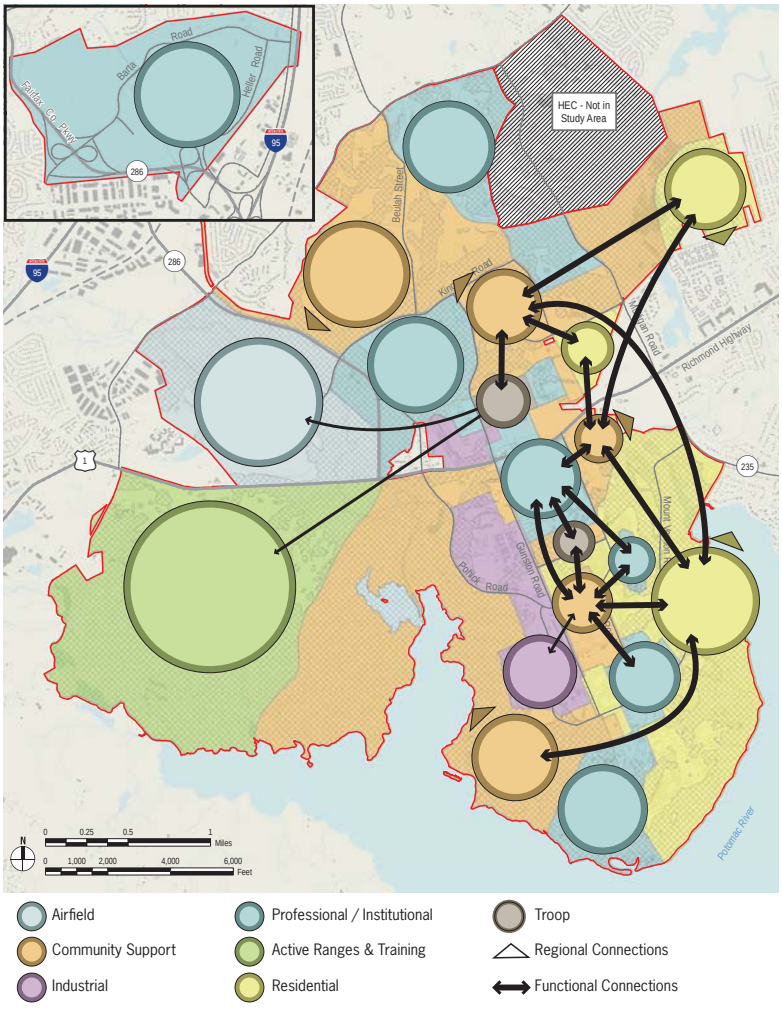


Figure 3.16 - 1993 Master Plan - Land Use Plan

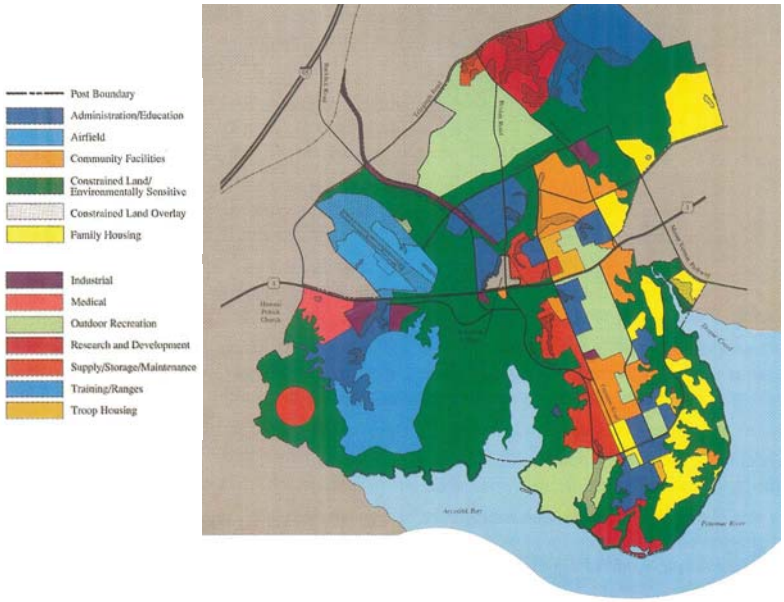
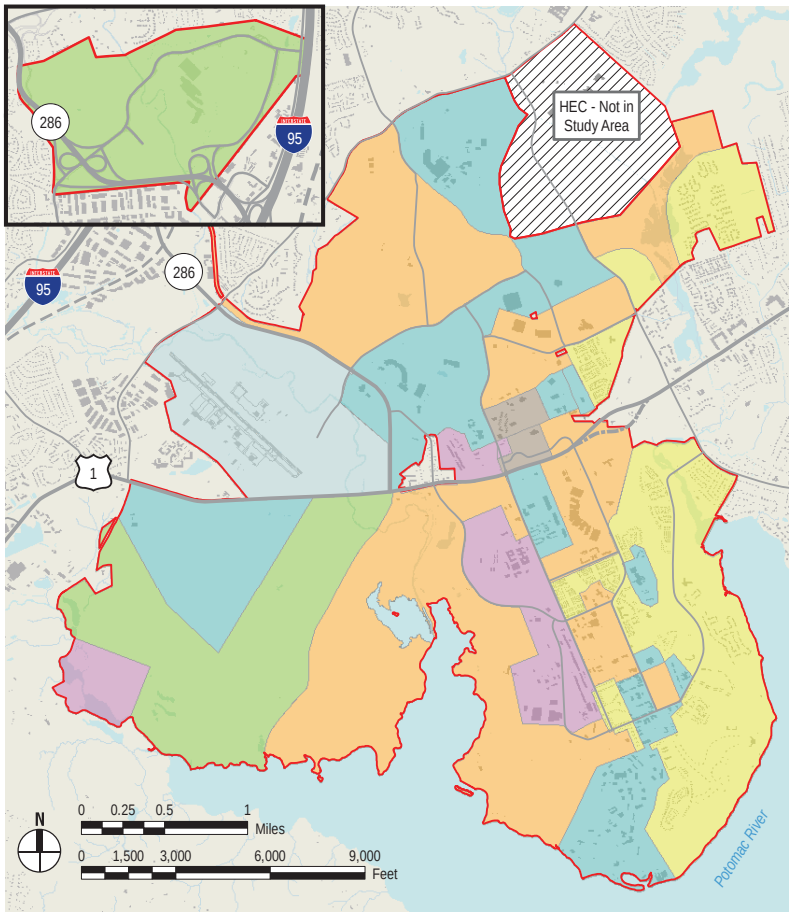


Figure 3.17 - 1993 Land Use Plan (updated using new land use classifications)



Proposed Land Use

This section briefly describes the progression of the Proposed Land Use Plans beginning with the approved 1993 Plan to the current Proposed Land Use Plan. It also outlines the changes between the proposed and existing land use.

Former Approved Land Use Plan (1993)

The last officially approved Land Use Plan was developed in the 1993 RPMP (Figure 3.16). At this point, the Army guidance used 12 land use categories. The plan reflected the Post's transition from a primarily troop support and training mission to an administrative center providing support to multiple organizations in the NCR. The 1993 RPMP was officially updated once by the adoption of a Regional Community Support Center Sub-area Development Plan. This plan revision addressed a desire to locate additional related activities in the portion of the Lower North Post area designated in 1993 as the Regional Community Support Center.

In 2007 the Army adopted new classifications for land uses. The new seven category system reflects a generalized view of the Installation, not a precise reflection of what is on the ground. The new classifications are meant to reflect the dominant use of the area, provide more flexibility in siting facilities, and encourage mixed-use development. The most recent Army Master Planning Technical Manual (MPTM), March 2011, includes a land use matrix that indicates specifically which facility types are allowed, conditionally allowed, or not allowed in each new land use category. An edited version of the full matrix (one that reflects Fort Belvoir-specific requirements) is provided in Appendix C. A condensed version of the matrix is provided on the following page (Table 3.2).

The seven categories used in the new system are:

- **Professional/Institutional** – This land use provides for non-tactical organizations including military schools, headquarters, major commands, and non-industrial Research, Development, Test and Evaluation (RDT&E).
- **Residential** – This land use provides space for family housing and senior unaccompanied personnel housing. It also includes family services and may have other neighborhood services associated with the community land use cluster included in the area.
- **Community** – This land use encourages a mix of uses. Facilities allowed include religious, family support, personnel services, professional services, medical, community, housing, commercial and recreational services. Users live both on and off Post and may include Soldiers, dependents, retirees, and other civilian personnel.
- **Troop** – This land use is designated for operational facilities for Table of Organization and Equipment (TOE) units, as well as complexes for Basic Combat Training (BCT), One Station Unit Training (OSUT), and selected Initial Entry Training (IET). The goal is to provide contiguous facilities to related organizations in order to facilitate operational readiness; to support

operations security for deployable units; and to improve circulation and movement of trainees between sleeping, eating, and training facilities.

- **Industrial** – This land use is designated for production; maintenance; depot and other storage; and activities that generate significant amounts of heavy vehicle traffic, loud outdoor equipment operations, noise, smoke, steam, or pollutants that must be processed on the site.
- **Ranges and Training** – This land use includes live fire ranges, non-live fire ranges, and special training areas, such as confidence courses, drivers training, or land navigation.
- **Airfield** – This land use is designated for flight operations (including runways and taxiways) and airfield support facilities (including airfield operations, aviation refueling, aviation maintenance, and related test facilities).

Table 3.2 - Land Use Matrix

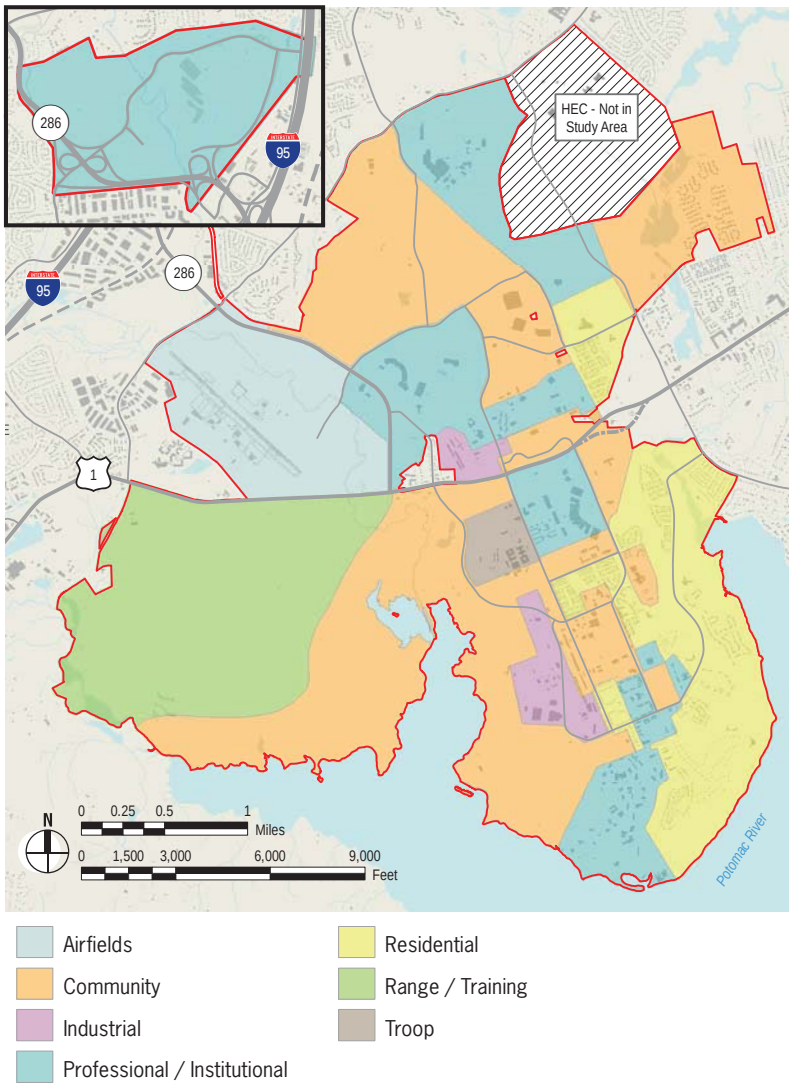
Description	Airfields	Ranges and Training	Industrial	Community	Professional/ Institutional	Residential	Troop
RUNWAYS & AIRCRAFT PARKING	A	C	N	N	N	N	C
FUELING FACILITIES	A	C	A	C	N	N	A
EOC/SCIF FACILITIES	C	N	C	N	A	N	C
BATTALION/COMPANY BRIGADE HQ BUILDINGS	C	A	N	N	C	N	A
GENERAL INSTRUCTION BUILDINGS	C	C	C	C	A	N	C
TRAINING CENTERS—RESERVES/ ARNGY/USAR	C	N	A	N	N	N	A
TRAINING CENTER AND RANGES	N	A	N	N	N	N	N
FIRE FIGHT/RESCUE	A	A	N	N	N	N	N
MAINTENANCE FACILITIES	A	N	A	N	N	N	N
PRODUCTION FACILITIES	C	C	A	N	N	N	N
RDT&E LABS	C	C	A	N	C	N	N
GENERAL STORAGE	C	C	A	N	N	N	C
MEDICAL CENTERS/HOSPITALS/ DENTAL FACILITIES	N	N	N	A	A	C	C
FISHER HOUSES	N	N	N	A	A	C	N
ADMINISTRATIVE FACILITIES	A	C	C	C	A	C	A
FAMILY HOUSING, FAMILIES	N	N	N	A	C	A	N
ARMY LODGING, SPACES	N	N	N	A	A	C	A
UNACCOMPANIED PERSONNEL HOUSING, ENLISTED SPACES	N	N	N	C	C	A	A
UNACCOMPANIED PERSONNEL HOUSING, SR NCO SPACES	N	N	N	C	C	N	A
UNACCOMPANIED PERSONNEL HOUSING, OFFICER SPACES	C	N	N	C	C	A	N
FIRE AND RESCUE FACILITIES	A	A	A	A	A	A	A
POLICE/MP STATIONS	C	N	A	A	A	N	N
RELIGIOUS FACILITIES	N	N	N	A	A	A	A
DEPENDENT SCHOOLS	N	N	N	A	C	A	N
BANKS/CREDIT UNIONS	N	N	C	A	A	A	C
AUDITORIUMS, GENERAL PURPOSE	N	N	N	A	A	A	A
EATING FACILITIES NOT EXCHANGE MANAGED	C	N	N	A	A	A	A
CHILD DEVELOPMENT CENTERS	N	N	N	A	A	A	N
FITNESS FACILITIES	C	N	N	A	C	A	A
MUSEUMS	C	N	N	A	A	N	N

Allowed A | Conditional C | Not Allowed N

One of the notable changes for land use classification is the elimination of a "constrained land" category, which was used to categorize protected land, environmentally sensitive areas, or otherwise undevelopable land in the 1993 RPMP. This type of land is now designated as the dominant land use category that surrounds it. Constrained land is now depicted on land use maps and plans with hatched overlay.

The lack of a land use designation for these constrained lands does not reduce environmental areas or increase developable areas. All of the constraints and use restrictions associated with these areas are still effective. To facilitate a comparison of the 1993 Land Use Plan with the current land use maps and plans, Figure 3.19 shows the 1993 RPMP Land Use Plan reclassified into the new categories.

Figure 3.18 - 2005 BRAC Plan Land Use Plan



The BRAC Land Use Plan

The 2005 Base Realignment and Closure (BRAC) Act had significant impacts on Fort Belvoir. A BRAC Master Plan and Environmental Impact Statement (EIS) were completed. The study included an updated Proposed Land Use Plan (Figure 3.18) that recommended the following changes from the previous 1993 and 2002 Land Use Plans:

- Increases the amount of land designated for Professional/Institutional use. A substantial part of the increase is due to the inclusion of FBNA as well as medical facilities in the Professional/Institutional category.
- Increases the land area dedicated to family housing on both the North and South Posts for RCI. Woodlawn Village will be converted to Community land use, and the housing units there will be consumed into other housing areas on Post.
- Exchange of the three McNaughton ballfields along Pole Road on the southern border of Woodlawn Village for the Berman Tract immediately east of Woodlawn Village. This area will be categorized as Community.
- Change the land use designation of the South Post golf course from Outdoor Recreation to Professional/ Institutional for the construction of the Fort Belvoir Community Hospital.
- Enables demolition of outdated and inefficient warehouses; relocation of most of the Supply, Storage, and Maintenance Operations in the 1400 Area to the 700/1100 Areas; and redevelopment of the eastern portion of the 1400 Area east of Gunston Road for Professional/Institutional uses.
- Convert North Post areas designated for Troop uses to Professional/Institutional. A new Troop land use area will be provided on South Post, west of Gunston Road.
- Recategorize the DeWitt Hospital site to Community land use.

Since the 2005 BRAC Plan and EIS, several changes have occurred on Fort Belvoir regarding new missions, regulations, and funding that have caused changes to the 2005 BRAC Plan. These include:

- Woodlawn Village will remain as a residential land use and under the purview of the Residential Communities Initiative.
- Troop land uses will be remain on North Post and the area originally slated for the new Troop Village in the 1400 Area is now intended for Professional/ Institutional uses.
- DeWitt Hospital area will remain as Professional/ Institutional land use.

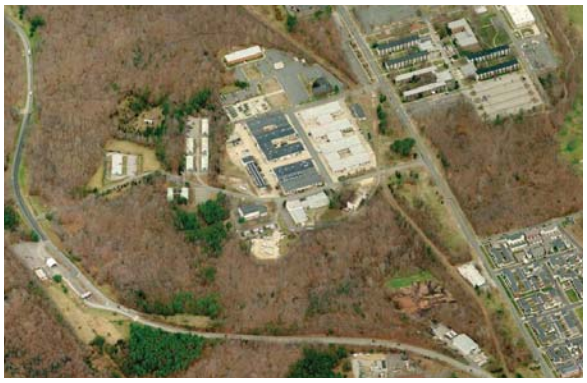
- Community land use in the Southwest Area has been reduced to reflect the condition of the existing land use. The adjustment was made based on the requirements of water access for the training activities.

Proposed Land Use Plan

There are only a few changes between the existing (Figure 2.28) and proposed (Figure 3.19) land use. Notable changes are listed below and referenced on Figure 3.19. It is important to note land use does not reflect the entire picture of the future development on Fort Belvoir. There is a significant amount of proposed redevelopment within the land uses that do not trigger a land use change. The full proposed development for Fort Belvoir is reflected in the *Framework Plans and Infrastructure Plans* chapters.

1. Establishing a new Professional/Institutional development area adjacent to the South Post Core development area (approximately 171 acres).
2. Reducing the South Post Industrial land use to a smaller acreage (55 percent reduction), which will be accommodated by constructing more efficient modern facilities for these functions.
3. Consolidating the Industrial land use to the west of Gunston Road. The small portion of Industrial land use (5 acres) to the east of the Gunston Road is transferred to the Professional/Institutional land use category.
4. Categorizing the Community land use south of the Fort Belvoir Community Hospital as Troop due to the continued expansion of the Warrior Transition (WT) development which has eliminated much of the former community facilities that were previously located on this site.

Table 3.3 indicates the changes in land use based on acreage between the 1993 Land Use Plan, the Existing Land Use, and the Proposed Land Use Plan.



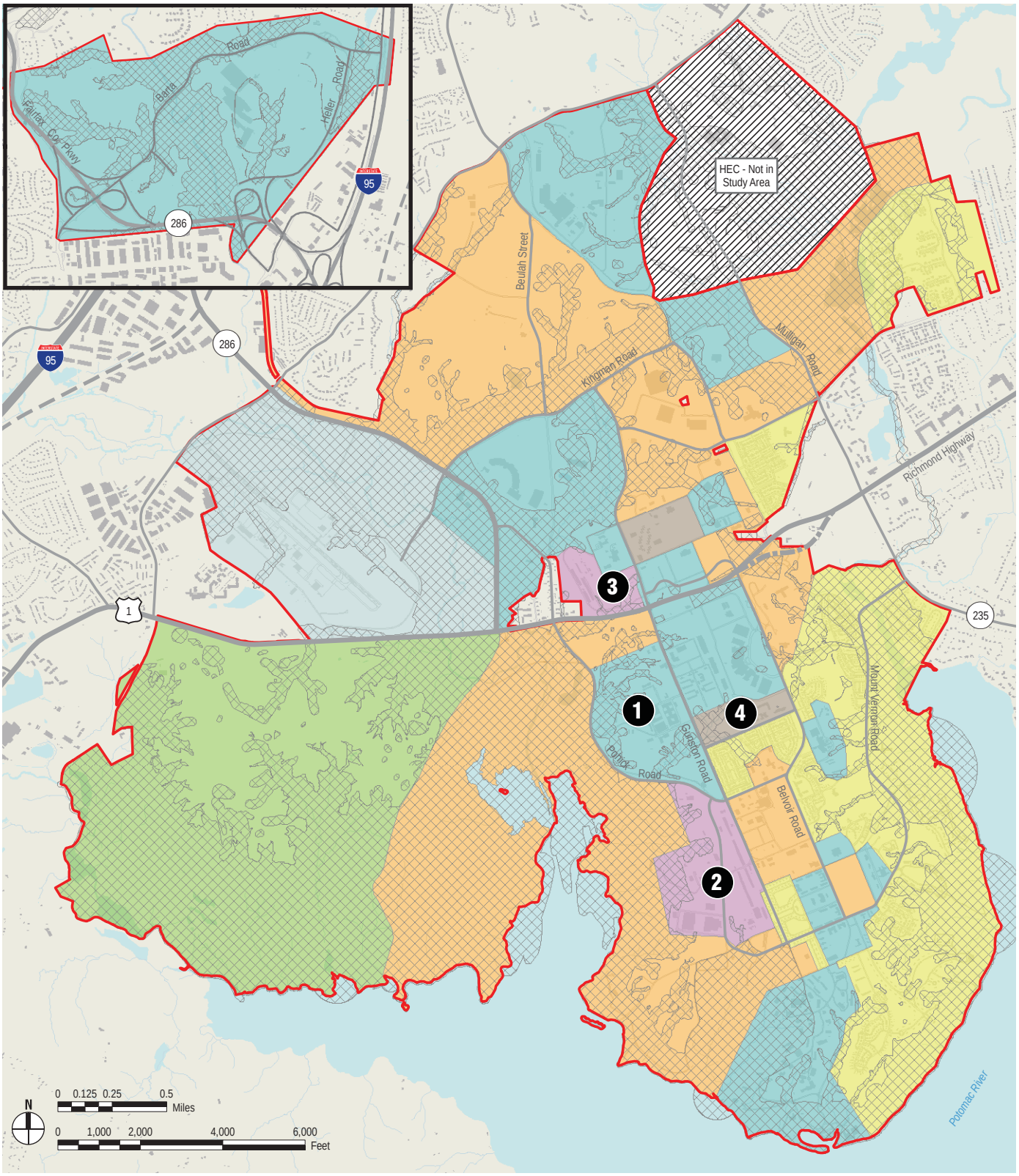
The Industrial functions between Pohick Road and Gunston Road will be redeveloped in the future as Professional/Institutional land uses.

The Warrior Transition Complex is a new and expanding Troop Area on South Post.

Table 3.3 - Land Use Acreage Comparison

Land Use Category	1993 Land Use Plan			Existing Land Use			Change in Developable Acres	Proposed Land Use			Change in Developable Acres
	Total	Constrained	Developable	Total	Constrained	Developable		Total	Constrained	Developable	
Professional / Institutional	**1674**	692	981	**2113**	863	1250	**269**	**2288**	914	1374	**124**
Residential	**1289**	702	586	**1240**	655	585	**(-1)**	**1240**	655	585	**0**
Troop	**82**	2	80	**46**	0	46	**(-34)**	**86**	10	76	**30**
Community	**2564**	1597	966	**2569**	1626	943	**(-23)**	**2515**	1615	900	**(-43)**
Range/ Training	**1699**	1032	667	**1463**	1003	460	**(-207)**	**1463**	1003	460	**0**
Airfield	**690**	472	218	**690**	472	218	**0**	**690**	472	218	**0**
Industrial	**501**	217	284	**378**	95	284	**0**	**218**	45	173	**(-111)**
TOTAL	**8500**	**4714**	**3786**	**8500**	**4714**	**3786**	**0**	**8500**	**4714**	**3786**	**0**

Figure 3.19 - Proposed Land Use Plan



Framework Plan

4

Figure 4.1 - Framework Process Diagram

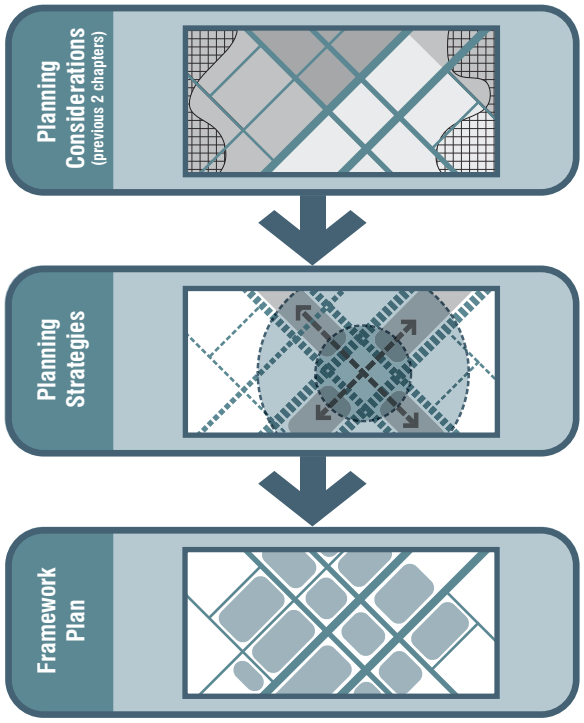


Table 4.1 - Guiding Principles Key	
Icon	Guiding Principle
	Create and sustain a world-class Installation.
	Achieve environmental sustainability.
	Support the natural habitat.
	Recognize that land is a valuable resource.
	Improve multimodal connectivity.
	Create a diverse and dynamic community.
	Respect the history of Fort Belvoir to ensure the continuation of its legacy.
	Strengthen community partnerships for mutual benefits.

Overview

This chapter presents the framework plan that serves as an adaptable blueprint to control, coordinate, and direct change. This plan integrates the Mission, Vision, Guiding Principles, and planning initiatives to arrive at a concrete strategy for implementing future planning strategies.

The process occurs in the following sequential steps:

Planning Considerations
The previous chapters analyzed the natural, cultural, and operational features of the Installation, as well as the planning initiatives. Having an understanding of these issues will provide the background knowledge that leads to the next step of planning strategies.

Planning Strategies
This step examines the large-scale/Installation-wide infrastructure systems and determines how they will be shaped to accommodate the future demands of growth and/or contraction. This step is where the stakeholder's guiding principles that were presented earlier in the document begin to take physical form. This leads to the next step of the framework plan.

Framework Plan
This step develops the blueprint for long-term planning that illustrates how guiding principles can be implemented. The framework plan is the summary plan of all the planning strategies from the previous step, and provides the regulating guidance for Installation-wide elements such as development parcels, circulation networks, and open space networks.

The Framework Plan is made up of several planning strategies. Think of the planning strategies as layers that are placed on top of each other. Together all the layers combine to create a unified framework plan. Each of the planning strategies covers a major infrastructure network system or planning pattern that tells the story of how Fort Belvoir should address future change. Each strategy is assessed using the guiding principles to ensure it is achieving the stakeholder's future vision for the Post. A key to all the guiding principles is provided in Table 4.1.

Planning Strategies

The planning strategies examine major systems for infrastructure and planning patterning. The strategies provide guidance for large-scale planning guidance such as: development use and general density; circulation networks; and open spaces. Together, these strategies form the basis of the framework plan presented later in this chapter.

Development Centers

Development Centers Planning Strategies (see Figure 4.2) highlight select places that act as development hubs where higher concentrations of people and activities occur in a compact, walkable area. There are six prominent employment centers where groupings of small mission tenants exist or where a single large agency is located. These areas can and do support some commercial uses. There are two primary town centers that comprise a mix of activities that include office, retail and housing. The planning strategies are to continue developing within these town centers to increase densities and encourage greater mixed-use diversity.

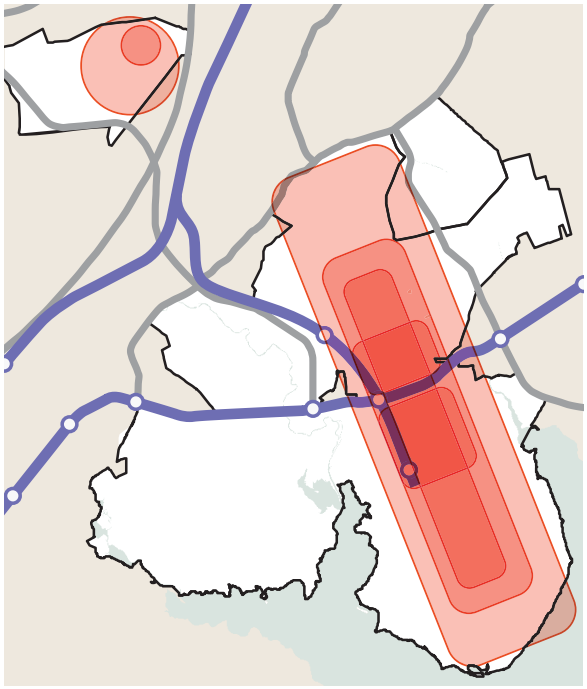
Table 4.2 - Development Centers Planning Strategies Matrix

Strategies								
Continuing the redevelopment of the central plateau area to create a dense, mixed-use urban core along the primary north-south axis of Main Post.	✔	✔	✔	✔		✔	✔	
Encouraging redevelopment as a catalyst for the replacement and modernization of aging infrastructure and buildings.	✔	✔	✔	✔		✔	✔	
Providing subdistricts within the Main Post urban core that establish scale and orientation.	✔			✔		✔	✔	
Encouraging expansion of employee campuses located outside the urban core (off the plateau) to increase efficiency and density.	✔	✔		✔		✔		
Ensuring that the potential transit corridor is not encroached upon.	✔	✔		✔	✔		✔	✔
Strengthening existing development and locating additional development along the potential transit corridor, particularly at multimodal transit nodes.	✔	✔		✔	✔			✔
Locating regional recreation and community services near Post boundaries .	✔			✔	✔	✔		✔
Locating other regional uses along the primary roads to take advantage of this public interface.	✔			✔	✔	✔		✔
Maintaining viable green infrastructure through all developed areas.	✔	✔	✔			✔		
Create designated common areas within the employment centers.	✔	✔		✔	✔	✔		

The plan includes designated common areas/nodes within the employment centers. These areas supplement the larger town centers for the employment centers that are not within reasonable walking distance of the town centers. The areas are sized to support small gathering areas, include drop off/ pick up zones for rideshare, docking areas for bikeshare program, mobile food venders, and may be used for special events. The common areas/nodes, as shown in Figure 4.2, are intended for general guidance. The actual locations should consider spaces for seating, covered pavilions, trash receptacles, pedestrian lighting, and informational kiosks.

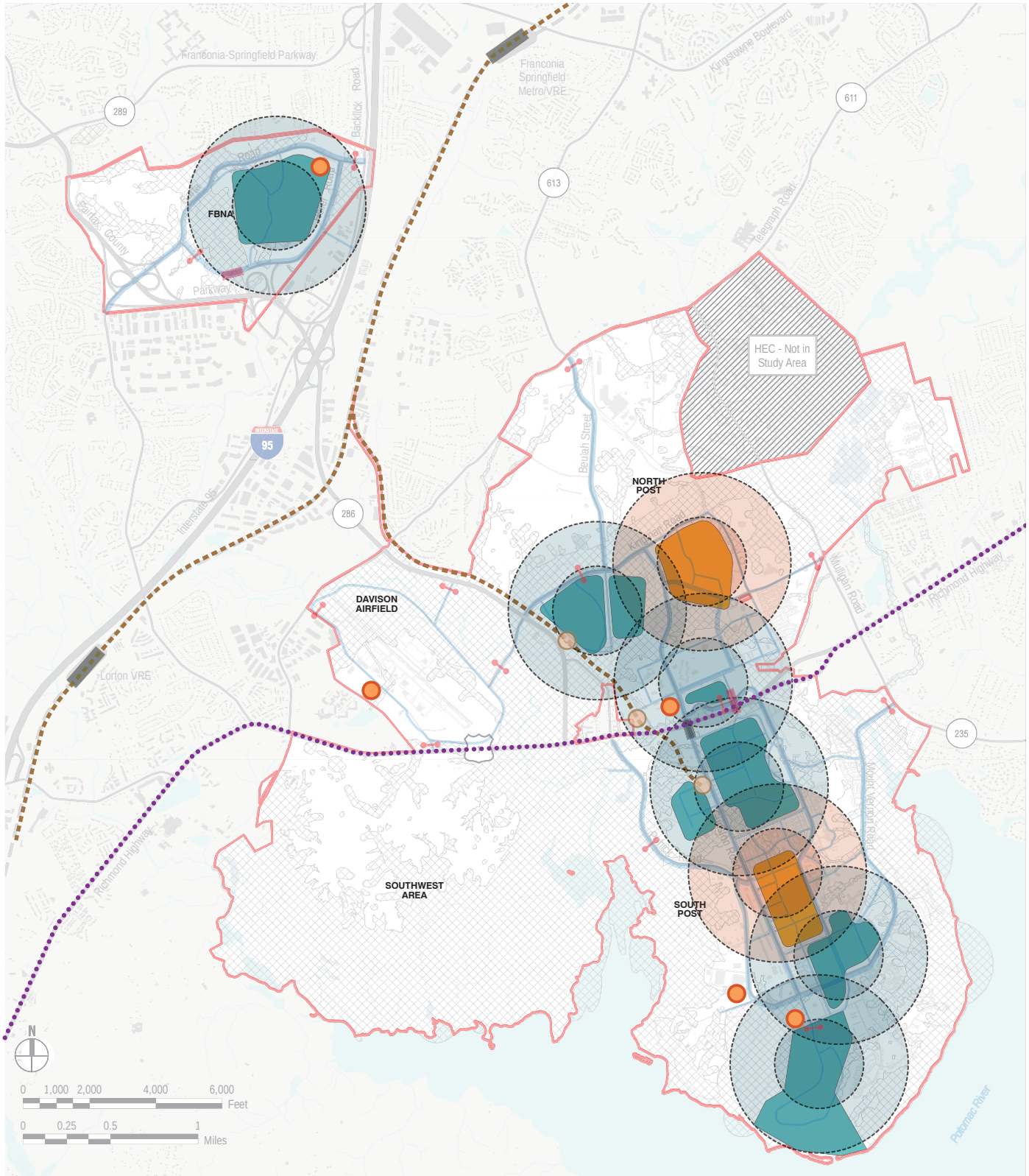
How these planning strategies support the guiding principles and master plan vision are compared in Table 4.2.

The Town Center along 12th Street serves as a model for mixed-use at the Post that can be expanded upon.



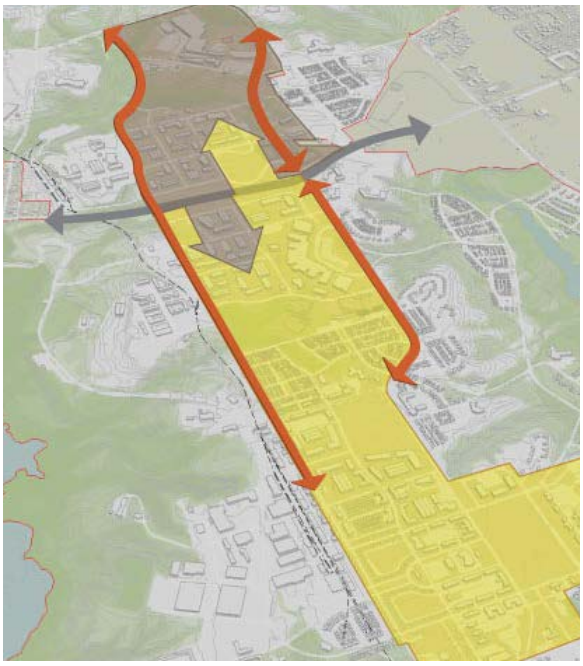
Densest concentration of development is directed toward the center of the Post along the plateau where developable land, transportation systems and infrastructure are available.

Figure 4.2 - Development Centers Planning Strategy (2040)



Roadway Circulation

The roadway circulation strategies (see Figure 4.3) highlight the major roadway infrastructure that services the Post. It identifies the primary and secondary roads, perimeter gates that control access onto the Installation, and intersections where improvements are necessary to meet the carrying capacity demand of the future. The basic strategy is preserving the network grid of streets to ensure the efficiency of the existing roads. Major proposals are an additional overpass at Route 1 to better connect northern and southern halves of the Post, and a transit spur along the existing rail corridor. The development strategies supporting the guiding principles and master plan vision are compared in Table 4.3.

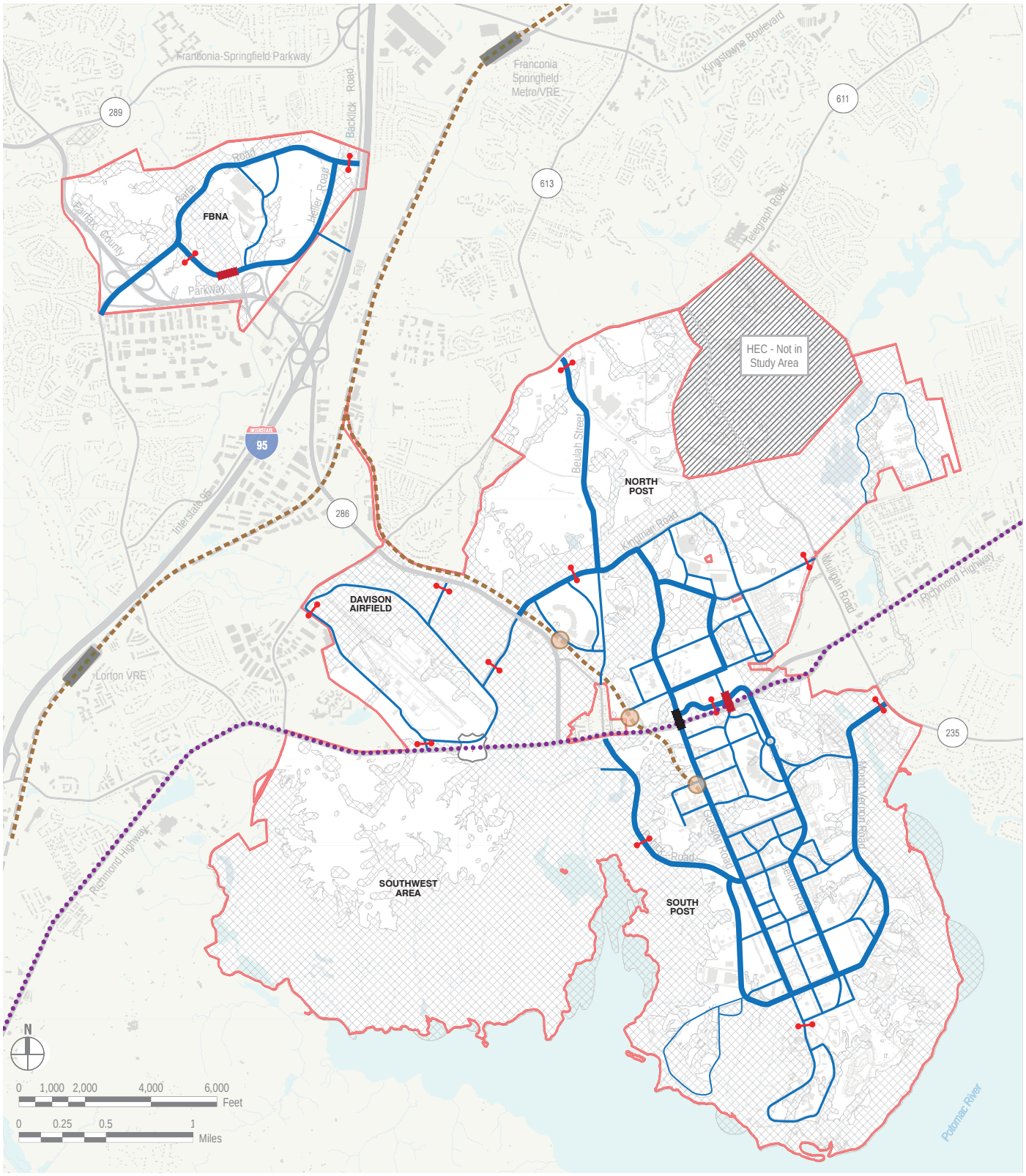


Connectivity between the North and South Post is important to establish a unified urban core. Long severed by U.S. Route 1, strong linear elements such as Gunston Road and Belvoir Road can span this formidable barrier. Connectivity can also be accomplished with well-orchestrated development that visually ties both halves of the Post together.

Table 4.3 - Circulation Planning Strategies Matrix

Strategies								
Increasing mobility between the Installation and regional roadways by incorporating intersection improvement locations in alignment with Fairfax County Transportation Plan.	✔				✔			
Providing direct access between Route 1 and North Post.	✔	✔		✔	✔		✔	
Providing an additional primary roadway connection between North and South Post, to be located in the area between Gunston and Mulligan Roads.	✔	✔		✔	✔		✔	
Creating a primary roadway loop around the Main Post urban core to enhance circulation and divert through-traffic away from more heavily concentrated pedestrian areas.	✔	✔		✔	✔		✔	
Providing additional east-west connections between Belvoir and Gunston Roads to enhance the grid network of secondary streets that link to the primary roadways.	✔			✔	✔			
Ensuring residential neighborhood streets remain connected to one another with direct and convenient access to the town center development.	✔				✔	✔		
Capitalizing on future direct connection between I-95 HOV lanes and FBNA.	✔	✔		✔	✔			✔
Extending Heller Road over Accotink Creek to complete the primary roadway loop at FBNA.	✔	✔		✔	✔			

Figure 4.3 - Roadway Circulation Planning Strategy (2040)

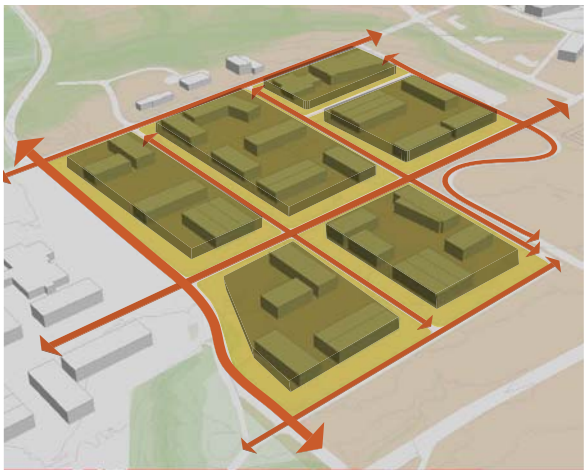


Development Parcels

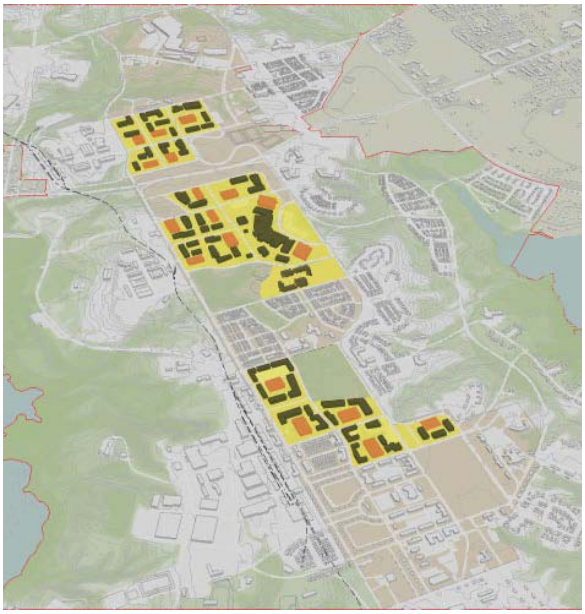
The development parcel strategies (see Figure 4.4) highlight where and how future growth can be integrated into the existing framework of the Installation. Parcels designated as developed already have considerable improvements in terms of infrastructure and facilities. Further development here will increase density with strategic infilling/expansion to existing facilities. Parcels designated for development/ redevelopment either have considerable inventory of aging infrastructure/buildings or have excess land for expansion. These areas have the potential for additional development, and can serve as a catalyst for change and improvement that impacts the entire Post. The development strategies supporting the guiding principles and master plan vision are compared in Table 4.4.

Table 4.4 - Development Parcels Planning Strategies Matrix

Strategies								
Concentrating redevelopment toward the central core, where aging facilities can be replaced with modern and sustainably designed facilities.	✔	✔	✔	✔		✔	✔	✔
Accommodating future growth by infill development between existing buildings as means to increase density and leverage existing infrastructure.	✔	✔	✔	✔		✔	✔	✔
Encouraging the redevelopment of surface parking lots.	✔	✔	✔	✔	✔			✔
Encouraging structured parking to create more land for other uses, and reduce the amount of impermeable surfaces.	✔	✔	✔	✔	✔	✔	✔	✔
Keeping to prescribed parcels in order to eliminate impacts to natural resources and preserve wildlife habitat.	✔	✔	✔	✔		✔	✔	✔
Maintaining a viable green infrastructure through all developed areas.	✔	✔	✔			✔		✔
Redevelopment of existing parcels by demolishing old, low-rise single story facilities and constructing to full build-out on parcels for more compact, denser development.	✔	✔	✔	✔		✔	✔	✔

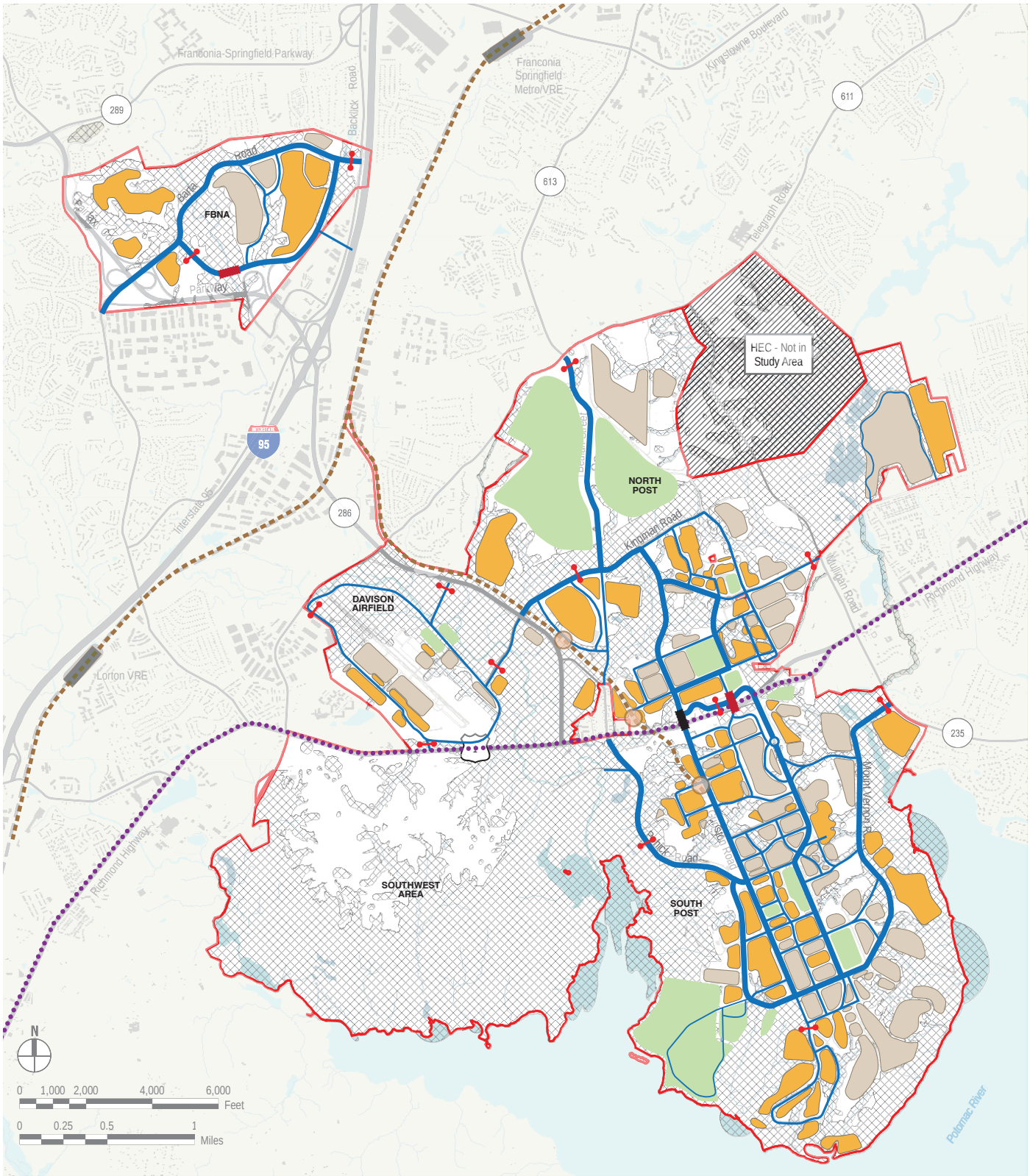


Future Development Pattern: Future development shall observe the development patterns already established on Post. They have efficiently served the Installation in terms of its mission and defined its character.



Activity Nodes: Most development on Post is focused around a central core of activity nodes. These offer the urban amenities that encourage a vibrant mixed-use community on Post.

Figure 4.4 - Developable Parcels Planning Strategy (2040)



Multimodal Circulation

The multimodal strategies (see Figure 4.5) indicate the various means of bus, rail, HOV, bike, and pedestrian networks that link the Installation to regional destinations. The multiple systems overlap to create nodes for connecting various options of travel. The strategies improve upon bicycles/pedestrians, public buses, Installation shuttles, park and rides, and rail. The ultimate goal is to bolster the existing infrastructure network for an integrated and efficient means of travel other than the car. The development strategies supporting the guiding principles and master plan vision are compared in Table 4.5.

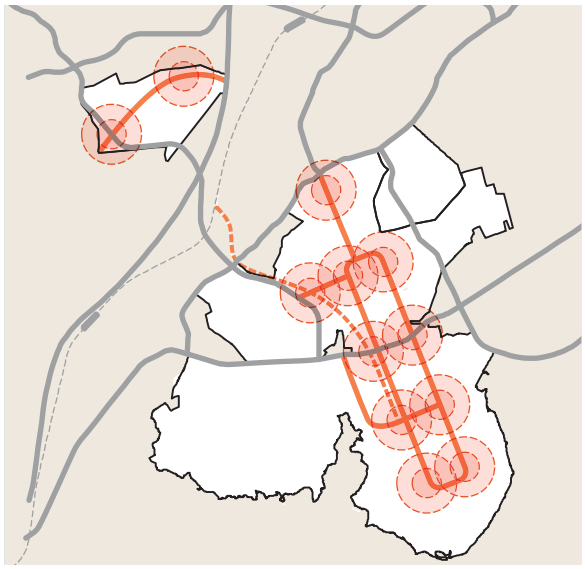
Figure 4.5 indicates potential locations of "Transit Transfer Centers." These general locations are intended to align with the prominent commercial and employment centers presented in Figure 4.2. Transit transfer centers are intended to be located in places with high commuter demand that support workers, residents and visitors to the Installation. The centers are to be located with convenient access to existing public/private bus service with dedicated bicycle lanes and walkways. The centers will also function as gathering areas for organized carpool and real-time rideshare pickup. The centers will be programmed to include such facilities as:

- An enclosed lighted bus shelter with a paved plaza area
- Group seating areas
- Wayfinding signage (bus route and trails maps)
- Community information kiosk
- Bus schedule with LED display board
- Bikeshare areas, bicycle racks, bicycle storage areas
- Nearby eateries

The centers should be adjacent to or near community open space areas to allow a small overflow pedestrian area that could also support special events and/or mobile food vendors.

Table 4.5 - Multimodal Circulation Planning Strategies Matrix

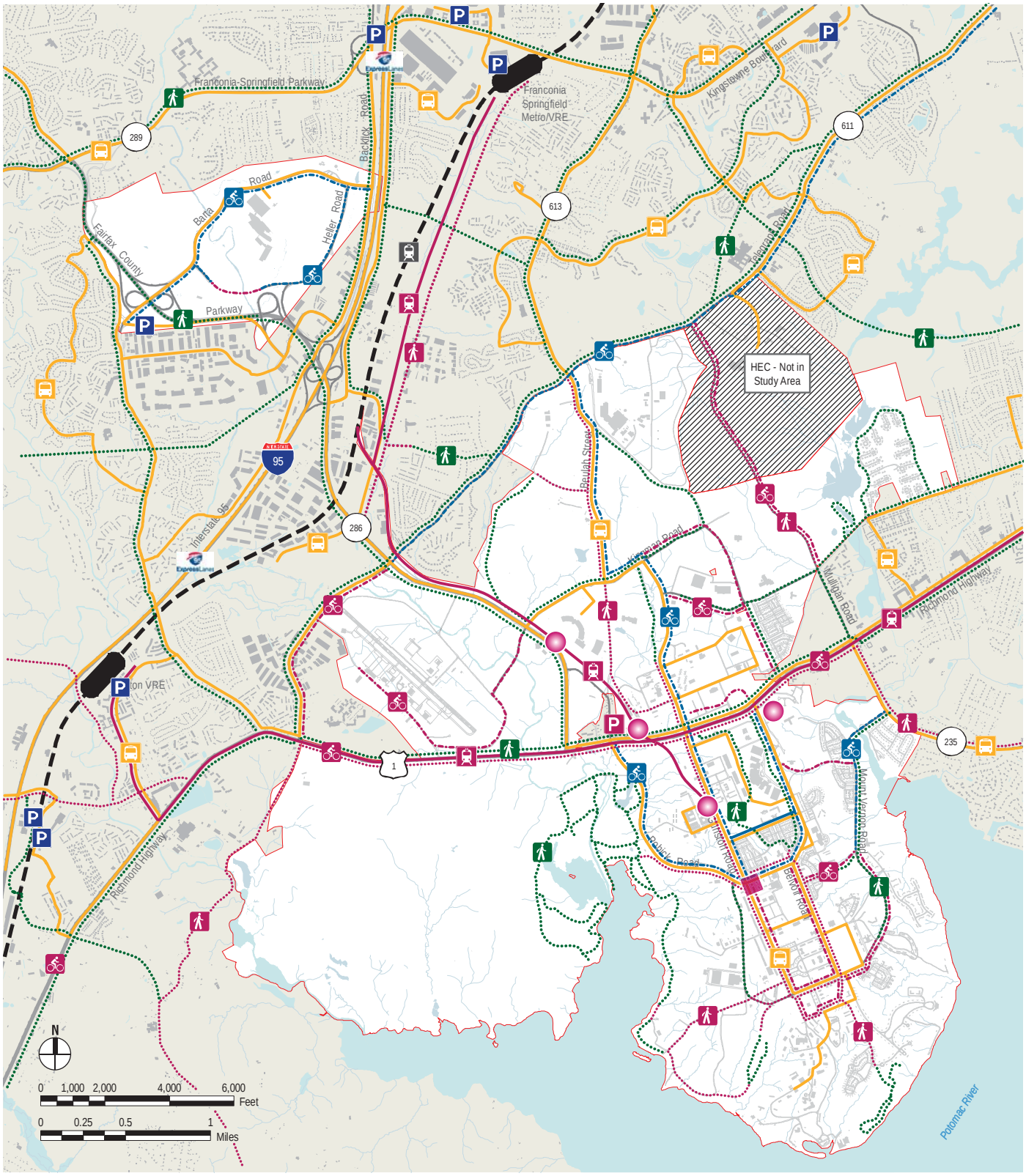
Strategies								
Establishing a dedicated transit and shared-use trail corridor along the Installation's abandoned rail line that directly connects Main Post to the Franconia-Springfield Transit Center as well as the County shared trail network that runs along Cinderbed Road (see Transit Corridor on Figures 4.2, 4.3 and 4.5).	✔	✔	✔	✔	✔	✔	✔	✔
Creating transit transfer centers to connect Installation commuters to regional transit services.	✔	✔			✔	✔		✔
Linking the more remote campuses with concentrated population centers, such as DAAF, FBNA, and the 300 Area, and residential areas to North and South Post Town Centers by extending the routes of the Army-run shuttle services.	✔	✔	✔	✔	✔	✔		✔
Establishing a Commuter Services Center in the South Post Town Center as a centrally-located office to assist personnel seeking alternative commute options.	✔	✔			✔	✔		✔
Establishing collection points to support programs such as bike- and car-shares to facilitate travel for transit riders to meet workday requirements.	✔	✔	✔	✔	✔	✔	✔	✔
Expanding the existing network of on-street bicycle lanes along all primary roads.	✔	✔	✔	✔	✔	✔	✔	✔
Expanding pedestrian linkages between all main activity centers, in accordance with the Installation Planning Standards.	✔	✔	✔	✔	✔	✔	✔	✔
Creating a usable wayfinding system for both vehicles and pedestrians that efficiently and safely moves people through Fort Belvoir.	✔	✔			✔	✔	✔	✔



The framework plan will propose a variety of transit and pedestrian routes and nodes that are strategically dispersed.

High density areas of activity such as the Town Center are prime locations for transit transfer centers as shown above at the intersection of Gunston Road and 12th Street.

Figure 4.5- Multimodal Circulation Planning Strategy (2030)



Existing

- Park and Ride
- Bus Route
- Trail
- On-street Bicycle Lane
- Commuter Rail Line

Future

- HOV / I-95 Express Lanes
- Transit Transfer Center
- Commuter Services Center
- Park and Ride
- Trail
- On-street Bicycle Lane
- Transit Corridor

In cases where potential transit centers are located adjacent to secure campuses (e.g., the DLA campus), they would need to be located outside of any secure perimeter fence; whereas, transit center locations adjacent to the future National Museum of the U.S. Army and community would not have the same requirement. The details for vetting public access (visitors) via public transit service would need to be worked out; however, the protocols are expected to be similar to current public bus access. One example is the future INSCOM campus expansion that coordinated the location of a Fairfax Connector (Route 335) bus stop and sidewalk with a secure pedestrian gate that allowed a more direct access to its secure campus.

Achieving effective multimodal facilities requires close coordination with the Fort Belvoir TDM Coordinator, the Installation mission partners, and regional stakeholders to facilitate improvements to public transit connections and service. This is described in the Fort Belvoir TMP as a Short-Term Strategy called "RC-1: Regional Collaboration Strategies."

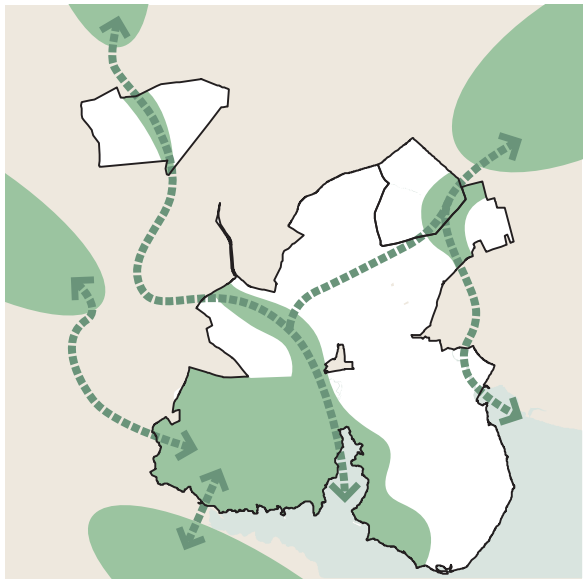
Table 4.6 - Open Space/Recreation Planning Strategies Matrix

Strategies								
Strategically locating community centers and recreational facilities to serve as hubs for the Main Post community.	✔	✔	✔	✔	✔	✔	✔	✔
Incorporating additional recreational amenities within smaller parks and open spaces.	✔	✔	✔	✔		✔		
Providing an accessible trail system that links open spaces and recreation areas together as an integrated network.	✔	✔	✔	✔	✔	✔	✔	✔
Providing recreational trails throughout the natural area on Post.	✔	✔	✔	✔	✔	✔	✔	
Aligning pedestrian trails with regional trails.	✔	✔	✔	✔	✔	✔	✔	✔
Preserving existing natural features whenever possible and integrating them as amenities.	✔	✔	✔	✔		✔	✔	
Providing a variety of open spaces to accommodate a wide range of activities.	✔	✔	✔			✔		
Utilizing open spaces as buffers to help mitigate impacts to neighboring historic properties.	✔	✔	✔	✔		✔	✔	
Grouping recreational fields together to create a sports complex.	✔	✔	✔	✔		✔		
Maintaining a viable green infrastructure through all developed areas.	✔	✔	✔			✔		
Providing interconnected pedestrian trails to the residential areas on-Post as well as connecting one residential area to another.	✔	✔	✔		✔	✔	✔	✔
Provide spaces for community gardens	✔	✔				✔		

Open Space/Recreation

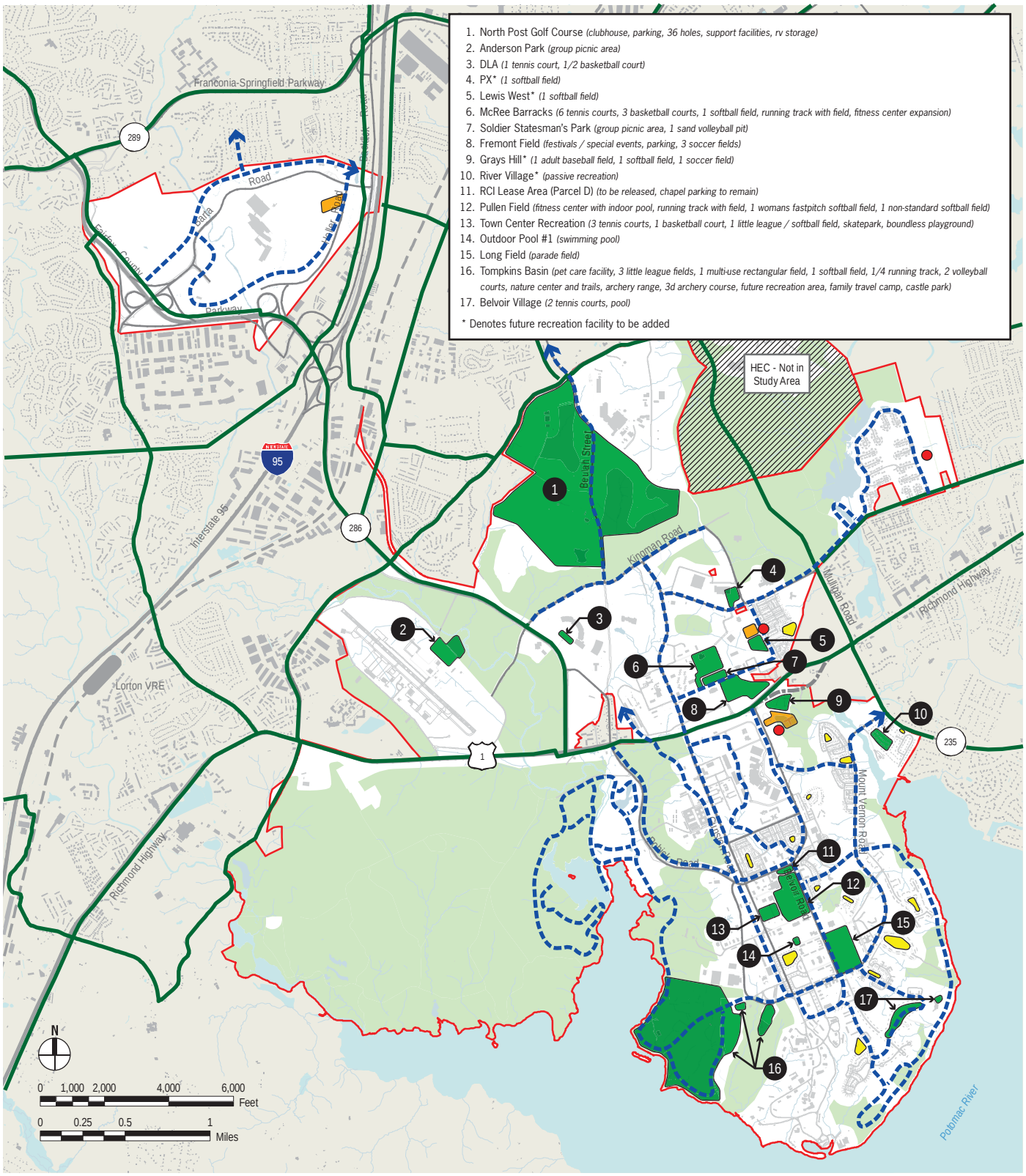
The open space/recreational strategies (see Figure 4.6) indicate major areas of green spaces and outdoor recreation available to the Post population. Linking these areas together via greenways enables them to become an integrated system of community amenities and natural resources. The basic premise of this strategy is preservation of these resources as much as possible, and focusing growth onto previously developed areas. The development strategies supporting the guiding principles and master plan vision are compared in Table 4.6.

Prominent green spaces are well distributed throughout the Post. These include the golf course, parade fields, recreation areas, and local parks. A strong network of trails shall link open spaces together and provide greenways for pedestrians and bicyclists.



Preservation areas on- and off-Post serve as important wildlife areas, and their connections provide a means for maintaining migration routes and habitat access.

Figure 4.6 - Open Space and Recreation Planning Strategy



Residential Housing

The Fort Belvoir Residential Communities Initiative (RCI) project commenced on 1 December 2003 in a partnership between the U.S. Army and Clark Pinnacle Family Communities LLC (known as Fort Belvoir Residential Communities LLC). The original plan from December 2003 envisioned 1,630 new homes, 170 historic renovations, and 270 "no touch" homes. This inventory comprised a total of 2,070 homes. A modified plan in 2009 canceled the Woodlawn Divestiture Plan, increased renovations, modified the Community Amenity Plan, and adjusted for changing demographics,. The new total of housing units increased to 2,106. The housing population at Fort Belvoir will remain at 7,500 residents (or approximately 3.5 people per household).

Table 4.7 - Residential Housing Planning Strategies Matrix

Strategies								
Demolish obsolete homes and construct new homes as replacement to improve the Soldier and dependent's quality of life.	✔			✔				
Renovate existing homes to improve quality and extend life cycle of house.	✔			✔				
Comply with current environmental land regulations at River Village and Dogue Creek by demolishing obsolete houses and constructing new homes on-site or on previously developed land elsewhere on the Installation.	✔	✔	✔	✔		✔	✔	
Provide common green space and pedestrian amenities within the residential villages to enhance a sense of place and promote walkability.	✔	✔			✔	✔		
Provide community club houses and recreation areas as gathering spaces and promote a sense of community.	✔	✔				✔		✔
Incorporating new housing units and open space amenities within the North and South town centers.	✔	✔		✔		✔		

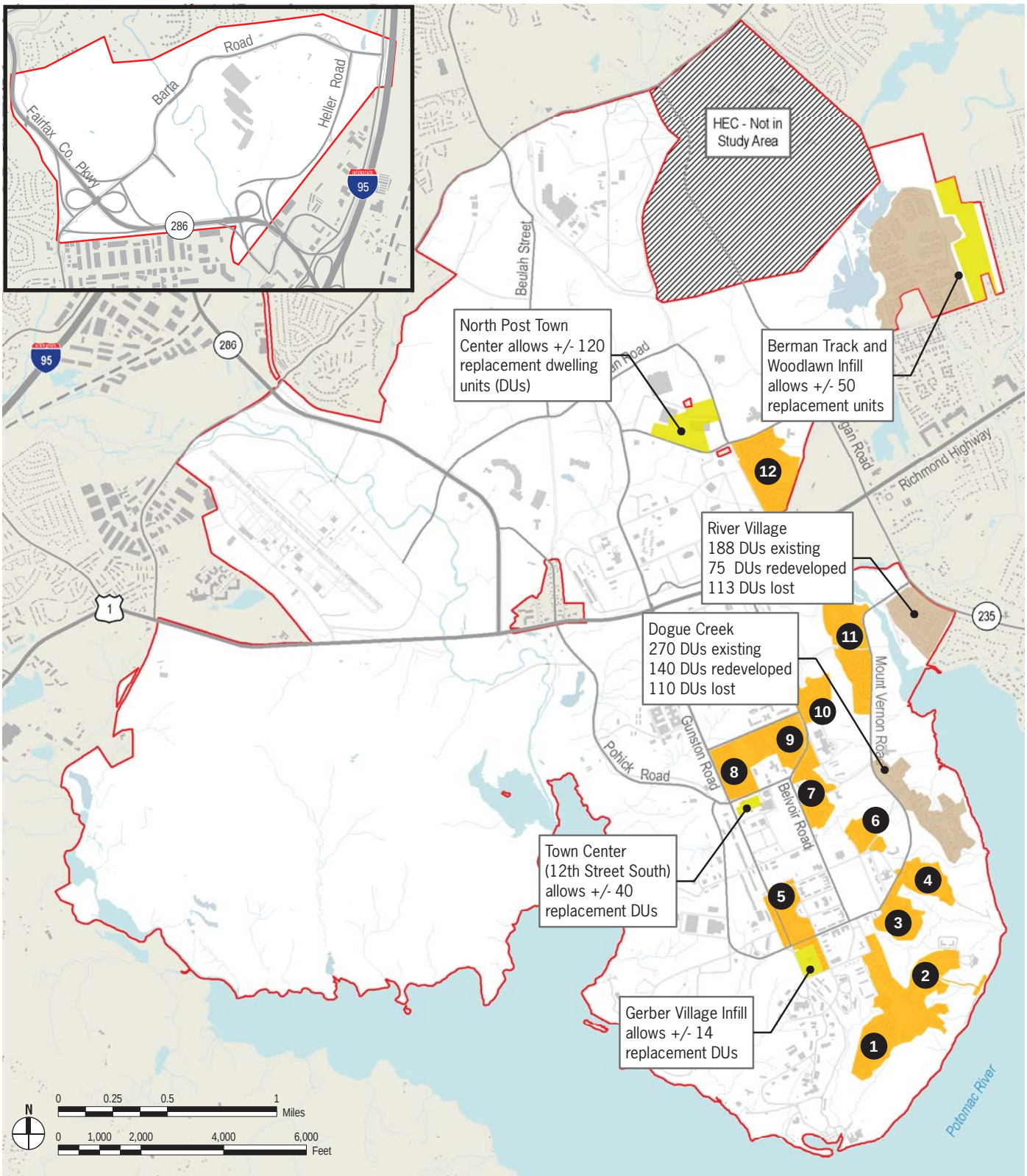
The residential housing strategy (see Figure 4.7) provides new residential locations; however, the total number of housing units and resident population will remain constant. These new areas enable the replacement of older housing units located at Dogue Creek and River Village. Based on RCI planning studies, it is projected that approximately 223 units will be lost with the redevelopment of these parcels due to environmental site restrictions and new housing typologies.

Targeted replacement land parcels that have been designated in the framework plan for residential use include infill areas within Gerber Village, 12th Street south, and the new North Post Community Support District. Implementation of the replacement housing plan is contingent on the following factors:

- Timing for the removal of the existing Benyaurd Pool in Gerber Village, the Garden Center and AAFES facilities along 12th Street, and the completion of the new PX/ Commissary and removal of existing facilities.
- The results of an updated Housing Market Analysis to determine the preferred building housing typologies, unit mix of officer/enlisted housing, the number of ADA and Wounded Warrior ADA housing units required, and other allowances to best support Soldier and Family needs.
- Future Real Estate agreements with RCI and Army leadership.

The implementation of the Housing Framework Plan is a critical element that supports the Installation's vision of creating a compact and walkable community. Incorporating new housing units and open space amenities within employment and retail areas will create a vibrant mixed-use district for the South Post Town Center and future North Post Community Support District. The development strategies supporting the guiding principles and master plan vision are compared in Table 4.7.

Figure 4.7 - RCI Housing Planning Strategy



Existing Housing Area
Planned Housing Redevelopment Area
Potential Housing Area

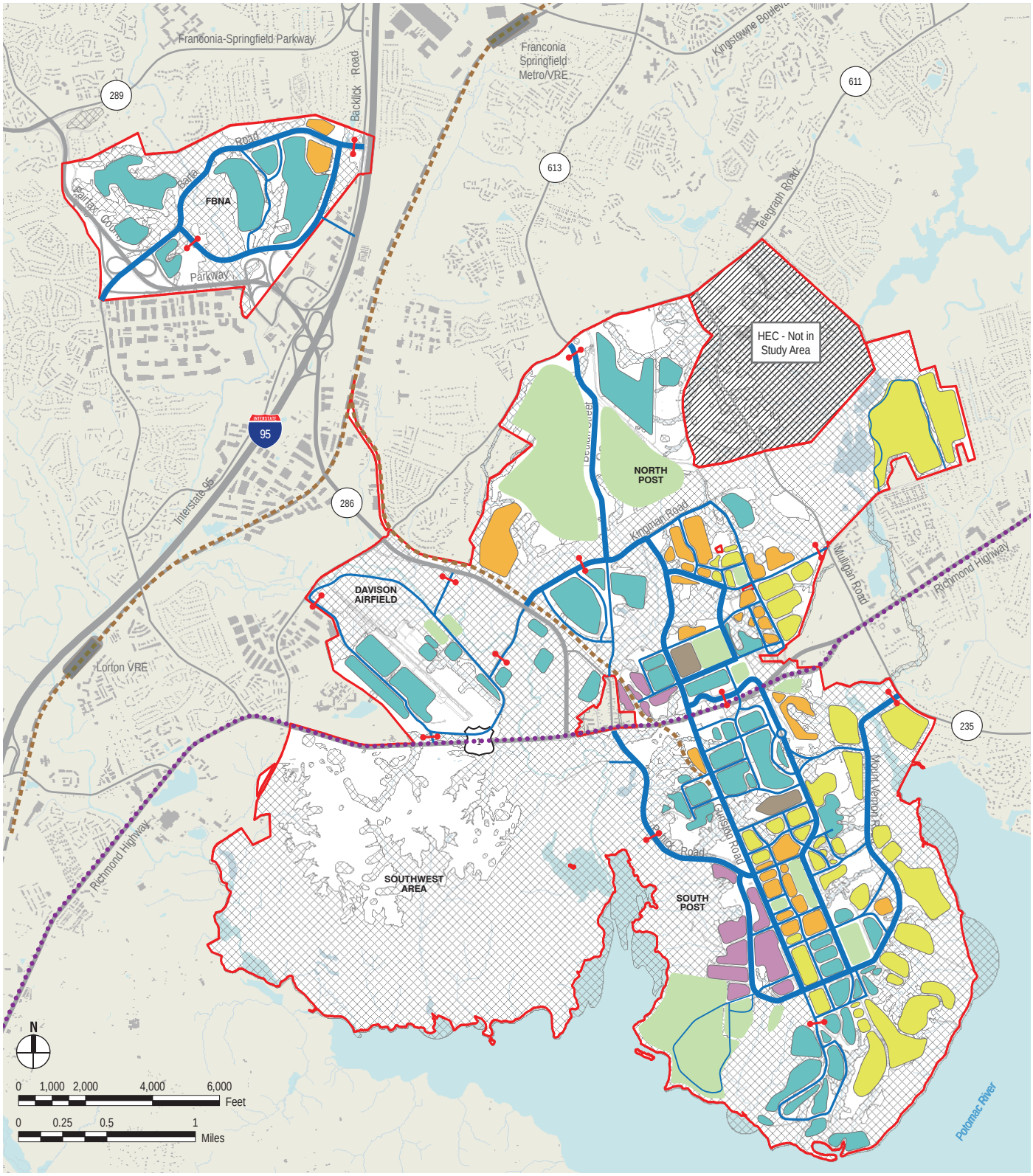
1 Fairfax Village
2 Belvoir Village
3 Rossell Loop Village
4 Jadwin Loop Village
5 Gerber Village
6 Park Village
7 Cedar Grove Village
8 Herryford Village
9 Vernondale Village
10 Colyer Village
11 George Washington Village
12 Lewis Village

Framework Plan

The framework plan (see Figure 4.8) integrates all the aforementioned strategies into one plan. The framework promotes and encourages mixed-use development. The assigned land uses for each parcel merely represented the predominant land use. The land use matrix chart included in Chapter 3 indicates the range of uses allowed within each land use category. The plan recommends the type and location of development, but does not indicate specific projects. Detailed project information is reserved for the Installation Development Program (IDP) and Area Development Plans (ADPs). This enables the framework plan to be flexible and enduring. Implementation of the master framework plan occurs in three phases: near-term (2017), long-term (2030) and future (2040+) (see Figure (4.9). The plan enables the following:

- Provides the framework for accommodating the growth to the year 2017, with an increase that ranges between 995 to 4,755. By the year 2030, employee populations can increase by 5,730 to 12,600. (Total projected population for 2030 is 47,000 to 56,700.) By the year 2040, employee populations can potentially increase by approximately 25,100 personnel to achieve a higher density of development and a total population of about 82,000 personnel.
- Provides a dense core of mixed-use development on the plateau that extends north-south across the Installation.
- Enhances the connection between North and South Posts.
- Reserves parcels for recreation and open space.
- Reserves right-of-way on Route 1 widening and maintains the historic rail line right-of-way for potential transit use.
- Reserves parcels for development beyond 2030 to 2040+.
- Maintains a viable green infrastructure through all developed areas.

Figure 4.8 - Framework Plan



Development Phasing Plan

Because many of the development parcels are already developed to some degree, redevelopment of the parcel will often involve relocating existing uses. To efficiently implement the master plan, a phasing strategy needed to be developed (Figure 4.9). Phasing was broken down into parcels to be developed by 2017, 2030 and 2040+. The 2017 parcels incorporate known programmed projects. The 2030 parcels are a mix of known programmed projects and anticipated future growth or expansion of existing uses. The 2040+ parcels are sites for future growth based on land potential, not known projects. More detail regarding specific project locations can be found in the regulating plans within the *Fort Belvoir Installation Planning Standards (IPS).*

Land Capacity Analysis

This section discusses the planned development capacity for Fort Belvoir. This is discussed at the district level. Districts are identifiable geographic areas based on compatible but not solely single uses. This is the primary land delineation used in the *Fort Belvoir Installation Planning Standards (IPS).* Each of the districts has an ideal development capacity. This ideal capacity is determined by the parcel's planned use; its proximity to infrastructure and other developments; environmental constraints; and by the guiding principles of this Master Plan, which describe a desired intent and character for development on the Post. The *IPS* regulating plans depict an illustrative image of the district's capacity (architectural massing, building heights, open space, setbacks and utility corridors). They govern the horizontal and vertical development for each of the districts and directly affect the population projection totals.

The capacity plan (Figure 4.10 and Table 4.8) helps the Installation make informed planning decisions for locating new projects, balancing resources and utility demands, evaluating roadway impacts, and determining ultimate expansion capabilities. Lastly, the land capacity analysis provides the necessary planning data for regional government population forecasting (COG model) and local comprehensive planning efforts.

As stated earlier, part of the 2030 and all of the 2040+ development is based on unprogrammed growth. Therefore, the population totals represented in the land capacity analysis could expand or may be reduced if the vision and mission changes. The EIS associated with this master plan does not assess development impacts for projected growth beyond 2030. Their occurrence is too uncertain and their prediction would be speculative. Some examples that may alter the project's capacity include:

- Reduced or eliminated training requirements could remove operational constraints and create additional development areas.
- Regional transit improvements serving Fort Belvoir could facilitate greater densities through decreasing the reliance on surface parking and road infrastructure.

The Planned Capacity for any one horizon year (2017, 2030 or 2040) reflects both existing uses, programmed projects and future projects based on what can fit on the land. The actual capacity of each district will be affected by such factors as government approvals, existing/future regulatory requirements, project funding, construction phasing, AT/FP, infrastructure, and additional architectural/engineering studies. Therefore, the personnel increases shown are considered estimates to guide future decision making.

Figure 4.9 - Development Phasing Plan

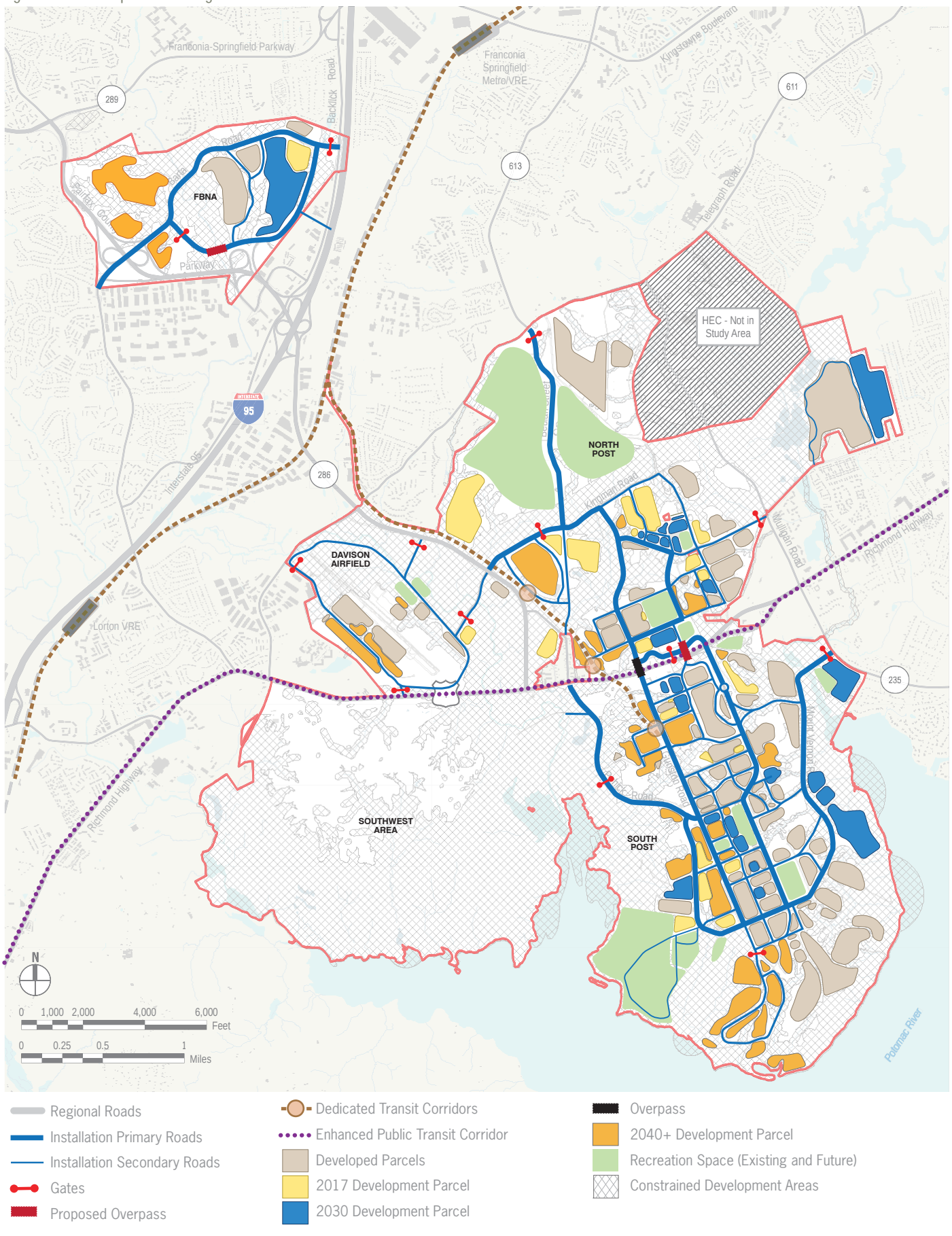


Table 4.8 - Land Capacity Analysis

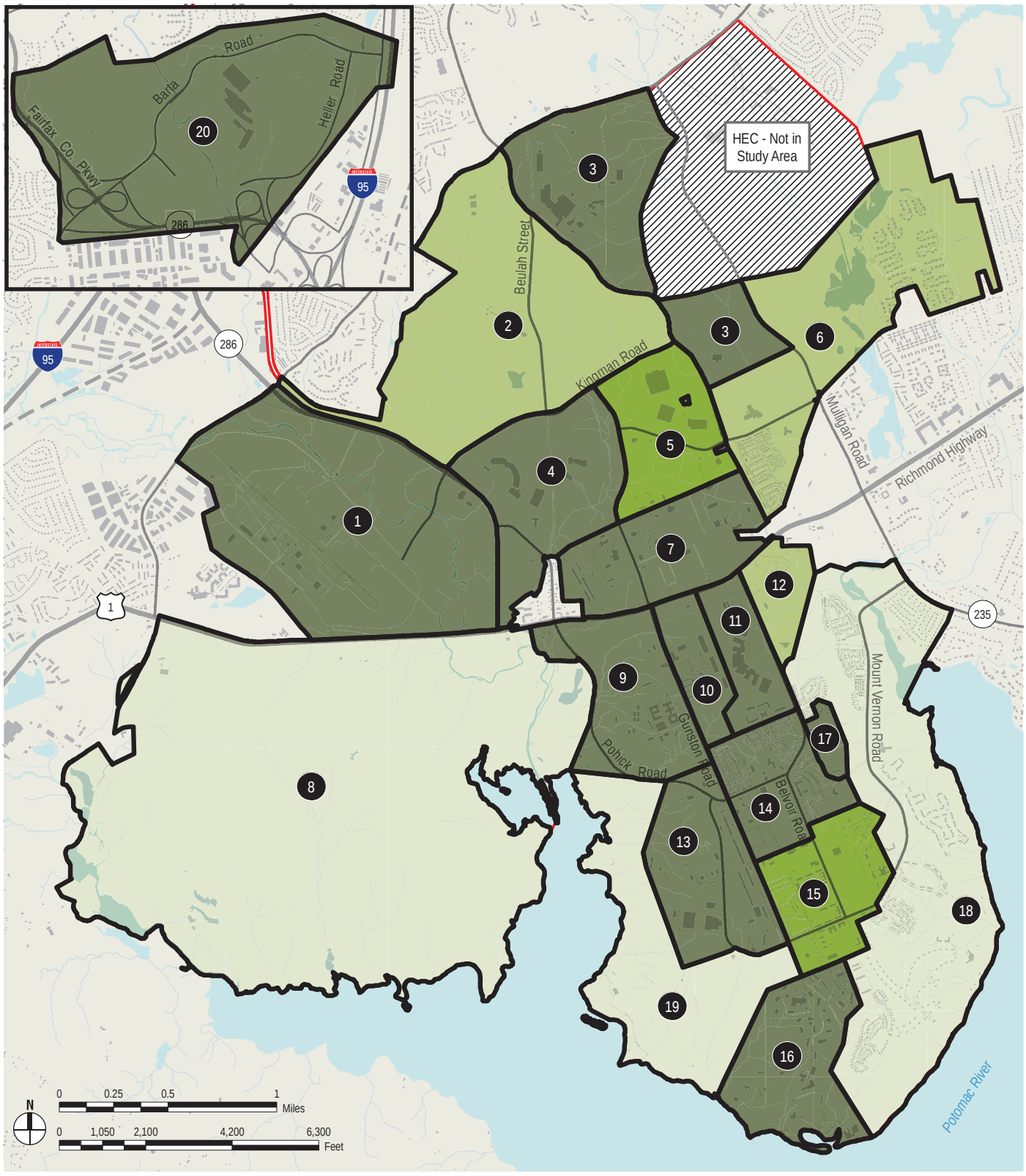
Map ID	District Name	2012 Personnel	Percent (%) Planned Capacity	2017 Personnel Increase	2017 Personnel Total	Percent (%) Planned Capacity	2030 Personnel Increase	2030 Personnel Total	Percent (%) Planned Capacity	2040+ Personnel Increase	2040+ Personnel Total	Percent (%) Planned Capacity
1	Davison Army Airfield	1,395	74%	+200	1,595	84%	0	1,595	84%	+295	1,890	100%
2	Golf/Course National Museum of the U.S. Army	0	0%	+90	90	100%	0	90	100%	0	90	100%
3	Intelligence	2,353	53%	0	2,353	53%	0	2,353	53%	2,047	4,400	100%
4	Defense Logistics Agency/Intelligence Command	6,837	70%	+2,011	8,848	90%	+476	9,324	95%	+476	9,800	100%
5	North Post Community Support	643	59%	+350	993	91%	+100	1,093	100%	0	1,093	100%
6	North Residential	215	74%	+75	290	100%	0	290	100%	0	290	100%
7	Lower North Post	2,579	48%	+315	2,894	54%	+1,200	4,094	76%	+1,276	5,370	100%
8	Southwest	2	100%	0	2	100%	0	2	100%	0	2	100%
9	1400 Area West	817	11%	0	817	11%	0	817	11%	6,767	7,584	100%
10	1400 Area East	3,039	46%	+300	3,339	51%	+1,330	4,669	71%	+1,903	6,572	100%
11	Medical	4,162	87%	+275	4,437	92%	0	4,437	92%	+363	4,800	100%
12	South Post Community Support	97	72%	+38	135	100%	0	135	100%	0	135	100%
13	Industrial	1,105	46%	+480	1,585	66%	+100	1,685	70%	+726	2,411	100%
14	Town Center	507	15%	+12	519	16%	+400	919	28%	+2,366	3,285	100%
15	Historic Core	3,327	91%	+25	3,352	92%	+300	3,652	100%	0	3,652	100%
16	300 Area	2,818	91%	+94	2,912	94%	+94	3,006	97%	+94	3,100	100%
17	Administrative Campus	269	6%	0	269	6%	+1,100	1,369	29%	+3,672	4,741	100%
18	Community Activities	58	100%	0	58	100%	0	58	100%	0	58	100%
19	Recreation	22	100%	0	22	100%	0	22	100%	0	22	100%
20	Fort Belvoir North Area	8,628	40%	+81	8,709	41%	+7,500	16,209	75%	+5,500	21,709	100%
-	Unassigned***	508	-	+409	917	-	0	917	-	0	917	-
	Total	39,381	48%	+4,755	44,136	54%	+12,600	56,736*	69%	+25,185	81,921	100%**

**Note: The difference between the FY 2030 totals shown in this table and NEPA option two found in Appendix D is +570 personnel. This assumes additional personnel will be added to DLA and the 300 Area within existing buildings or a separate NEPA action will follow if new construction is proposed.*

***Note: 100% planned capacity equates to development that is at or near capacity for the land and shall be considered approximate by +/- 2%.*

****Note: Unassigned personnel are those employees that are reflected in the current Army Stationing Plans, but whose building locations on the Post have not been confirmed.*

Figure 4.10 - Projected Land Capacity Analysis Plan



**Note: 100% planned capacity equates to development that is at or near capacity for the land and shall be considered approximate by +/- 2%.

Sustainability and Healthy Community Planning

The latest master planning guidance, UFC 2-100-01, has a strong focus on sustainability and healthy communities planning.

Sustainable planning leads to development that meets present mission requirements without compromising the ability of future generations to meet their needs. It makes the most effective use of limited resources. It creates compact communities that still meet security and safety requirements.

Healthy community planning recognizes that physical activity is critically important for the health and well being of people of all ages.

Fort Belvoir's master plan fully reflects the intent of these strategies. Table 4.9 lists the UFC 2-100-01 strategies and how the master plan features meet their intent.

Table 4.9 - Sustainability and Healthy Community Planning Strategies Matrix

Sustainability Planning Strategies	Master Plan Features
Compact Development	Planning initiatives such as focusing developed to specific areas, redeveloping existing parcels, multi-story construction, and replacing surface parking with structured parking, the framework plan allows for a 76% increase in population while only increasing the impervious surface by 2%.
Infill Development	The framework plan identifies parcels where strategic infilling and expansion of facilities can occur.
Transit-Oriented Development	The framework plan has a comprehensive multimodal circulation strategy, including the preservation of a historic rail line as potential use as a transit corridor. This would connect to the regional transit system.
Horizontal Mixed-Use	The framework promotes and encourages horizontal mixed-use. The assigned land uses for each parcel merely represented the predominant land use. The land use matrix chart included in Chapter 3 indicates the range of uses allowed within each land use category.
Vertical Mixed-Use	The framework promotes and encourages vertical mixed-use. Fort Belvoir was the first Army installation to have a town center that included housing above retail.
Connected Transportation Networks	The framework plan has a comprehensive multimodal circulation strategy that integrates with the overall transportation strategy. The plan integrates POVs, transit, bikers and pedestrians into a comprehensive network.
Sustainable Landscape Elements	The IPS promotes and directs the use of landscape to improve the physical and psychological wellbeing of those living and working on the installation, contribute to the preservation and restoration of natural resources on Post such as wildlife habitats, and increasing sustainability of developments.
Low Impact Development and Stormwater Management	The framework plan has considered and provided space within development parcels to accommodate sustainable stormwater management principles.
Multi-Story Construction	Building heights are dictated in the Installation Planning Standards (IPS). Overall they range from 2 to 8 stories. The heights are dictated by desired character, existing context, transit potential, airfield safety clearances and cultural viewsheds.
Building Orientation and Configuration	This strategy competes with the desire to align buildings within the existing street grid. Where possible in relation to the grid, building placement will consider solar orientation.
Energy Conservation	The framework plan has allocated space where alternative energy is feasible to implement, such as the geothermal field that will be associated with the Museum development. More information can be found in Chapter 5 under "Implementing Energy Reduction Goals."
Water Conservation	The IPS directs the use of landscape designs that utilize drought tolerant species and minimize large expanses of turfgrass, or leave grass unmown to create meadows in infrequently used areas. If exterior water features are desired, implement stormwater or grey-water reuse systems utilizing cisterns to eliminate the need for continuous potable water supply.
Waste Management	The framework incorporated building condition assessments in deciding where to direct parcel redevelopment.
Facility Utilization and Building Reuse	The framework plan is flexible and can accommodate the reuse of existing facilities, which would be determined through more detailed assessments and planning.
Lifecycle Planning	The framework directs development into a more dense clusters that can capitalize the use of existing and future infrastructure.
Flood Protection	The framework directs no new development into floodplains and it provides opportunities to relocate facilities that are currently within the floodplain.
Healthy Community Planning Strategies	Master Plan Features
Planning for Walking, Running and Biking	The framework plan has a comprehensive open space plan and multimodal circulation strategy. These plans provided a comprehensive network of trails, sidewalks and on-street bicycle lanes.
Community Gardens	The framework plan incorporated the existing community gardens and provided space for expansion of the program to other areas.

Infrastructure Plans

5

Construction of Mulligan Road, Fort Belvoir

Installation of the underground detention system along Pohick Road.

Overview

This chapter presents the major infrastructure improvements that will be needed to support the programmed near-term projects, long-term projects and areas where potential future growth can occur. The proposed improvements consider existing infrastructure conditions that are described in Chapter 2 (Site Assessment), and future growth areas as described in Chapter 4 (Framework Plan). The infrastructure plans are intended to guide phasing for future development, project siting locations, open spaces and circulation networks based on the employee population projections described in the Land Capacity Analysis section of Chapter 4. Elements of the infrastructure plans (e.g., future roads, open space corridors) are incorporated into the Regulating Plans in Chapter 2 of the *Installation Planning Standards*. This Chapter identifies the types of infrastructure improvements needed to ensure that land is reserved for improvements such as roadway widening, transit stations, stormwater management, and utility upgrades.

Transportation Assessment

Fort Belvoir is located amid a rapidly growing suburban area with a heavily congested regional transportation system. Moving personnel on and off the Post every day will be challenging in upcoming years, with increased congestion and occasional back-ups anticipated. Both local and state government agencies recognize the extensive roadway improvements needed and have identified these in their Comprehensive Plans. Off-site regional transportation improvements within the I-95 and Route 1 corridors and key locations surrounding Fort Belvoir are essential to supporting future capacity demands. These issues are discussed in greater detail in the *Transportation Management Plan* (TMP).

The transportation improvements described in this chapter are based on traffic assessments prepared as part of the Fort Belvoir TMP. The TMP addresses the current deficiencies of the on-Post transportation system and identifies potential improvements. The TMP strategies include both near- and long-term initiatives, given the existing and known future conditions. The Near-term (2017) and Long-term (2030) plans provide qualitative

guidance and recommendations for new facilities and measures based on: population projects; type and location of uses (land/building); and previous traffic studies.

The RPMP transportation goals are to:

- Improve traffic circulation and wayfinding.
- Develop a "grid" system of roadways to distribute traffic.
- Improve connections between North and South Post.
- Improve connectivity with regional transportation systems.
- Balance roadway improvements to provide a pedestrian-friendly Installation that supports multimodal travel choices (no roadways on Post shall be more than four travel lanes).
- Accommodate Army and DoD security requirements.
- Actively plan and promote alternate modes of transportation.
- Guide projected growth and denser development around transit opportunities.
- Create convenient access to transit.
- Enhance public bus and/or private shuttle connections between office campuses, hospital area, the Town Center, PX/Commissary, activity nodes, parking facilities, and regional transit hubs.
- Support state/local plan guidance for off-Post roadway transit improvements.

Transportation Management Plan

Fort Belvoir is committed to reducing single occupancy vehicle (SOV) travel during peak hours to minimize roadway congestion impacts as a result of future population growth. In accordance with both Army and NCPC guidance, an Installation-wide TMP, submitted separately as part of the RPMP, identifies travel demand management strategies that will influence employee travel behavior and mode choice of employees, thereby reducing the overall number of SOV trips. The TMP provides a framework that will continue to evolve and improve as more transit options and management programs are put into place over the long term.

The primary goal is reducing SOV trips 10 percent by 2017 (75 percent SOV) and 25 percent by 2030 (60 percent SOV) through numerous initiatives and programs. Fort Belvoir established a full-time Transportation Demand Coordinator (TDM) in 2010, who oversees the development and implementation of these initiatives. Some of these recent and/or ongoing efforts include:

Updating Parking Policies:

- Limiting new administrative projects to 60 percent parking.
- Justifying the need for new parking, conducting a Parking Demand Analysis for new projects by analyzing parking availability versus parking needs.
- Completing a Parking Demand Analysis within a 2,000-foot "walkable" radius within the Lower North Post and 1400 Area.
- Completing an updated parking inventory of the entire Installation for use in assessing parking demands within sub-areas.

Engaging Tenant Agencies:

- Requiring agency-level TMPs for any new or additional increase of more than 100 personnel.
- Requiring all existing and incoming mission partners to designate an agency TDM Point of Contact, who will coordinate with and participate in Installation-level TDM efforts, and track agency mode splits.
- Specific guidance on the establishment of Employment Transportation Coordinators (ETC) for agencies with 100 personnel or greater can be found in the TMP, See Strategy AC-1 in Section 7.

Improving Transit Service:

- Coordinating with Fairfax County Connector and Richmond Highway Express (REX) to increase/ adjust public bus route service in and around the Post.
- Expanding private commuter bus service between Fort Belvoir and Fredericksburg/Stafford area.
- Implementing the "Trusted Traveler" Pass Program to allow commercial commuter transportation companies carrying Fort Belvoir personnel to enter the Installation via the "decal-only" lanes at Tulley Gate and Kingman Gate.

Implementing Policy Initiatives:

- Working with Senior Army Leadership on Alternate Work Schedules and Telework Policies (November 2010).

Conducting Information Outreach:

- Hosting monthly TDM Working Group meetings to discuss opportunities to reduce the number of SOV trips through the ACPs and to increase opportunities to utilize alternate work schedules and teleworking.
- Maintaining Fort Belvoir's Transportation Management website (www.belvoir.army.mil/rideshare).
- Hosting an annual Commuter Fair to educate and encourage alternate transportation.
- Recommending that employees and employers take advantage of services provided by Fairfax County Department of Transportation

Conducting Surveys

- Developing standardized "data call" sheets to collect employee travel and work schedule characteristics.
- Conducting frequent Installation-wide transportation surveys.

Parking Management

Parking management is the key to achieving SOV trip reduction goals. According to the NCPC Comprehensive Plan Transportation Element, "an available parking space at the work site is perhaps the most important factor in an employee's decision of commuting mode." Cost, availability, and location of parking will greatly influence mode choice.

As required by the Army technical manual, administrative uses is allotted parking for 60 percent of personnel (parking ratio of 1 parking space to 1.67 employees). This exceeds NCPC's guidance of 1 space for every 1.5 employees (approximately 67 percent of personnel). To meet the parking ratio of 1:1.67, more viable options for alternative commuting practices must become available. The one exception to the 60 percent parking ratio is the areas on-Post that would have direct access to an HOV ramp; in this case, parking is reduced to 50 percent (1 space to 2 employees) per NCPC guidance. The 50 percent parking will apply for the remaining future development on FBNA with the completion of the HOV/Express ramp onto the I-95 Express Lanes.

In the near-term, SOV trip reductions will be accomplished by a gradual removal of available parking. This will be achieved through strategic redevelopment that will displace existing parking, and only replace an appropriate number of parking to meet the Army's 1:1.67 parking ratio.

Parking demand analysis identified surplus parking areas and explored opportunities to share parking between facilities. Further reduction of SOV parking can be incentivised by dedicated parking spaces for rideshare.

Trails, Walkways, and Bikeways

It is hoped that future development can serve as a catalyst in bolstering the existing network of trails, walkways, and bikeways, and expand their reach and capacity. Furthering the efforts to link with off-Post trails such as the Potomac Heritage National Scenic Trail will only improve the means of promoting alternative transportation. The recent BRAC improvements that added walkways and on-street bikeways along Pohick Road, Gunston Road and Belvoir Road are examples of the Army's commitment to pedestrian circulation. This effort will only continue using Sustainment, Restoration, and Maintenance (SRM) and MILCON funding.

Transit

Rail/Shuttles/Bus

Fort Belvoir needs to be connected to the regional bus and rail systems in order to make transit travel viable for its personnel. This involves connections to the Lorton VRE Station, Franconia-Springfield Transit Center, regional Metrorail system, and access to bus providers.

In the near-term, regional connectivity can be achieved with express bus routes between the rail stations and Fort Belvoir. Bus routes shall be supplemented by an on-Post circulation system that links the main activity centers on North and South Posts. Overall, the program must account for increased frequency, and abundance of stops for convenience and ease of use. Figure 2.37 shows the routes and stops and connections to external destinations.

In the long term, transit center hub(s) must be developed to enable efficient transfers between services and provide real-time transit information. The premier example of this is the conversion of the existing rail right-of-way into a transit corridor that links Main Post to Franconia-Springfield.

Regional Transit Hubs

Park-and-ride lots are located throughout Fairfax and Prince William Counties and serve as hubs to bus, HOV service, and ridesharing. As Fort Belvoir becomes a high density employment center, it too needs to have efficient connections to these lots for direct service into the Post. Three locations are identified, and include:

- **Pence Gate Transit Hub.** Located on Belvoir Road proximal to Pence Gate and the hospital, this hub can be a location for park-and-ride facilities, rideshare connections, and a bus transfer station. This location and concept is aligned with local government transit planning efforts: the Fairfax County Transit Development Plan recommends the addition of an "enhanced bus stop" at Pence Gate that supports

transfers from public bus service to a Fort Belvoir internal shuttle. A full public bus transit center is not viable at this location due to land constraints.

- **Route 1 Transit Hub.** Located directly off of Route 1 east of Fairfax County Parkway and Pohick Road, this hub can be a location for park-and-ride facilities and rideshare connections. In the long-term, this location can potentially be served by public transit via a light rail line or rapid bus service as recommended in the transportation section of Fairfax County's Comprehensive Plan.
- **Fairfax County Parkway Transit Hub**. The Saratoga Park and Ride lot is located at the Fairfax County Parkway and Barta Road interchange at FBNA. Express service to the Pentagon and Tysons Corner, and local service to the Franconia-Springfield Metro Station are now operating from this hub.

Security Considerations

Provisions must be made for security and anti-terrorism features in the development, selection, and design of transit options, especially related to vehicle and personnel screening that are entering Fort Belvoir. These must be developed in conjunction with transit service providers and the Installation as additional options for transit are developed.

Transportation Improvements

Transportation improvements will generally affect Access Control Points (ACPs), road alignments/widening, and intersection reconfiguration. While specific details on these improvements will be determined by the individual projects' designers, this document discusses recommendations based on the following:

- Qualitative assessment of population projections (as presented in the previous section: Workforce Projections).
- Type and location of uses (land/building).
- Previous traffic studies (Fort Belvoir Comprehensive Traffic Engineering Study; Military Surface Deployment and Distribution Command (MSDDC TEA) Transportation Engineering Agency; Gannett Fleming; October 2010) (MSDDC Study).

The recommendations are shown as near-term (2017) and long-term (2030) improvements, and presented on Figure 5.1: Recommended Transportation Improvements.

Access Control Point Improvements

In the near-term, the existing ACPs have the capacity to accommodate the projected population growth with the pending completion of a reconfigured Lieber Gate. When completed, the Lieber Gate will provide direct access from Route 1 onto North Post – a connection that is not currently provided. The facility will be fully compliant with current DoD and force protection criteria, and will relieve traffic congestion along Gunston Road.

In the long-term, Kingman Gate will need to be fully reconfigured as part of the larger Kingman Road/Fairfax County Parkway/Museum access improvements (see the following section on Roadway Improvements).

Congestion at Main Post gates can be reduced by implementing the use of Automated Installation Entry (AIE) systems. This will increase the efficiency of processing vehicles, thereby increasing the capacity of each inspection lane. AIE is part of an Army-wide effort. The AIE system began testing and phase-in at Tulley Gate on 1 March 2014. Assessments reports that have been conducted have made the following recommendations in addition to including AIE:

- Telegraph Road Gate: Expand the ACP entry from two lanes to three lanes
- Kingman Gate: Expand the ACP entry from two lanes to three lanes
- Walker Gate: Expand the ACP entry from one lane to two lanes

Security Considerations

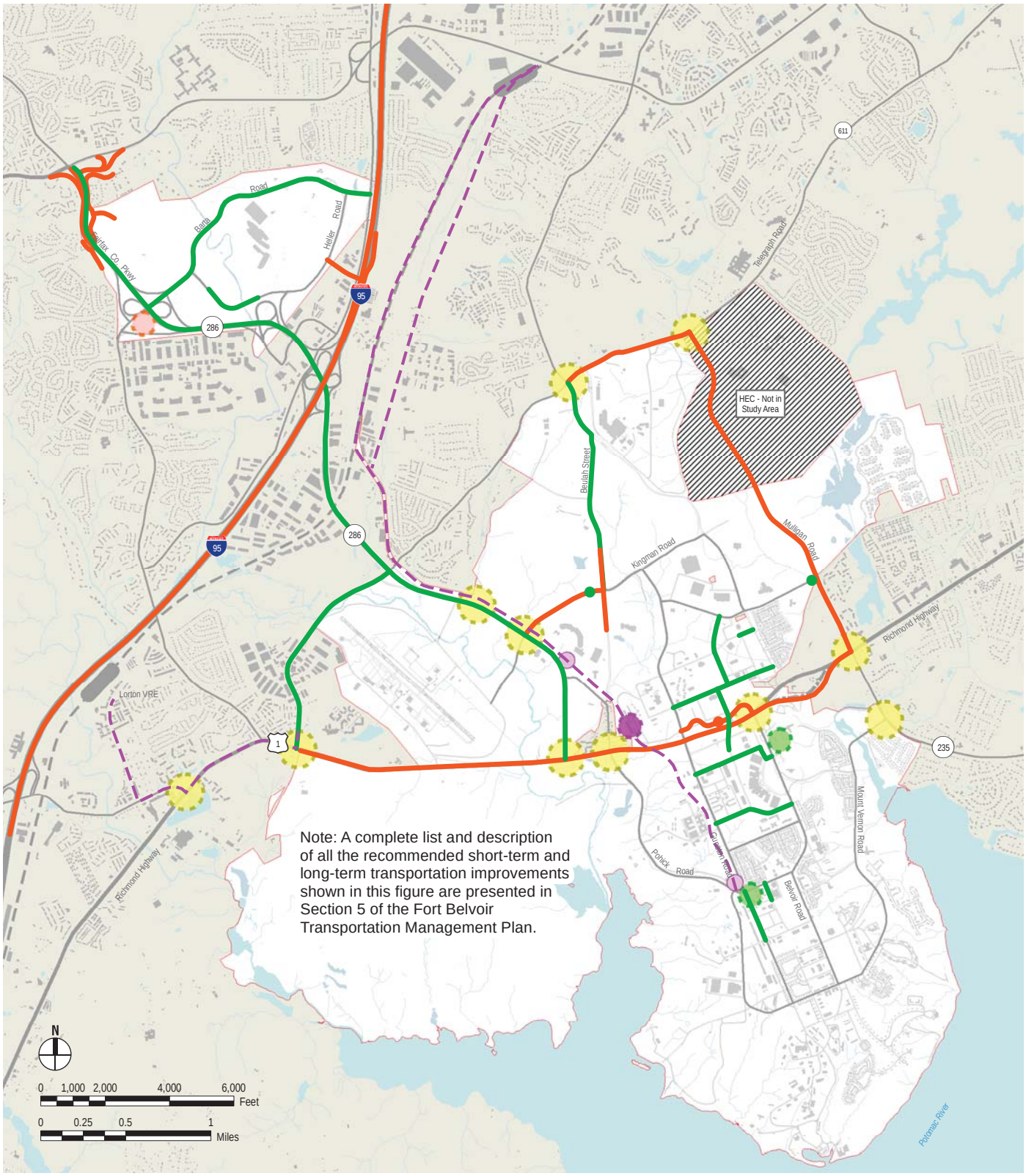
As the Installation continues to grow and expand, and technology continues to advance, system upgrades to AT/FP measures will be required. Means to employ the latest security capabilities to move efficiently and reduce vehicle and personnel screening times and queues through gates will be necessary.

Other Considerations

Equipment and materials delivered to the Post require screening and inspection, as do the delivery and transfer trucks. Some mail and packages are delivered by agents, such as Federal Express, directly to the mission partner/user without screening. Though not currently programmed as part of any future project, consideration shall be given to additional inspection facilities.

Currently, deliveries are inspected at Tulley Gate. Although inspection activities can be conducted in the same area as commuter traffic, it is best to conduct screening in a separate designated area. The need to expand the

Figure 5.1 - Recommended Transportation Improvements



current inspection facilities is anticipated, with Tulley Gate becoming the primary Remote Inspection Facility (RIF) serving the Main Post. There are some advantages in establishing two RIFs – one for the South Main Post and one for the North Main Post. A determination of whether one or two facilities will be required shall be based on an estimate of the number of delivery vehicles expected in the short and long term, as well as the threat estimate and individual mission partner needs on both geographical sides of the Post. An additional level of security that may be appropriate for some organizations and mission partners on the Post can be achieved by the use of a Remote Delivery Facility (RDF). The RDF concept was implemented at the Pentagon after the terrorist attacks on 11 September 2001. At an RDF, materials are off-loaded from the delivery vehicle to be more thoroughly screened. Delivery to the final destination within the Post will be made by a secure government owned vehicle.

Installation Roadway Improvements

The short- and long-term programmed improvements to the Installation roadway network are described below and presented in two categories:

- On-Post improvements which describe improvements that are wholly internal to the Installation boundary; and connections to the regional roadway network, which describe improvements that are located along the Installation boundary, therefore involving both access roads to the Installation and regional roadways.
- Regional programmed improvements that are wholly external to the Installation (i.e., that are initiatives of regional, state, and local agencies) are described in Section 2: Regional Transportation Plans (includes both table and map of improvements). Fort Belvoir supports these improvements that will enhance the mobility of travelers throughout northern Virginia and the region, including reserving Installation right-of-way for the Route 1 widening (on Main Post) and the future Fairfax County Parkway intersection and ramp improvements (on FBNA). The recent completion and opening of the Fairfax County Parkway has significantly reduced the travel time and increased accessibility between Fort Belvoir and points west in Fairfax County.

On-Post Improvements (Short- and Long-Term)

In the short term, the existing roadway network has the capacity to support the projected population increases, with the following improvements:

- **Mulligan Road** will address the movement between Telegraph Road and Route 1, which was made more circuitous when local traffic was barred from using Beulah Street after 11 September 2001. Traffic volume is expected to decrease on the Fairfax County Parkway.
- **Telegraph Road** will be widened to four lanes from Mulligan Road to Beulah Road. This is a proffered improvement associated with the Hilltop Shopping Center.
- **Lieber Gate Access Road** will complete the four-leg intersection of Route 1 and Belvoir Road and provide access between Route 1 and Gunston Road. Lieber Gate improves connectivity between the North and South Posts.

Additional improvements will be ongoing and provided as new projects come on-line. These types of site-specific projects will include new signals, signal timing improvements, and minor intersection and/or site access turn lane improvements. Major long-term improvements to the roadway network within Fort Belvoir are identified as the following:

- Improvements to Heller Road on Belvoir North
- Improvements to Kingman Road and Fairfax County intersection and ACP
- Improvements to Goethels Road between Belvoir Road and Gunston Road
- Completion of 3rd Street between Belvoir Road and Gunston Road
- Completion of 6th Street between Belvoir Road and Gunston Road
- Improvements to Gunston Road south of 12th Street
- New overpass and roadway extending Belvoir Road to Kingman Road near Pence Gate

Connections to Regional Network (Short- and Long-Term)

As the Installation grows, the connections from the Installation to the regional roadway network will be of primary importance; improvements to one or all of these intersections will be necessary to minimize the impact to traffic operations both on the regional roadways or the Installation roadways. These improvements will significantly reduce the delays on the major roadways that bisect the Post; as such, these improvements will require partnership and coordination with regional stakeholders including Fairfax County and/or VDOT. These intersection improvements are located at Belvoir Road at Route 1; Route 1 at the Fairfax County Parkway; and Fairfax County Parkway at Kingman Gate and described in further detail in Section 5 of the TMP.

Other Future Considerations

Though not currently programmed, as the Installation grows past its projected 2030 population, the following will need to be considered:

- Improve connection of Pohick Road and Fairfax County Parkway with Route 1. Possibilities include:
  - Realignment between Pohick Road beyond Tulley Gate to intersect directly with Fairfax County Parkway.
  - A grade-separated interchange(s) at Fairfax County Parkway and Route 1, Pohick Road and Route 1, and Belvoir Road and Route 1.
- Increased accessibility and capacity to North Post. Possibilities include:
  - Extension of Kingman Road to intersection with Mulligan Road will require a new ACP at this location to monitor access.

A complete list of all the recommended short-term and long-term transportation improvements are presented in Section 5 of the Fort Belvoir Transportation Management Plan.

Utility Assessment

As described in **Chapter 2** (Utility Systems), major utilities at Fort Belvoir have been privatized in the past several years. These private utility companies are now responsible for operations, maintenance, and capital improvement plans to the systems. This section reflects interviews and input from Fort Belvoir staff and privatized utility providers to assess the capacity of domestic water, wastewater, storm drainage and stormwater management to determine future demands.

Population Projections for Analysis

As a result of BRAC, major infrastructure upgrades throughout the Post were completed in 2011. The Installation infrastructure has the capacity to accommodate additional growth as anticipated in the Master Plan to the year 2017. However, any large, stand-alone projects that are not currently programmed (for example, another DLA- or NGA-type facility at FBNA of 5,000 or more personnel) will likely require major infrastructure improvements. A combination of smaller projects in one area can also cause similar impacts on infrastructure. The Installation needs to track current demands and projected growth on a regularly updated five-to-seven year look-ahead, and coordinate regularly with American Water, Dominion Virginia Power, and Washington Gas to ensure that required infrastructure improvements can be funded and constructed as needed. The Installation shall also maintain regular contact with local utility providers (Fairfax Water, Fairfax County Department of Public Works Environmental Services, Wastewater Management Division (DPWES-WMD), Washington Gas, and Dominion Virginia Power) to ensure that contractual capacities and infrastructure to be provided by these privatized systems will be available as needed.

The post-BRAC workforce population at Fort Belvoir is approximately 39,300 (30,700 at Main Post and 8,600 at FBNA). Population is expected to grow to approximately 44,100 by 2017 (35,400 at Main Post and 8,700 at FBNA). Anticipated population in 2030 is 56,700 (40,500 at Main Post and 16,200 at FBNA).

Existing and Projected Utility Demands

Sanitary Sewer

Sewer service to Fort Belvoir Main Post is provided under an existing contract with the Fairfax County DPWES-WMD which allows the Installation to discharge up to an average flow of 3.0 MGD and a peak flow of 6.0 MGD. This contract does not include flows from FBNA.

The current actual (2012) average sewage flow is approximately 1.4 MGD (average daily flow) and peak flows are approximately 1.9 MGD. These flows account for the entire Installation population, not just employee/workforce populations reflected in Table 5.1. Average employee/workforce flows are projected at approximately 1.4 MGD in 2017; 1.7 MGD in 2030; and 2.5 MGD in 2040+.

Water

Water service to Fort Belvoir Main Post is provided under an existing contract with Fairfax Water with a contracted limit of 4.6 MGD peak flow. The current (2012) actual water demand is 2.3 MGD, with the peak at 3.5 MGD. This average water demand accounts for the entire Fort Belvoir population, not just the employee/workforce population. Average water demand for the employee/workforce population is projected at approximately 2.2 MGD in 2017, 2.8 MGD in 2030; and 4.1 MGD in 2040+.

The Installation needs to track future water and sewer demands and continue to monitor average and peak usage; when usage approaches the contract amount, the Installation shall begin discussions with Fairfax Water and Fairfax County Sewer to increase the contracted amount. It is recommended that a 5 to 7 year look ahead of the future demands from new projects are tracked to fund and construct necessary infrastructure improvements to support the new projects.

Table 5.1 - Existing and Projected Water and Sewer						
	Population		**Water**		**Sewer**	
Year - Location	Added PN	Total PN	Average (MGD)	Peak (MGD)	Average (MGD)	Peak (MGD)
2012 - FBNA	0	8,628	.2	.4	.2	.4
2012 - Main Post	0	30,753	2.1	3.1	1.2	1.5
2012 - Total Demand	**0**	**39,381**	**2.3**	**3.5**	**1.4**	**1.9**
2017 - FBNA	+81	8,709	.4	.7	.3	.5
2017 - Main Post	+4,674	35,427	1.8	2.8	1.1	2.2
2017 - Total Projected Demand	**+4,755**	**44,136**	**2.2**	**3.5**	**1.4**	**2.7**
2030 - FBNA	+7,500	16,209	.8	1.3	.5	1.0
2030 - Main Post	+5,100	40,527	2.0	3.2	1.2	2.4
2030 - Total Projected Demand	**+12,600**	**56,736**	**2.8**	**4.5**	**1.7**	**3.4**

Notes: 1. Average sewer flow at 30 GPD/PN, assuming peak flow at 2 x average.
2. Average water demand per UFC criteria for office is 50 GPD, assuming peak water demand at 1.6 x average (40 GPD/PN per FCWA criteria).

Table 5.1 is intended to provide a general overview of the project utility demands associated with the increased workforce populations described in the land capacity analysis described in Chapter 4. Fort Belvoir DPW is responsible for monitoring the current utility agreements as new projects come on board, and to engage local government agencies and private utility providers when additional capacity is needed.

Energy

Table 5.2 provides a projected overview of future energy use for the Main Post based on 2017 and 2030 projects.

The 2011 Comprehensive Energy and Water Management Plan (CEWMP) establishes a long-range energy and water vision for the Installation to meet or exceed the current federal mandates for energy and water use. Since FY 2003, Fort Belvoir has reduced the annual energy consumption intensity of DoD-owned facilities by 10.8 percent, from 115.3 million British thermal units per thousand square feet (MBtu/kSF) in FY 2003 to 102.8 MBtu/kSF in 2012. This reduction did not meet the EO 13423 requirement for a 21 percent reduction by FY 2012. The realized 10.8 percent decrease was due largely to reducing the thermal portion of the energy consumed. While thermal energy consumption intensity decreased by 41.2 percent between FY 2003 and 2012, electricity consumption intensity increased by 24.2 percent during the same period.

Table 5.2 - Existing and Projected Annual Energy Use - Main Post				
	U/M	**2012**	**2017**	**2030**
Annual Building Area	kSF	11,784	15,238	16,144
Consumption				
Electricity	MBtu	783,102	1,012,607	1,072,815
Natural Gas	MBtu	428,147	553,625	586,542
Propane	MBtu	0	0	0
Heating Oil (Petroleum FSD)	MBtu	210	272	288
TOTAL	**MBtu**	**1,211,459**	**1,566,503**	**1,659,645**

Source: Fort Belvoir Directorate of Public Works and the 2014 EIS for Short-Term project and Real Property Master Plan Update
1. MBtu stands for million British thermal units

The Installation's increase in electricity consumption intensity is due to the recent construction and operation of increasingly energy-intensive buildings, such as those supporting research, development, and intelligence missions. The average Main Post energy use between 2003 and 2012 (electricity and thermal combined) was approximately 117 MBtu/kSF, while a typical government office building in the U.S. consumes approximately 109.6 MBtu/kSF (U.S. Department of Energy, September 2010). The Main Post's higher-than-average energy consumption intensity compared to the national average could be reflective of energy-intensive data processing and storage uses.

Computer servers have become increasingly more energy efficient in recent years. While computer and data processing facilities have expanded at Main Post, it is likely that the use of increasingly efficient server technology has kept energy consumption from increasing too rapidly. An additional contributing factor to the Main Post's higher-than-average energy consumption is that the square footage of every facility has not been registered into the energy tracking system, while energy consumption has been registered and reported, reflecting the energy use

that appears higher than the actual energy consumption per square foot. A growth of data center and cybersecurity operations from 2004 through 2007 without a sizable increase in building square footage likely contributed to the reported increase in energy consumption.

Despite the uncertainties of relating energy use and building square footage, the overall energy trends projected in Table 5.2 are assumed to be valid for planning purposes.

Implementing Energy Reduction Goals

The Sustainable Design and Development Policy Update on Environmental and Energy Performance (U.S. Army, 2010h) provide guidance for how aspects of the EPAct05, EISA07, EO 13423, and EO 13514 apply to Army facility construction. Achieving these federal mandates and the energy reduction vision described in the CEWMP are carried out on two main levels. These are:

Planning Level

At a large scale, implementing renewable energy projects such as geothermal energy for direct use or electricity generation is largely dependent on subsurface geological conditions of hot water and steam reservoirs. These projects are generally not feasible. Fort Belvoir's region is not well-suited to the continuously high wind speeds required for significant wind power potential; in addition, wind turbines would impact migratory bird routes. Solar photovoltaic technology for converting sunlight into electricity has been too costly to pursue without access to the federal and state tax incentives available for the commercial and residential sector.

However, smaller scale renewable energy systems (i.e., building rooftop solar panels and geothermal systems) may be possible in certain select areas. Additionally, clustered buildings, particularly those with offsetting peak energy demands, could share common heating/cooling systems. This approach would be cost effective and increase energy efficiency throughout the life cycle. Mixed-use buildings and/or new development clustered around common open spaces areas as shown in **Section 4: Framework Plan** and in the regulating plans presented in the IPS support the notion of shared uses in a campus style setting.

Project and Building Level

Energy reduction and sustainability goals to meet federal mandates are achieved largely measured and incorporated at the project or building level. It is during the site development phase when planning and engineering studies begin to incorporate sustainable design and development principles to minimize water consumption and optimize energy efficiency. The Army will incorporate the high performance building requirements of EO 13514 into any facility design. Starting with the FY 2013 military construction program, new buildings and structures, and major renovations shall be built to achieve a minimum silver level through the Leadership in Energy and Environmental Design (LEED) green building rating system, one performance level above LEED-certified and two levels below LEED platinum. Several excellent examples of this energy-efficient building can are found, such as the new Fort Belvoir Community Hospital on the Main Post.

Additional information regarding the Army energy policy, including energy reduction goals, can be found in **Appendix B4 Army Directive 2014-02 Net Zero Installation Policy** (issued 28 January 2014).

Regulating Plans in the Fort Belvoir IPS align with and support energy reduction goals. They include open space areas that could incorporate low impact design features that enhance protection of the streams and watersheds.

FBNA Short-Term (2017) Utility Systems Requirements

Sanitary Sewers

As part of BRAC 2005, a network of new sanitary sewer lines was installed at FBNA that connects to the Fairfax County trunk sewer that runs along Accotink Creek. These lines have been located and sized to serve potential additional development on FBNA. The Fairfax County trunk sewer varies in diameter from 42 to 54 inches. Fairfax County DPWES-WMD staff indicate that this existing trunk sewer and the existing County wastewater treatment plant both have adequate capacity to serve the potential additional development at FBNA. Sewer service to FBNA was previously metered, but (according to Installation staff) these meters were pulled prior to construction of the NGA complex. The Installation is negotiating a new contract with the Fairfax County DPWES-WMD for sewer service to FBNA.

Water Distribution

As part of BRAC 2005, a water distribution network was installed that connects to the existing Fairfax Water system on Backlick Road. Fairfax Water indicates that the existing County water system has adequate capacity to serve both existing and anticipated future development at FBNA. Water infrastructure at FBNA includes a distribution system and a new water tank sized for future development at FBNA.

A new water storage tank is proposed at FBNA to provide emergency storage; the tank site will allow construction of two additional tanks if required. Water service to FBNA is metered at the connection to the Fairfax Water system at Backlick Road.

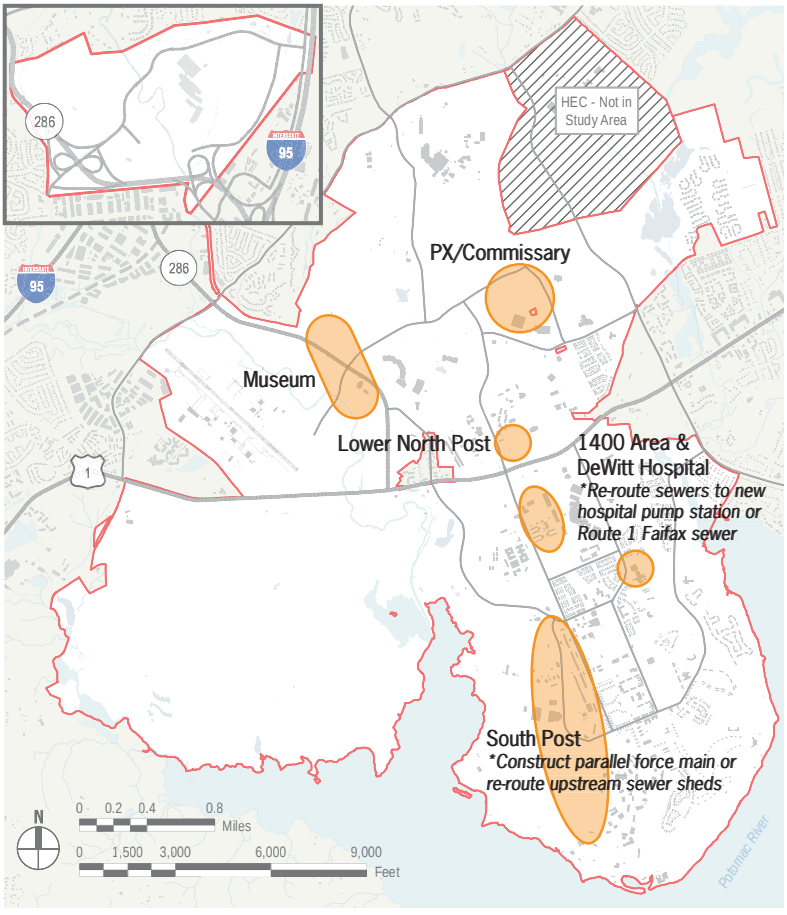
Electric and Natural Gas

Both electric and natural gas service at FBNA are privatized. Dominion Virginia Power (DVP) and Washington Gas provide electric and natural gas service, respectively, to the Installation boundary, as well as distribution and service lines within the Installation. DVP has constructed off-site transmission lines and a new substation to provide permanent electric service. These facilities have capacity for some additional development; however, the anticipated trend for more intensive electrical/energy service demands as described in the CEWMP, are expected to increase with the number of secure campuses that require large data processing facilities to operate. The Installation and DVP shall remain engaged in the planning process for any significant new construction at FBNA. Washington Gas has extended service to FBNA and does not foresee any difficulty in providing service for future development. In summary, utility service providers will be able to support new development at the levels proposed. Depending on the size and location of the project, advance planning is recommended to identify the specific load requirements in order to allow time to construct any new facilities that may be needed.

Stormwater Management

The development at FBNA includes extensive drainage conveyance and stormwater management facilities, providing both quality and quantity control. These facilities convey runoff to the existing on-site channels that eventually drain into Accotink Creek. In general, the types of stormwater management quality and quantity control facilities, including LID measures that were constructed with the NGA project, represent an improved post-development condition from previous uses on the site. Future development on FBNA would deploy similar SWM design measures. For further information on SWM design strategies that apply to all new projects, see the section on Stormwater Management.

Figure 5.2 - Sanitary Sewer Improvements - Short Term (2017)



Installation Boundary
HEC Installation Boundary
Proposed Sanitary Improvement (2017)

Main Post Short-Term (2017) Utility Systems Requirements

Sanitary Sewers

The sewer system was privatized to American Water Military Systems in 2010. American Water (AW) is preparing a Capital Improvement Plan that includes repair and replacement to existing pump stations, and repairs and upgrades to existing sanitary lines. Based on existing conditions and projected sewer demands created by the near-term project, AW has identified several areas of concern (See Figure 5.2):

- American Water has prepared a hydraulic study of the sewer system using limited survey and metering data. From observation, no significant capacity problems exist on Post. Pump Stations 00097 and 00687, serving the southern part of Main Post, sometimes overflow into holding tanks during wet weather events. American Water plans pump replacements at these two facilities and also plans pipe lining which shall reduce infiltration. American Water does not see any major infrastructure problems in the system to support near-term growth. Some pipe surcharging occurs during wet weather events, but there are no overflows.
- Construction of the new Fort Belvoir Community Hospital complex included a rerouting of sanitary lines in the area around the Hospital. This area previously flowed to a trunk line east of Belvoir Road and south to Pump Station 687. It now ties to a new

pump station near the Hospital and then flows north to the Fairfax County sewer line along Route 1. This diversion has relieved capacity issues on the trunk line east of Belvoir Road as well as at Pump Station 687. The Hospital pump station has capacity to serve the Hospital complex. It may also have capacity for additional development in the 1400 Area.

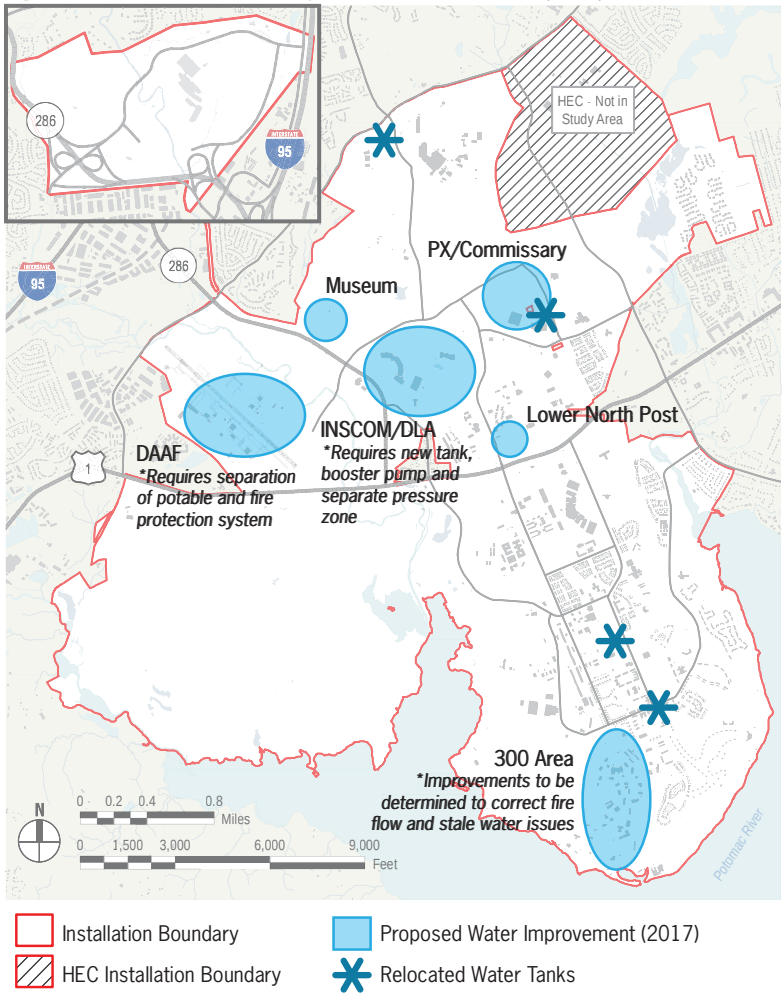
- Future development of the NMUSA and at the DLA complex will need to evaluate the capacity of the 15 inch sewer which runs from DLA southwest toward Davison Field. Based on preliminary studies, this line is at or near capacity.
- The proposed INSCOM expansion shall evaluate the capacity of the existing pump station east of the site and the gravity sewers downstream to insure that adequate capacity exists for the additional population.
- Anticipated development at the PX/Commissary, on Lower North Post, and on South Post will require extension of the sanitary sewer collection system to serve these areas. No capacity problems are expected.

Water Distribution

A water capacity study at Main Post conducted in 2007 analyzed existing conditions and considered requirements to serve growth to the year 2015. The study identified several areas of concern and suggested improvements to the water system. The BRAC infrastructure program and Fort Belvoir Community Hospital included several of the projects required to alleviate these problems. See Figure 5.3.

- The water system was privatized to American Water Military Systems in 2010. American Water is preparing a Capital Improvement Plan that includes repair, replacement, and upgrades of pipes, pumps and tanks.
- American Water has prepared a hydraulic study of the water system. The study indicates that there are no significant capacity or pressure problems on Post. Nearly all areas have pressure of 38 psi or more under peak (non fire flow) conditions. No location on post has pressure below 30 psi. In some areas, buildings higher than three or four floors will require fire pumps to insure adequate fire flows. (Providing system pressures adequate to meet fire flow requirements will typically require pressure reducing valves on domestic services at each building.) There are concerns with inadequate circulation in the 300 Area.
- The infrastructure projects completed in 2011 as a result of BRAC provided upgrades to the existing water system and shall provide adequate pipe capacity for anticipated growth to 2017.
- American Water is evaluating the replacement of several of the existing water tanks and relocating to new locations with higher elevations as shown in Figure 5.3. Placing a new tank near DLA will provide additional storage and pressure near an area of high demand and high fire flow requirements; however, Davison Army Airfield's proximity to DLA will limit the tank height. Providing elevated tanks at new locations or at slightly higher elevations can improve water pressure at DLA.
- The system includes several pressure reducing valves (PRVs) to regulate water pressure between the higher areas on Upper North Post and lower areas farther south. Relocating some of these PRVs can provide improved pressure to several areas.
- Anticipated development at INSCOM, DLA, the Museum, and the Lower North Post will require extension of the water distribution system to serve new facilities and may require the tank and pressure improvements noted above to accommodate the additional demand.
- Development at the PX/Commissary, Lower North Post, and South Post will require extension and/or replacement of the water distribution systems in these areas.

Figure 5.3 - Water Distribution Improvements - Short Term (2017)



Electric

Dominion Virginia Power (DVP) has an extensive network of distribution lines throughout the Post. New projects must provide a load letter to DVP, and DVP determines the extent of improvements to provide service. Each project must fund any required improvements. For most small projects, the costs for service extensions will not be significant. Projects with high loads may require significant infrastructure improvements depending on site location and program requirements.

Natural Gas

Washington Gas has an extensive network of distribution lines covering large parts of the Post. New projects must provide a load letter to Washington Gas to determine the extent of improvements required to provide service. Each project must fund any required improvements. For small projects adjacent to existing gas mains, service can be provided at low or no costs. Projects that require extension of gas mains for a significant distance may incur substantial costs to provide service.

Steam

In 2007, the existing steam plants and distribution system were analyzed to determine their adequacy for current and future needs. The steam system is old, inefficient, and leaky. The Installation is phasing out the steam system and replacing it with gas boilers in individual buildings. There are no plans to expand the steam system. It will be several years before the entire steam system is abandoned. The existing steam lines will be abandoned in place and will not be removed.

Storm Sewer System

The existing Main Post storm sewer system includes 280,241 linear feet (LF) of storm drainage pipe and 597 culvert crossings (representing an additional 32,181 LF of pipe). Pipe diameters range from 6 inches to 54 inches, and vary in material: reinforced concrete, asbestos cement, cast iron, brick, corrugated metal, ductile iron, and polyvinyl chloride (PVC). There are about 501 manholes and 2,140 inlets. In addition, 43 storm basins, primarily dry ponds, exist on Main Post. The storm system drains via a series of piping that discharges to various streams and tributaries, and ultimately, to the Potomac River and its tributaries. Installation staff maintains the system.

Prior to BRAC, the previous development at Main Post occurred without the provision of stormwater management. The increased runoff exceeds the capacity of receiving water courses, resulting in serious erosion of natural channels.

Installation staff have indicated that existing stream erosion is their primary concern associated with the drainage system. A study called “Stormwater Management Guidance” (dated March 2007) was developed to summarize design criteria, provide guidelines for meeting the Fairfax County and VDEQ design criteria, and suggest methods of providing quality and quantity control. While stormwater management regulations have changed since the study was completed, elements of this document continue to be carried forward to guide decision making.

The BRAC projects completed in 2011 (both new buildings and the Infrastructure projects) included extensive drainage conveyance and stormwater management facilities upgrades, providing both quality and quantity control. The infrastructure projects also included several stream restoration projects to remediate stream erosion.

Areas of the Installation with well developed storm drainage systems, adequate inlets, an extensive network of storm sewers, and stormwater management (SWM) facilities, include:

- Tracy Loop and Theote Road-16th Street areas
- New RCI housing areas, such as Vernondale and Herryford Village
- DLA and DTRA complex

Several areas on the Installation have limited inlet and pipe networks and no storm water management facilities:

- The block between 16th and 18th Streets and Gunston and Belvoir Roads. (The 6-8 inch pipes in this area appear to be undersized for the drainage area. Paved areas are relatively flat, but there are very few inlets.)
- The block between 12th and 16th Streets and Gunston and Middleton Roads, in the vicinity of Buildings 1150, 1155, and 1190. (Very little storm drainage exists.)
- East of Gunston Road, between U.S. Route 1 and 9th Street, within the 3rd, 4th, 5th, and 6th Streets vicinity (the 1400 Area). Pipes within this area appear to be undersized for the amount of impervious area associated with full build-out conditions.

Since funding to improve the existing inadequate drainage systems is unlikely, all new development shall include: an adequate storm drainage system (including upgrades to the existing system where runoff is directed from new development), stormwater quality/quantity control, and an analysis of the existing downstream storm system to ensure adequate outfall is available.

Design of all new drainage facilities shall consider the ultimate anticipated development in the surrounding area, including the entire upstream sanitary or storm drainage-shed. New infrastructure shall be designed to serve the ultimate anticipated flow from the upstream area, based on the potential of achieving full build-out as reflected in the district regulating plans.

Drainage facilities at Fort Belvoir are regulated by DoD design criteria and by the Installation's MS-4 stormwater discharge permit, which is issued by the Commonwealth of Virginia's Department of Environmental Quality (VDEQ). The MS-4 permit requires that stormwater management and erosion control be provided in accordance with Fairfax County standards. Note that Fairfax County has no jurisdictional authority over Fort Belvoir; enforcement of the regulations is the responsibility of the Installation staff.

Stormwater Management

Stormwater management strategies for individual projects shall emphasize decentralized infiltration techniques to the maximum extent possible. This will achieve Low Impact Development goals and the requirements of the Energy Independence and Security Act 2007 Section 438. Low impact design techniques are especially appropriate when redeveloping on smaller infill parcels where land may not be able to support a traditional SWM facility and/or the site would not have access to a larger, centralized underground SWM facility that will be designed to serve existing and future projects.

The Installation has proposed one centralized stormwater management facility near Theote Road and 16th Street to serve existing and future development in the area. This proposed regional facility is located within the Accotink Bay sub-watershed (listed as Short-term Project #14, ST 14, in the EIS) and is currently on hold pending environmental remediation. There are no other centralized SWM facilities planned.

There are no other centralized SWM facilities planned. The Installation shall pursue additional funding for SWM facilities which may also include stream restoration, riparian buffer revegetation, and culvert crossing improvements to improve stream stability and in places where there is an inadequate outfall condition, consistent with the goals of the INRMP. In accordance with the MS-4 permit, all new development at Fort Belvoir must meet three specific stormwater management criteria:

- Runoff volume control: To reduce peak runoff of the developed Post to the same level as the pre-developed Post, for both the two-year and ten-year frequency storms.
- Quality control: To reduce pollutants in runoff caused by paved, roofed, and other impervious areas. (This is usually met by detaining the first half-inch of runoff from a site for 48 to 72 hours, which allows solids and other pollutants to settle before runoff is released).
- Adequate outfall: To ensure any new development discharges storm and other surface waters into a natural watercourse or man-made drainage facility, with sufficient capacity to preclude any adverse impacts to the land (over which waters are conveyed) or natural watercourse/facility (into which waters are discharged).

The Fairfax County Public Facilities Manual (Section 6-0203) defines the following requirements for an adequate outfall analysis. The extent of the review of the downstream drainage system shall be:

- To a point that is at least 150 feet (46 m) downstream to a point where the receiving pipe or channel is joined by another that has a drainage area that is at least 90 percent of the size of the first drainage area at the point of confluence; or
- To a point at which the total drainage area is at least 100 times greater than the contributing drainage area of the development site; or
- To a point that is at least 150 feet (45 m) downstream of a point where the drainage area is 360 acres (1.46 km2) or greater.

Additionally, there have been several culvert crossing improvements to install a base flow culvert and a second high flow culvert for storm events to provide stability to the stream system and allow self-maintenance.

Figure 5.4 - Open Space Analysis, 2017 (Short Term)

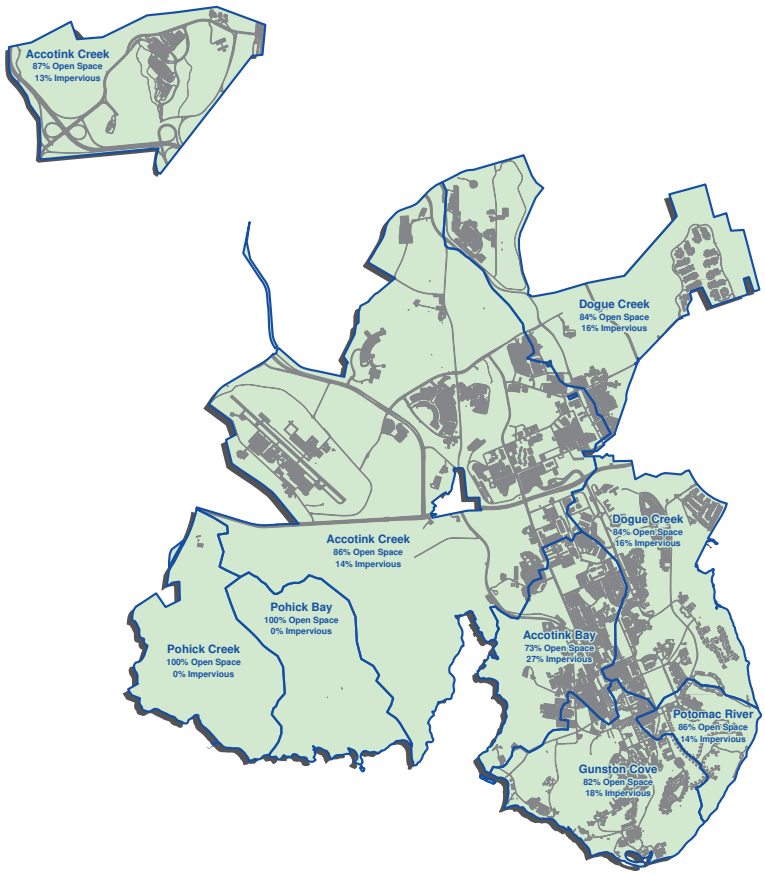


Table 5.3 - Open Space Analysis - Short Term (2017)

	2011 (Post-BRAC)				2017 (Near Term)			
Watersheds	**Open Space (Acres)**		**Impervious (Acres)[2]**		**Open Space (Acres)**		**Impervious (Acres)[2]**	
Accotink Bay	452	74%	156	26%	442	73%	166	27%
Accotink Creek	2,859	88%	392	12%	2,802	86%	449	14%
Accotink Creek - FBNA	702	87%	102	13%	700	87%	104	13%
Dogue Creek	1,507	85%	258	15%	1,489	84%	276	16%
Gunston Cove	559	83%	117	17%	557	82%	119	18%
Pohick Bay	566	100%	0	0%	566	100%	0	0%
Pohick Creek	635	100%	1	0%	635	100%	1	0%
Potomac River	203	88%	34	14%	203	86%	34	14%
Total	**7,484**	**88%**	**1,059**	**12%**	**7,394**	**87%**	**1,149**	**13%**

Notes: 1. Percentages shown in tables reflect estimates of future project footprints; therefore, impervious areas may vary by approximately 3%.
2. Impervious area does not include paved trails and sidewalks.

Impervious = Airfield Surfaces, Buildings, Parking Lots, Bridges, Driveways and Roads
Open Space = Everything Else

Locations for stormwater management facilities on Fort Belvoir are limited. The following factors will be considered in the design and siting of new SWM facilities:

- No interference with known locations for major facilities and roads
- No incursion into wetlands, waters of the U.S., or Chesapeake Bay Resource Protection Areas, or riparian buffers
- Avoids wetland, stream restoration, and revegetated mitigation areas
- Minimization of removal of forest cover
- No interference with known Threatened and Endangered Species sites
- Minimization of excavation requirements
- Conformance to local topography to the greatest extent possible
- Access from existing or planned roads
- Distribution of sites over all watersheds within the project area.
- Accessibility of facility for maintenance and inspection

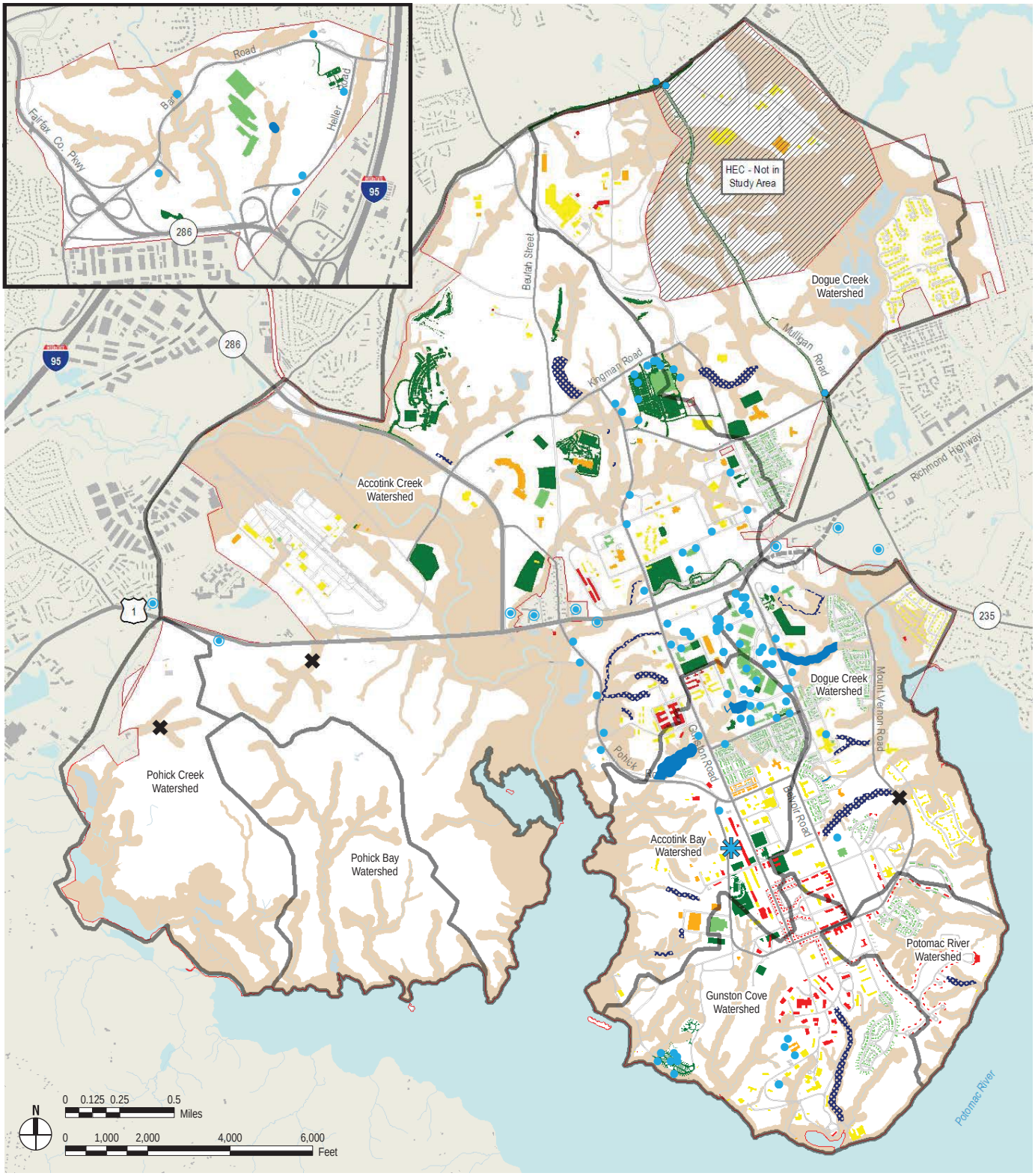
Stormwater management efforts should be designed as a comprehensive and integrated solution that addresses the existing watershed conditions as described in Section 2.

The following is a summary of the types of SWM facilities that will be required to support individual projects. The exact facility locations will be determined with the design of the project.

- Underground SWM facilities will generally be located in low areas within the open space areas as shown in the Regulating Plans Chapter 2 of the IPS or in surface parking lots and/or paved areas. One recent example is the underground facility in the parking lot within the WT campus.
- The expansion of existing and/or future aboveground SWM facilities (dry or wet ponds) where facilities have been sized to support additional runoff.
- Use of innovative low impact design solutions and facilities such as rain gardens, bioswales and porous pavement. Opportunities for stormwater reuse should also be considered.
- Outfall improvements, if required, will be determined by the condition of the drainage shed in accordance with regulations.

An Open Space Analysis prepared in 2011 showed that Fort Belvoir will retain more than 87 percent (over 7,000 acres) of open space upon completion of anticipated 2017 development. New development will fall largely within Accotink Creek and Dogue Creek watersheds. As shown in Figure 5.4 and Table 5.3, Accotink Creek watershed is anticipated to lose 57 acres of open space, and Dogue Creek will lose 18 acres of open space.

Figure 5.5 - Watershed Improvements



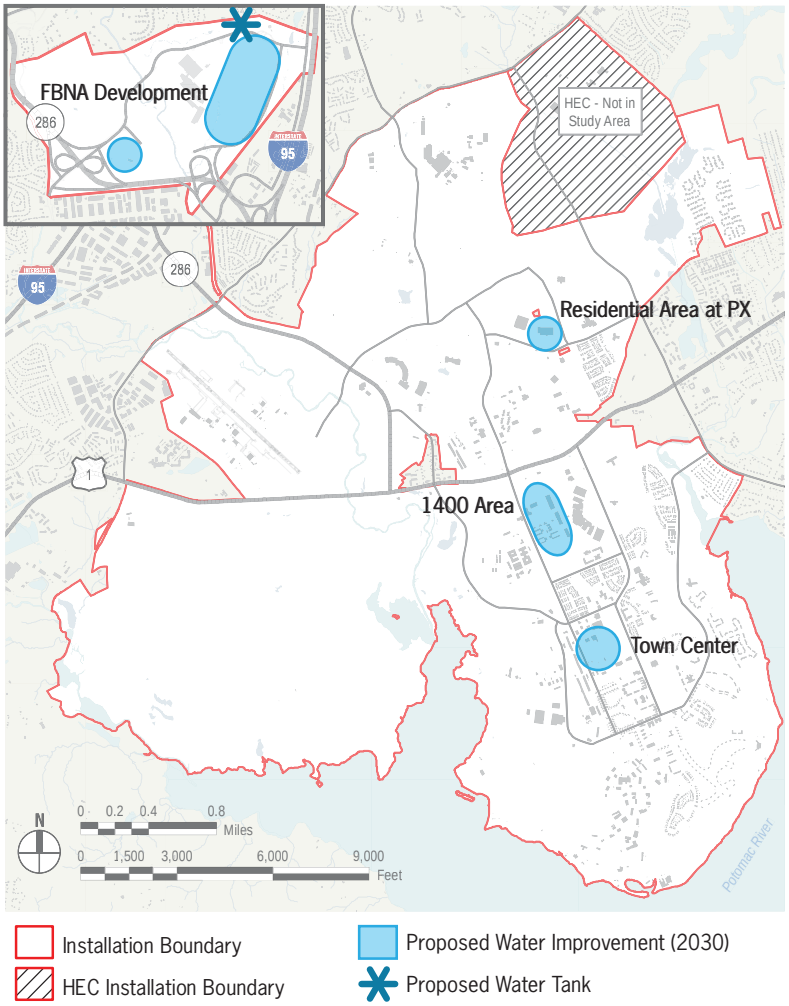
- Culvert Crossing Stream Improvement
- Existing Stormwater Management Area
- Proposed Stormwater Management Area
- Proposed Regional Stormwater Management Facility
- Watershed Boundary
- RPA Boundary & Riparian Buffer
- Completed Stream Restoration
- Proposed Stream Restoration
- Short Range Project with new SWM/LID design measures as required

Facility Stormwater Treatment Based on Age

- No SWM Treatment
- Minimal SWM, Limited to Quantity Control, Areas with No SWM
- SWM Generally Both Quantity and Quality Control
- Enhanced SWM Extended Detention, LID, Etc.

Typical locations for new, SWM facilities on smaller redevelopment sites will be determined in the short term (2017) on a project-by-project basis. Ideally, areas include the open lawn areas created by AT/FP building setbacks and in places where surface parking lots may be proposed that minimize their impact on the land. When possible, new SWM facilities should provide expansion for future projects within the sub-watershed. Lastly, SWM strategies must consider downstream conditions that may require enhanced SWM measures such as extended detention, water conservation, LID measures and/or stream restoration. See Figure 5.5 for location of proposed stream restoration areas and 2017 projects.

Figure 5.6 - Water Distribution Improvements - Long Term (2030)



Long-Term (2030) Utility Systems Improvements

Water

The FBNA water distribution network will need to be extended for anticipated new development at FBNA. The existing system shall have adequate capacity to serve anticipated development. If additional storage is required, a second tank can be constructed at FBNA.

At Main Post, construction of the residential area adjacent to the PX and redevelopment of the Town Center area will require extension of the water distribution system to these areas, and replacement of existing lines which conflict with proposed development redevelopment of the 1400 Area that requires a new pipe network, as most of the existing lines in the area west of the new hospital will need to be abandoned; (proposed buildings are in conflict with most existing water lines here). The new USALSA building has constructed the first portion of this new pipe network. The proposed 16-inch water line spanning from the Fairfax County Water System in the north to just south of U.S. Route 1 will provide adequate service for proposed 2030 development.

Some infrastructure upgrades will be required if all the projects anticipated are built; however, the exact scope of these depends on what will actually be built. See Figure 5.6.

Stormwater Management

The densest projected development in the 2030 plan is in the 1400 Area and redevelopment of the old DeWitt Hospital. Significant development is also proposed in the Lower North Post area. Stormwater conveyance and management facilities in these areas will be funded and constructed with individual projects, but facility design must consider the ultimate anticipated development in each area.

Site selection for each new building shall consider utility, drainage and stormwater requirements for future development and reserve utility corridors and adequate areas for future stormwater facilities. Preliminary design for each new building shall include preliminary infrastructure design for future buildings in the vicinity to demonstrate: 1) they can be efficiently served by expansion or extension of existing and proposed facilities, and 2) the new development infrastructure (e.g., will not be in conflict with future development) and projected building/parking facilities. All utilities (water, sanitary, storm, gas, electric) shall be designed with capacity for the ultimate anticipated development. Where feasible, design stormwater management facilities with capacity for future development in the area. The Installation must ensure that the siting of each building and its required infrastructure will not preclude the cost efficient provision of access, drainage or utilities for future planned development.

Due to site limitations, most stormwater management (quality and quantity control) facilities in the 1400 Area are likely to be underground storage systems, designed to serve only one or two new buildings. (The Gunston Road infrastructure project has constructed several small underground facilities; the USALSA building is served by an underground facility that is sized only for the USALSA site.) It may be possible to construct larger surface or underground facilities on the perimeter of the 1400 Area that can initially serve one building but be expanded with additional development.

The Lower North Post area drains toward a stream that runs to the southwest and eventually becomes Mason Run. Development here shall consider the use of shared surface or underground stormwater management facilities. OCAR has built a surface facility which can be expanded to serve additional development.

Drainage design in both the 1400 Area and Lower North Post areas shall consider adequate outfall in the downstream receiving waters.

The 2011 Open Space Analysis also evaluated the long range (to 2030) impacts of development by watershed. From 2017 to 2030, most development will again fall largely within Accotink, Dogue Creek, and Gunston Cove watersheds. Accotink Creek watershed loses 12 acres of open space on Main Post and 26 acres on FBNA. Dogue Creek and Gunston Cove both lose 9 acres of open space. See Figure 5.7 and Table 5.4.

Typical locations for new, SWM facilities on smaller redevelopment sites in the long range (2030) will be the same as noted for 2017 and will be determined on a project-by-project basis. In addition, several 2030 projects, such as the future campus at FBNA and the redevelopment of the 1400 Area, offer the opportunity to provide a more centralized SWM approach given a larger land area to support the facilities.

Figure 5.7 - Open Space Analysis, 2030 (Long Range)

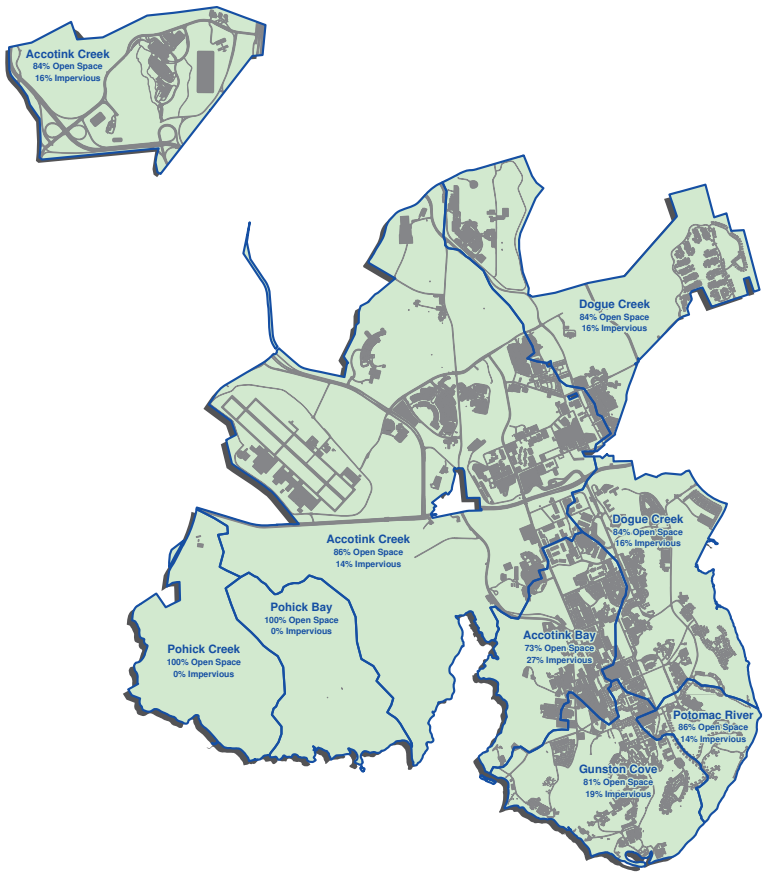


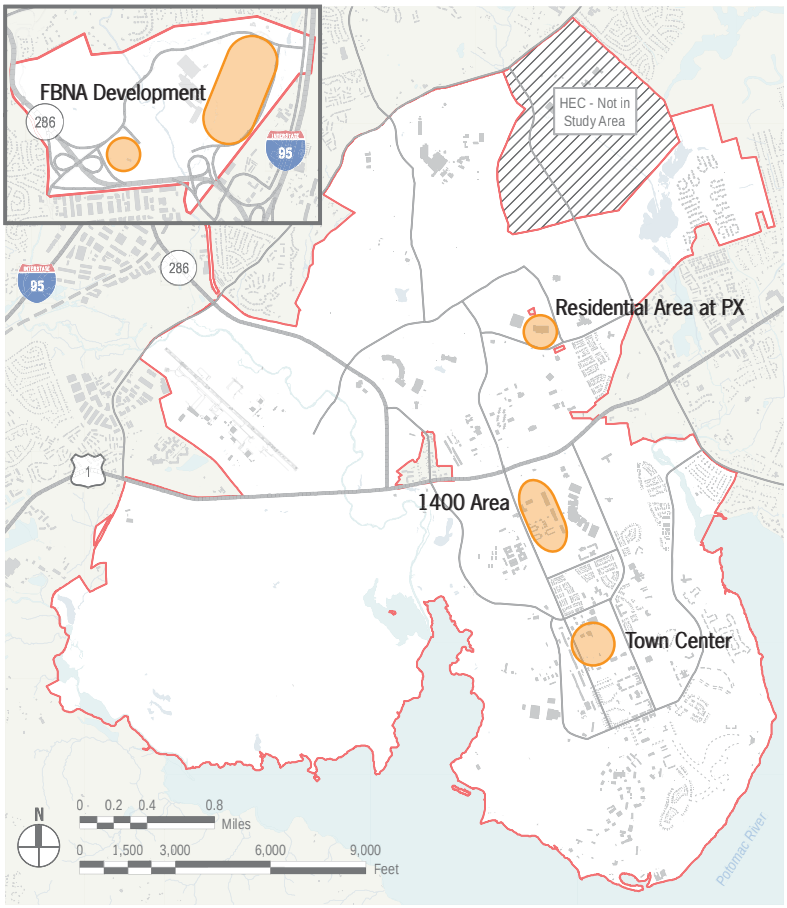
Table 5.4 - Open Space Analysis - Long Range (2030)

	2017 (Short Term)				2030 (Long Range)			
Watersheds	**Open (Acres)**		**Impervious (Acres)[2]**		**Open (Acres)**		**Impervious (Acres)[2]**	
Accotink Bay	442	73%	166	27%	442	73%	166	27%
Accotink Creek	2,802	86%	449	14%	2,790	86%	462	14%
Accotink Creek - FBNA	700	87%	104	13%	674	84%	130	16%
Dogue Creek	1,489	84%	276	16%	1,480	84%	285	16%
Gunston Cove	557	82%	119	18%	548	81%	127	19%
Pohick Bay	566	100%	0	0%	566	100%	0	0%
Pohick Creek	635	100%	1	0%	635	100%	1	0%
Potomac River	203	86%	34	14%	203	86%	34	14%
Total	7,394	87%	1,149	13%	7,339	86%	1,204	14%

Notes: 1. Percentages shown in tables reflect estimates of future project footprints; therefore, impervious areas may vary by approximately 3%.
2. Impervious area does not include paved trails and sidewalks.

Impervious = Airfield Surfaces, Buildings, Parking Lots, Bridges, Driveways and Roads
Open Space = Everything Else

Figure 5.8 - Sanitary Sewer Improvements - Long Term (2030)



Installation Boundary

HEC Installation Boundary

Proposed Sanitary Improvement (2030)

Sanitary Sewer

Potential development at FBNA will require extension of the sanitary sewer system to serve these areas. No capacity problems in serving these areas is anticipated.

At Main Post, construction of the residential area adjacent to the PX and redevelopment of the Town Center area will require extension of the sanitary collection system to these areas, and replacement of existing lines which conflict with proposed development. No capacity issues are anticipated. The densest projected development in the 2030 plan is the new construction in the 1400 Area. This development has the potential to overload the downstream gravity sewers and pump stations. Part or all of this area can be diverted to the new hospital pump station; if there is not adequate capacity for this flow in the pump station, a second pump station can be constructed adjacent to it. Redevelopment of the 1400 Area will require a new pipe network, as most of the existing lines in the area west of the new hospital will need to be abandoned; (proposed buildings are in conflict with most existing water lines here). The new USALSA building has constructed the first portion of this new pipe network.

Summary Utility Assessment

The utility construction work associated with BRAC 2005 and the ongoing replacement of aging water and sewer lines by American Water should be able to support the near-term projects. Any additional water and sewer line extensions that will be needed for these new projects should be sized to support future development. The ability of utility service providers to meet these future demands is expected to continue and should not hinder the Installation's ability to expand. The current demands for enhanced electric service associated with more energy intensive uses needed to meet the existing population as well as future growth levels are expected to continue. This trend will require advance planning with the service providers and the continuation of innovative project design solutions. Innovative examples include the recent LEED built projects such as the Fort Belvoir Community Hospital and the secure campus at FBNA that can offset these increased energy demands. See Figure 5.8.