4 Affected Environment and Consequences

4.1 Land Use

4.1.1 Affected Environment

4.1.1.1 Regional Setting

Fort Belvoir is located in southeastern Fairfax County, Virginia (VA), about 12 miles southwest of Washington, District of Columbia (DC), 10 miles from the Pentagon, and 5 miles from Alexandria, VA (Figure 1-1). The Main Post lies near the community of Mount Vernon, alongside the Potomac River, Dogue Creek, Gunston Cove, and Pohick Creek, about 85 miles upstream of the Chesapeake Bay. The installation also exercises direct responsibility for the Engineer Proving Ground (EPG), located about 2 miles northwest of Main Post.

Fairfax County is one of the largest regional jurisdictions in the Washington, D.C., metropolitan area, covering almost 400 square miles (US Army Garrison, 1993). The county is the location of many bedroom communities and employment centers that support the Washington metropolitan area. Fairfax County has been characterized by rapid growth in the residential, industrial, and commercial sectors. Interstate 95 and U.S. Route 1 bisect the county on a generally north-south axis.

Straddling Northern Virginia's U.S. Route 1, Fort Belvoir is divided into two halves, known as the North and South Posts (Clark Pinnacle, 2003). The south post lies on a peninsula adjacent to the Potomac River, Dogue Creek, Pohick Creek and Accotink Creek. The majority of the South Post lies on a plateau with steep slopes leading towards the three rivers. The North Post is surrounded by non-government-owned lands. The installation has two wildlife refuges (the Accotink Bay Wildlife Refuge and the Jackson Miles Abbott Wetland Refuge) and a wildlife corridor which connects Huntley Meadows to the wildlife refuges. Fort Belvoir is home to a variety of birds, mammals, reptiles, amphibians, and fish, including the Bald eagle *(Haliaeetus leucocephalu*s).

January and February are the coldest months at Fort Belvoir with an average temperature of 34 degrees Fahrenheit (°F), and July is the hottest month with an average temperature of 79° F. Average annual precipitation is 42 inches, and is generally well distributed throughout the year. The Atlantic Ocean and Gulf of Mexico are the principal sources of moisture. Moist, tropical air flows from the southwest in summer and early fall. The frost-free season is 265 days at Fort Belvoir. Snowfall averages 20.6 inches, but rarely stays on the ground for more than a few days (US Army Garrison, September 2001).

The greatest potential for flooding occurs in late winter and early spring, but storms in the late summer and fall can also cause flooding. Thunderstorms are common in the summer months, occurring an average of 44 days per year at Fort Belvoir (US Army Garrison, September 2001). Hurricanes, which typically affect the weather in the United States during

August, September, and October, have the potential to cause destructive high winds, torrential rains, and flooding on Fort Belvoir if they enter Virginia or pass close offshore.

4.1.1.2 Installation Land Use

The Fort Belvoir Real Property Master Plan, Long-Range Component (US Army Garrison, 1993) is in the process of being updated. All information presented in this section is based upon the 1993 version. Land use throughout the installation is highly varied and consists of the following categories: administrative, research and development, medical, community facilities, barracks, family housing, service and storage, recreation, environmentally sensitive areas, and training areas (US Army Garrison, September 2001). Table 4-1 describes and Figure 4-1 shows the Land Use categories at Fort Belvoir.

The Fort Belvoir Real Property Master Plan, Long Range Component (US Army Garrison, 1993) divides the installation into six planning districts: South Post, Southwest Area, South Post Core Area, Lower North Post, Upper North Post, and Davison Army Airfield.

Ten of the 12 existing housing villages and the proposed New South Post Village are located in the South Post Planning District. Woodlawn Village and Lewis Heights Village are located in the Lower North Post Planning District.

The South Post Planning District is located on the Belvoir Peninsula and borders Accotink Bay, Dogue Creek, Gunston Cove, and the Potomac River. This planning area encompasses a portion of Fort Belvoir's historic district. Land uses within this area are primarily research and development facilities and educational facilities. The South Post Planning District contains several U.S. Army and DoD tenant organizations, including the Defense Mapping School, the U.S. Army's DeWitt Hospital, and the Defense Systems Management College. In addition, the South Post Planning District contains research and development facilities, family housing, recreation, administration and education, supply and storage.

The Upper and Lower North Post Planning Districts accommodate troop and family housing, support facilities, and large tenant organizations such as the Defense Logistics Agency and the Defense Communication Electronics Evaluation and Testing Activity. These planning districts also include the North Post Golf Course, the Fort Belvoir Elementary School, the commissary, the post exchange, and recreation facilities for military personnel and their families. Each of these districts contains a portion of Fort Belvoir's Forest and Wildlife Corridor. The Lower North Post Planning District contains the 146-acre Jackson Miles Abbott Wetland Refuge (JMAWR) (US Army Garrison, March 2001).

The following table presents general land use categories at Fort Belvoir.

TABLE 4-1
Land Use at Fort Belvoir

Land Use Category	Major Activities
Administration/Education	Installation headquarters, installation administrative offices, Defense Logistics Agency, two major Army Command headquarters, the Adjutant General's office, Army Management Staff college, Defense Acquisition University, and National Imagery and Mapping Agency.
Research and Development	Defense Communications—Electronics Evaluation and Testing Activity, CECOM RDEC, additional sites throughout the installation.
Medical	DeWitt Hospital complex, Logan Dental Clinic, four dispensaries.
Community Facilities	Commissary, post exchange, convenience stores, credit union, automobile service station, education center, library, post office, banks, Sosa Recreation Center, movie theater, self-help center, officers' club, Community Club, child development centers, elementary school.
Family and Troop Housing	Enlisted and officer family housing units, barracks for single enlisted soldiers, and temporary housing rooms for new arrivals and visitors.
Supply/Storage/Maintenance	Warehousing, maintenance facilities, light-industrial areas
Outdoor Recreation	Tennis courts, 36-hole golf course, 9-hole golf course, swimming pools, athletic fields, an archery range, picnic, area soccer fields, two football fields, walking and running trails, Dogue Creek marina.
Environmentally Sensitive Areas	Wildlife and wetland refuges, Forest and Wildlife Corridor, Resource Protection Areas, steep sloping topography, wetlands, floodplains, rare species habitat, cultural resources
Training	Classroom and other training facilities.
Airfield	Davison Army Airfield
Industrial	Filtration plant, former landfill

Source: Fort Belvoir, 2001 Integrated Natural Resources Management Plan (INRMP);

Land uses bordering the proposed New South Post Village and existing housing villages include Environmentally Sensitive Areas, Outdoor Recreation, Troop Housing, Community Facilities, Administration and Education, and Supply/Storage/Maintenance.

As of 2001, Fort Belvoir had nine land leases that accommodate various tenant activities and non-DoD organizations located at the installation. Easements accounted for approximately 88 acres of the installation. They included:

- Utility easements for power transmission lines, natural gas pipelines, communications lines, water and sanitary sewers, which include an off-road right-of-way and an access corridor for maintenance, repairs, and construction; some of these utility easements cross the housing villages and proposed New South Post Village parcel.
- Road rights-of-way, held by the Virginia Department of Transportation (VDOT) along Backlick Road, Telegraph Road, Woodlawn Road, Beulah Street, U.S. Route 1,and the Fairfax County Parkway (VA Route 7100)

- Fort Belvoir Elementary School, which is operated and maintained by the Fairfax County Public Schools system

Fort Belvoir also contains or surrounds eight cemeteries. Six are listed in the Fairfax County Land Records as private properties not owned by the Department of the Army. Two are on property owned by Fort Belvoir (Goodwin, 2001).

4.1.1.3 Context of Fort Belvoir Within Regional Land Use

Fort Belvoir is located in Fairfax County's Lower Potomac Planning District and comprises the LP4-Fort Belvoir Community Planning Sector, one of four Community Planning Sectors within the Lower Potomac Planning District. Sector LP2-Lorton-South Route 1 is east of Fort Belvoir, near the installation's most developed areas, and Sector LP3-Mason Neck is to the southwest, near Fort Belvoir's most undeveloped area. Although local zoning does not apply to Federal property, Fairfax County considers the Fort Belvoir Community Sector (LP4) a Large Institutional Land Area. In the LP-4 portion of the Fairfax County Comprehensive Plan, the county encourages the construction of on-post housing for military families at Fort Belvoir to reduce the competition for affordable housing in the County (Fairfax County, 2002).

The Lorton-South Route 1 Community (LP2) is considered a Suburban Center with Suburban Neighborhood and Low-Density Residential Areas. Major objectives for land use include developing a strong "sense of place" and positive image as well as the preservation and protection of existing, stable residential neighborhoods. The Mason Neck area (LP3) is classified as a Low-Density Residential Area. Recommendations for future land use in Mason Neck include limiting residential density (not to exceed one dwelling unit per acre), to preserve the remaining rural character and to reduce existing septic system problems (Fort Belvoir, 2002; Fairfax County, 2002).

The Lower Potomac Planning District connects Fort Belvoir's open space to other comparable areas in Fairfax County such as floodplains, stream influence zones, and tidal and non-tidal wetlands associated with major watercourses, including the Potomac River. Significant portions of the Mason Neck peninsula immediately south of Fort Belvoir are held in public ownership, and are managed for the protection of important wildlife habitats and wetlands, with public recreation as a secondary use. The Lower Potomac Planning District also includes a number of historic sites and other cultural resources, some of which exist on Fort Belvoir.

According to the Integrated Natural Resources Management Plan (INRMP), undeveloped areas on Fort Belvoir are one component of southeastern Fairfax County's open space network, which contributes to the Chesapeake Bay Program's restoration efforts. The Comprehensive Plan for Fairfax County defines open space as any public or private land existing primarily in a natural condition that helps to shape the character, form, and quality of county development. As defined, these areas are used for environmental and heritage resource protection, parks and recreation, agriculture, visual relief, and buffering between adjacent land uses (US Army Garrison, September 2001).

4.1.1.4 Surrounding Land Use

Land use immediately surrounding Fort Belvoir consists of residential areas, industrial parks, nature parks, and large water bodies (Figure 4-2). The area north of the post is mainly residential, while the area to the northwest consists of industrial and business parks combined with residential land use. West of the Fort Belvoir boundary and the Davison US Army Airfield (located on Fort Belvoir) is the Noman M. Cole, Jr. Pollution Control Plant (formerly the Lower Potomac Pollution Control Plant). Residential areas surround this industrial (wastewater treatment) facility. Gunston Cove, Pohick Bay and Regional Park, Mason Neck State Park and Wildlife Refuge are located south and southwest of the post. The Potomac River and Dogue Creek define the southeast boundary of Fort Belvoir. The eastern portion of the post abuts a residential area and Woodlawn Plantation, an historic property owned and operated by the National Trust. U.S. Route 1 bisects Fort Belvoir and Interstate 95 runs to the west of the post. US Route 1 is a four-lane road at the point where it bisects Fort Belvoir. Fort Belvoir's boundaries run immediately adjacent to the road. Access to Fort Belvoir from U.S. Route 1 is limited to Pence and Tulley Gates.

All of the existing housing villages are surrounded by Fort Belvoir lands, except for Woodlawn Village on North Post and River Village on South Post. Civilian housing areas that are zoned as R-2 (two dwelling units per acre) are located to the east and south of River Village.

Civilian housing areas are located to the east and south of Woodlawn Village. The areas to the east of Woodlawn Village are zoned as R-3 (three dwelling units per acre) and R-2 two dwelling units per acre). The areas to the south of Woodlawn Village are zoned as R-20 (20 dwelling units per acre). Two nature areas (Huntley Meadows Park and the 146-acre Jackson Miles Abbott Wetland Refuge) are located to the north and west of Woodlawn Village. Huntley Meadows consists of 1,424 acres of mature forests, meadows, and wetlands supporting a wide variety of wildlife.

Woodlawn Historic Overlay District

In 1971, Fairfax County established the Woodlawn Historic Overlay District, one of thirteen such districts currently designated by the county. The core of the district encompasses several historic properties: Woodlawn Plantation, Pope/Leighey House, Woodlawn Friends Meeting House (along the north and south sides of Route 1) and George Washington's Grist Mill (on Mount Vernon Highway, northeast of River Village). Lewis Heights Village is entirely within the Overlay District, along with portions of George Washington and River Villages. Fairfax County uses Historic Overlay Districts as a zoning tool to ensure that new construction is compatible with historic resources in designated areas. The provisions of the zoning ordinance are administered by the Fairfax County Architectural Review Board (ARB), which reviews rezoning applications, construction permits, sign permits, site plans, subdivision plats, and grading plans for properties within Historic Overlay Districts. However, local zoning and construction permit approval procedures do not apply to Federal facilities. See Section 4.8 (Cultural Resources) for further discussion.

4.1.2 Consequences

4.1.2.1 Proposed Action

Overall, the proposed action would result in long-term minor beneficial effects on installation land use. Locating the New South Post Village closer to community services is an improvement in land use (see "Land Use Planning Principle" in section 3.0). Existing residential areas would be improved for the designated land use through housing rehabilitation, although the land use designation of these areas would not change. No areas that are currently used for family housing would be converted to other uses. However, related amenities such as recreational areas and village centers would be constructed on these residential land use areas, which would improve their quality for the designated use. Other improvements (for instance, improved storm drainage systems, landscaping with native plants, and placement of buffers between living spaces and noise sources) would also improve the quality and suitability of the residential areas for the designated land use. The addition of these amenities would be expected to result in an overall positive benefit.

Land use planning for the proposed action has been coordinated with the planning process for the updated (2004) Fort Belvoir Master Plan. According to the Land Use GIS layer provided by Fort Belvoir DPW&L in June 2003, most of the land area (94 percent of 548 acres) proposed for transfer with the existing housing villages carries the land use designation of Troop and Family Housing. However, the boundaries of Belvoir, Colyer, Dogue Creek, Fairfax, George Washington, Gerber, Jadwin, Lewis Heights, Park and Rossell Villages, will be expanded to include approximately 31 acres total of land that is currently designated as Administrative/Education. In addition, Dogue Creek and Lewis Heights Villages will be expanded to include approximately 2 acres of land that are currently designated as Community Facility. The land use designations of these areas is being changed to Family Housing in the updated (2004) Fort Belvoir Master Plan.

For the proposed New South Post Village parcel, the proposed action will result in a modification in land use designation from Administrative and Education (approximately 4 acres), Community Facilities (approximately 35 acres), Industrial (approximately 6 acres), and Outdoor Recreation (approximately 35 acres) to Family Housing. Fort Belvoir is currently developing an update to the 1993 Master Plan and will prepare an Environmental Impact Statement to address potential environmental impacts of land use changes for the installation as a whole.

The proposed action would increase acreage in the Family Housing land use category and reduce the total acreage in the Administrative/Education and Community Facilities land use categories. This would slightly reduce the land available for future development of community support facilities and outdoor recreation to serve military personnel and retirees in the region. Under Fort Belvoir's 1993 Real Property Master Plan and subsequent development, the Regional Community Support Center Area on North Post (just west of Lewis Heights Village) is the focal point of community support facilities for the Fort Belvoir community and the large active duty and retired military community residing in the National Capital Region. Therefore, this change is not expected to result in significant adverse effects on future installation land use and development.

The Proposed New South Post Village is adjacent to two other villages, a golf course, and ball fields, which are compatible and desirable adjacent land uses for Family Housing.

The ground lease will be subject to the existing utility easements and similar encumbrances on the parcels.

No direct effects on surrounding land use would be expected. For a discussion of indirect effects, see Section 4.2 (Aesthetics and Visual Resources), Section 4.8 (Cultural Resources) and Section 4.10 (Transportation.)

The redevelopment of Lewis Heights and, to a lesser extent, the demolition of River Village and redevelopment of George Washington Village, would indirectly affect the Woodlawn Historic Overlay District. Local zoning and construction permit approval procedures do not apply to Federal facilities. However, potential effects on the historic properties in the Woodlawn Historic Overlay District will be addressed through the Section 106 consultation process, as discussed in Section 4.8.

4.1.2.2 No Action Alternative

No effects would be expected. No changes to land use designations would occur under the no action alternative. Residential areas would be maintained as they currently are, with no changes or improvements anticipated to occur to existing conditions, other than those undertaken in the course of normal maintenance activities.

4.2 Aesthetics and Visual Resources

4.2.1 Affected Environment

Aesthetics resources consist of natural and man-made landscape features that appear indigenous to the area. Aesthetic resource issues include style, taste, design concept, and urban amenity. By incorporating aesthetics into all land use categories it creates a more pleasing environment for work and recreation. Fort Belvoir displays three forms of land use features that contribute to this aesthetic atmosphere: unimproved, semi-improved, and improved areas on the Post. Unimproved areas feature many diverse landscapes (forests, marshes, and meadows). These natural areas are usually surrounded by semi-improved areas, which include such things as mowed fields and wooded areas that have been cleared of undergrowth. Improved areas at Fort Belvoir include recreational and community facilities, golf courses, housing, research buildings, administration buildings, maintenance facilities, etc. as well as parking lots and roadways (RCSC, 2002).

Although Fort Belvoir has many aesthetically pleasing features, certain elements contribute to impair the visual connectivity surrounding the different housing parcels. These limiting elements are as follows:

- Utility Lines. Overhead utility lines are visually dominant in many parts of the installation and represent an intrusive element of the aesthetic environment.
- Character of architecture. Some of the older, wooden buildings give an impression often described as institutional, monotonous, or lacking in enrichment. This is, however, appropriate to their context and need not be considered a visual impact. Only where these buildings appear to be in disrepair are they considered to be visually intrusive. The uniform color of the buildings in many parts of the installation is considered to be aesthetically appropriate.

- Housing areas at Fort Belvoir are broken down into different villages; each village has differing landscaping as well as surrounding visual elements. Therefore the aesthetic value of each village differs from one another. Some villages have much more to offer the resident aesthetically than others that have little in the way of aesthetic value.

4.2.1.1 Belvoir Village

The Officers Club is located in the eastern side of the housing area, and is concealed from view with large mature trees, which serves to visually distract from the structure. Mature, historic trees are found throughout the improved grounds of Belvoir Village. There is a large open area between Mason and Woodlawn Drives with a tennis court and a playground. Belvoir Village is beautifully landscaped and is one of the more attractive villages on post, not only for its landscaping, but also for the historic aspect of the structures and their setting.

4.2.1.2 Colyer Village

Colyer Village is bordered on the North and east by mature wooded forests, the South golf course borders the West Side, and the Fort Belvoir DeWitt Army Community Hospital on the south side. Those units that are located on the southern side of the complex have a view of the hospital parking lot and hospital buildings. Mature trees as well as a tributary of Dogue Creek border the northern exterior units, while only mature trees border the eastern exterior units. There are medium age landscape trees in the front yards of all housing units. Those few units, which over look Belvoir Road, have a view of the golf course. Although the golf course is manmade and unnatural it is more aesthetically pleasing than a building structure in the residents line of sight.

There is a playground in the middle of the village, but otherwise there is little open space outside of the yards.

4.2.1.3 Dogue Creek Village

The Dogue Creek Village area is bordered on the eastern side by the Dogue Creek. This provides a beautiful backdrop to those units backing to the forest as well as the creek. A park with a playground is also located on the eastern side of the development. Wooded areas also encompass the southern, northern, and western sides of the village. Small tributaries of the Dogue Creek are also located close to some of the housing units. Along with the wooded areas, which back to the exterior units, mature trees also line the neighborhood roads. This landscaping, as well as additional land uses, adds to the aesthetic beauty of the village.

4.2.1.4 Fairfax Village

Forested areas border the North, South, East and West portions of the village. Along with the wooded area, small tributaries of the Potomac River are located in close proximity to the housing units. Mature trees and younger landscape trees are found throughout the improved grounds as well as wooded edges at Fairfax Village adding to the visually pleasing landscape design.

The Belvoir and Potomac View Self-Guided Trail starts at the intersection of Marshall Road and Forney Loop. This is a wonderful opportunity for those residents to enjoy the nature that surrounds them and their homes.

4.2.1.5 George Washington Village

Mature woods border the north, east, and western areas surrounding the village. A walking/running path cuts through the southern portion of George Washington Village. A small tributary of Dogue Creek runs along this path and is used by residents as a recreational outlet. Medium age landscape trees are located in the front yards as well as the improved common areas.

4.2.1.6 Gerber Village

Gerber Village houses are part of Fort Belvoir's Historic District. The area is beautifully landscaped, with large mature trees lining the roads as well as scattered throughout the village. No woods border the village, as it is situated in a developed area of Fort Belvoir.

Gerber Village is adjacent to administrative offices and educational buildings to the south and east. North of the village is a swimming pool and the Fire Station. To the west of the village, separated by a thin strip of trees and a fence, is a row of old warehouses. Even with the close proximity to these developed areas, the landscaping and trees assist in camouflaging the otherwise austere surroundings.

4.2.1.7 Jadwin Village

Jadwin Village is aesthetically pleasing, with large mature trees lining the roadways as well as mature forests bordering the north, south, and east. The homes are widely spaced, which serves to give some additional privacy for the residents. Two small tributaries of Dogue Creek flow on either side of housing unit 464 and run along the back of the units on the northern side. Along with the northern tributary another small tributary of Dogue Creek runs along the southern border of the village. Both small streams serve as visually pleasing aspects of Jadwin Village.

In the middle of the village is an open area with a play ground and a basketball court, which are used for recreational purposes.

4.2.1.8 Lewis Heights Village

Lewis Heights has very little aesthetically pleasing features located in and among the village. A small number of mature trees and young-medium age landscape trees are scattered throughout the improved grounds of Lewis Heights. A large, sparsely wooded field borders the southwest portion of the development, and buildings and open fields surround the remaining borders. The small intermittent stream offers some visual atmosphere, but as it is intermittent the full benefit can not been gained by residents. With the visual restrictions from all sides, the village has little in the way of aesthetic atmosphere.

From outside of the installation, part of Lewis Heights is visible from the adjacent Woodlawn Plantation, which is owned and operated by the National Trust for Historic Preservation. Historic viewshed issues are discussed in Section 4.8.

4.2.1.9 Park Village

Mature trees line the thoroughfares throughout the village. Units are widely spaced, which give residents privacy barriers from one another. Woods border the north, east, and west

portents of the surrounding area. Three of the units back to buildings, but with the landscaping and mature trees, this view is not intrusive. A small tributary of Dogue Creek runs behind some of the end units along Harrington Drive.

4.2.1.10 River Village

River Village has some landscaped and mature trees that are scattered throughout the development. There are medium age landscape trees in all front yards as well as the common areas at River Village. The houses are situated relatively close together but some distance is maintained among the units. Civilian housing borders the southeast sides of the village. Although this could be considered a visual impediment, a small buffer of woods has been left for the northeast side units. The civilian houses that border the southeast side have little in the way of a buffer area. River Village is bordered to the south and east by the main branch of Dogue Creek. The Post's Dogue Creek Marina borders the west side of the development and although considered a manmade structure, it is visually pleasing to the residents. Numerous playgrounds are situated throughout the village, and are used for recreation by resident's children.

4.2.1.11 Rossell Loop Village

Rossell Loop Village is bordered on three sides by medium density of mature trees throughout the improved grounds and woodland edges at Rossell Loop Village. A small tributary of Dogue Creek winds its way around the village area and serves as an aesthetically pleasing backdrop for those residents that live in the outer units. The duplex units are spaced widely and mature trees are scattered along the thoroughfares. A playground as well as a basketball court are located in the interior open area and are for recreational use.

4.2.1.12 Woodlawn Village

The Jackson Miles Abbott Wetland Refuge (JMAWR) borders Woodlawn Village, on the west. This area is a beautiful natural border to those residents of the village. Young landscape trees border the eastern side of the village and are found throughout the housing units (front and back yards) and common grounds at Woodlawn Village. Other housing complexes and townhouses are scattered on the southern end of the village. There is also an open area running through the middle of the village.

4.2.1.13 Proposed New South Housing Village

The northern parcel is a U-shaped area of previously developed land adjacent to the golf course. The majority of the western side of the parcel is cleared with well-maintained green space. The central portion of the parcel is heavily wooded. The eastern portion of the area from the south golf course parking lot to Ferrel Road contains over 30 trees of significant/ historic value, many of which are over 100 years of age. This area is lightly wooded and has a walking trail. The parcel is mostly undeveloped, with the exception of three small buildings, two small parking areas, and some walking trails.

The middle parcel is adjacent to the northern and is located between the Barden School and the Hospital. A small dirt road runs through the property. The eastern side of the parcel slopes downhill towards a small stream. This area is lightly wooded. Portions of the parcel consist of maintained grass.

The southern parcel is south of the Barden School. One structure (Building 1001) and some tennis courts are located on the southern parcel. The remainder of the parcel is made up of landscaped areas around the building and tennis courts, and wooded areas sloping downhill to the southeast.

4.2.2 Consequences

4.2.2.1 Proposed Action

Short-term and long-term adverse effects to aesthetics are expected due to the removal of some of the mature trees and vegetation in the existing housing villages and the proposed new housing village. As discussed in detail in Section 4.7, a tree survey will be conducted to identify and avoid, to the maximum extent practicable, all specimen trees in the housing villages. Steps will be taken to avoid as many of these trees as possible. In cases where it is not possible to avoid impacts to the vegetation, trees will be replaced at a 1:1 ratio on Fort Belvoir. Open areas will be vegetated with trees and shrubs in order to provide a natural park-like setting. Trees and shrubs will be planted along streets and in yards to provide shade, privacy, and energy conservation. The visual effects of removing mature trees and replacing with young trees will continue beyond the construction period. Impacts are only "short-term" in the sense that trees are a renewable resource. Initially, the trees will be young, but with each year's growth they will provide additional shade and privacy screening. A landscape planting and maintenance plan will be developed in coordination with DPW&L ENRD that uses native plants and addresses invasive exotic vegetation management.

Other long-term minor beneficial effects would be expected. Revitalization and reconstruction of existing housing units that are currently in need of upgrading; construction of new, modern housing; and the addition of recreational areas and native-plant landscaping (see Section 2.0) within the housing communities affected by the proposed action would be expected to improve the aesthetic and visual appeal of the villages. Additionally, the placement of new utility lines underground, removal of some existing overhead utility lines, improvements to roads would be expected to have a positive effect on the visual appearance and aesthetic appeal of the villages.

Construction of new garages in Belvoir and Gerber Villages will block the view of some green spaces, which in and of itself is an adverse effect. However, the additional storage space provided to the residents will eliminate the need for temporary storage sheds and allow residents to store belongings in the garages rather then in front, side, and back yards as is currently occurring, resulting in a beneficial effect. The ability to park cars in the garages, rather than on the street, will result in an overall improvement in the view of the neighborhood. Many of the existing garages in Belvoir Village do not meet the current size vehicle requirements causing residents to park on the street or in the driveway. In addition, all construction including garages, street benches, street and yard lighting, in the historic areas will be in agreement with the Programmatic Agreement. Therefore, construction of the new garages is expected to have an overall neutral effect to the views in Belvoir and Gerber Villages.

Construction in the proposed New South Village will result in a significant change in the views. This area is currently composed of a mix of suburban, semi-developed, and

undeveloped areas. Once construction is complete, this area will have the look of a suburban (or "new urban") housing area, including townhouses, streets with sidewalks and gutter systems, street lights, and other usual housing amenities. The yards, streets, and open areas will be re-vegetated with native trees and shrubs and maintained on a regular basis. In addition, a vegetated buffer will be maintained 100-feet from the perennial stream that runs through the property. The neighborhood will become South Post's new "Main Street." Although overall, this new village is a significant change in the appearance of this parcel, it is not a significant adverse effect.

As discussed in Section 4.8, existing vegetation will be maintained to screen the view of housing villages from outside the installation, along the boundaries of Lewis Heights Village with Woodlawn Plantation and River Village with Mount Vernon Memorial Highway.

4.2.2.2 No Action Alternative

Long-term neutral effects would be expected under the No Action alternative.

Under the No Action alternative, housing villages will remain essentially the same as far as structure, road networks, and vegetation. No new housing related construction will occur in the proposed New South Post Village and the two construction sites would not be needed as sites for a rock crusher and/or concrete plant. Stands of forest and mature trees that currently exist would not be removed.

Houses on Fort Belvoir range from 20 to 80 years in age. Many of the houses, especially in the Historic District, are brick, two-story homes in spacious neighborhoods. However, other units are apartment style complexes with no private yards, with shared open areas, and little vegetation. As is the case with many older homes, many of the units need upgrades and are currently in a mild state of disrepair. Due to funding constraints, it is not likely that under the current situation, many of the houses will be upgraded or significant repairs or additions made.

Therefore, overall, the No Action alternative is not expected to have a significant adverse or beneficial impact on the housing villages.

4.3 Air Quality

4.3.1 Affected Environment

4.3.1.1 Regional and Local Air Quality Conditions

Fort Belvoir is located in Fairfax County, Virginia, which is part of the Metropolitan Washington Air Quality Control Region. The U.S. Environmental Protection Agency (USEPA), under the requirements of the 1970 CAA as amended in 1977 and 1990, has established National Ambient Air Quality Standards (NAAQS) for six criteria pollutants – ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NOx), particulate matter (PM), lead (Pb), and sulfur dioxide (SO_2), as shown in Table 4-2 below. The NAAQS include primary and secondary standards. The primary standards were established at levels sufficient to protect public health with an adequate margin of safety. The secondary standards were

established to protect the public welfare from the adverse effects associated with pollutants in the ambient air.

Air quality data for Virginia is collected by the Virginia Department of Environmental Quality (VDEQ) at representative sites throughout the state. The most recent available data (for year 2001) from nearby monitoring stations are used to describe the existing ambient air quality at Fort Belvoir. Measured ambient air concentrations were well below the NAAQS except for ozone. The ozone exceedance is expected since the region within which Fort Belvoir and the ozone monitoring sites are located has been designated an ozone nonattainment area. Table 4-2 below summarizes the local ambient air quality around Fort Belvoir.

TABLE 4-2
National and Virginia Ambient Air Quality Standards

Pollutant and Averaging Time	Monitored Data	Primary Standard		Secondary Standard		Monitoring Site Location
		$\mu g/m^3$	ppm	$\mu g/m^3$	ppm	
Carbon Monoxide				Same as primary		Lee District Park
8- hour concentration	1.9 ppm	10,000[1]	9[1]			
1- hour concentration	3.1 ppm	40,000[1]	35[1]			
Nitrogen Dioxide						
Annual Arithmetic Mean	0.014 ppm	100	0.053	Same as primary		Broad Run High School
Ozone						
8- hour concentration	0.106 ppm	157[2]	0.08[2]	Same as primary		Lee District Park
1- hour concentration	0.119 ppm	235[3]	0.12[3]			
Particulate Matter						
PM2.5:						Lee District Park
Annual Arithmetic Mean	14.3 $\mu g/m^3$	15[4]	-			
24- hour Maximum	40.1 $\mu g/m^3$	65[5]	-	Same as primary		
PM10:						Manassas Health Dept.
Annual Arithmetic Mean	18 $\mu g/m^3$	50[4]	-			
24- hour Maximum	39 $\mu g/m^3$	150[6]	-			
Lead						
Annual Arithmetic Mean)	(a)	1.5	-	Same as primary		(a)
Sulfur Dioxide						
Annual Arithmetic Mean	0.007 ppm	80	0.03	-	-	
24- hour concentration	0.25 ppm	365[1]	0.14[1]	-	-	McLean Gov. Ctr.
3- hour concentration	0.047 ppm	-	-	1300[1]	0.50[1]	

Source: Virginia Ambient Air Monitoring 2001 Data Report, VDEQ and 9 VAC 5 Chapter 30.
Notes:
(a) Lead was not monitored in the Virginia Ambient Air Monitoring 2001 Data Report.
[1] Not to be exceeded more than once per year.
[2] 3-year average of the 4th highest 8-hour concentration may not exceed 0.08 ppm.
[3] Areas not attaining the 1-hour standard must meet that standard before demonstrating attainment with the 8-hour standard.
[4] Based on 3-year average of annual averages.
[5] Based on 3-year average of annual 98th percentile values
[6] Based on a 3-year average of annual 99th percentile values.
ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter

The CAA requires that the USEPA review scientific data every 5 years to ensure that the NAAQS effectively protect the public health. Effective on September 16, 1997, the USEPA enacted a more stringent standard for ozone of 0.08 parts per million (ppm) measured over

8 hours, with the average fourth-highest concentration over a three-year period determining whether or not an area is in compliance. Additionally, a new standard for particulate matter (PM-2.5) was issued on July 18, 1997 at an annual limit of 15 micrograms per cubic meter ($\mu g/m^3$), with a 24-hour limit of 65 $\mu g/m^3$. Because this new standard would regulate fine particulates for the first time, the USEPA allowed 5 years to build a nationwide monitoring network and to collect and analyze the data needed to designate areas and develop implementation plans (TAMS, July 2002).

Areas that meet the NAAQS for a criteria pollutant are designated as being "in attainment;" areas where a criteria pollutant level exceeds the NAAQS are designated as being "in nonattainment." Ozone nonattainment areas are categorized based on the severity of their pollution problem- marginal, moderate, serious, severe, or extreme. Fort Belvoir has a status of severe nonattainment for ozone, and is considered to be in attainment for the other criteria pollutants.

Based on the attainment status for the area, the Title V major source thresholds (based on the facility's Potential to Emit) applicable to Fort Belvoir are:

- 25 tons per year (tpy) for volatile organic compounds (VOCs) or NOx
- 100 tpy for other criteria pollutants
- 25 tpy for total hazardous air pollutants (HAPs) or 10 tpy for any one HAP

Fort Belvoir is a major source of NOx and SO_2. A Title V permit application was submitted for the installation in March 1998 and a final permit was issued on March 24, 2003. (Werner, Personal communication, April 2003).

4.3.1.2 State Implementation Plan

The CAA amendments of 1990 classifies areas that exceed national health-based air quality standards based upon the severity of their pollution problem (marginal, moderate, serious, and extreme) and prescribes measures and emission reduction requirements to ensure that continual progress toward attainment is made. All areas classified as "serious" or above for ozone nonattainment (including the Washington area encompassing Fort Belvoir) must submit revisions of the State Implementation Plan demonstrating how emissions that contribute to the formation of ozone will be reduced until area reaches attainment.

Until recently, the Metropolitan Washington area was designated as a serious nonattainment area for ozone. The CAA requires that serious nonattainment areas ensure progress toward the attainment goal by achieving a 15 percent reduction in volatile organic chemical (VOCs) by 1996, and an additional 9 percent reduction by 1999.The Metropolitan Washington Air Quality Committee (MWAQC) approved several State Implementation Plans to meet the requirements for serious nonattainment areas: the 15 percent Plan, Phase I and Phase II Plans. The 15 percent Plan was approved in January 1994 and revised in February 1998. The Phase I Attainment Plan, which includes the 9 percent rate of progress requirements was approved in October 1997, and was revised in April 1999. MWAQC approved the Attainment Plan (Phase II) in April 1998 and revised it in January 2000.

The Phase II Plan, also prepared by MWAQC in February 2000 evaluates whether the measure included in the 9 percent plan and other steps being taken are adequate to reach attainment in the Washington metropolitan area. The plan concluded that the Washington

metropolitan area is likely to attain the federal one-hour standard for ozone by 2005, when the emission control measures currently proposed are fully implemented and after ozone transport is reduced. As part of the plan, the Washington region was required to submit a demonstration using an urban air quality model to show that ozone concentrations will be reduced to levels below the federal one-hour standard (MWAQC, 2003). Since attainment is based upon a three-year record of ozone levels, MWAQC anticipated that Washington will attain the ozone standard based upon data from the ozone seasons in 2003-2005. Therefore MWAQC, which includes the state of Virginia, requested an extension of the 1999 attainment date until 2005 (MWAQC, June 2003).

In January 2003, EPA reclassified the Washington metropolitan area as a severe nonattainment area for ozone. In April 2003, EPA published a final rule to conditionally approve the Washington region's severe area SIP if the three states in the region meet nine commitments to EPA, including adopting state regulations to meet CAA Section 182 (d) requirements for severe nonattainment areas; adopt a contingency plan for 1999 Rate of Progress; revise and submit an updated attainment demonstration that reflects revised MOBILE6-based motor vehicle emissions budgets; demonstrate 3 percent per year rate of progress from 1999-2002 and from 2002-2005; adopt contingency measures for failure to make rate of progress in those periods; and submit an analysis of Reasonably Available Control Measures for the region.

Additional SIP requirements for severe nonattainment areas are:

- Lower permit threshold for point sources from 50 tpy to 25 tpy of ozone precursors, NOx and VOCs.
- Lower threshold for definition of "Major" source requiring controls to 25 tpy
- Require new or expanding sources to offset increased emissions by 1.3:1 of ozone precursors, NOx and VOCs.
- Offset emissions growth due to growth in Vehicle Miles Traveled (VMT) by adopting control measures
- Attainment deadline for Severe Areas is November 15, 2005
- Adopt fee for "failure to attain" to be paid by major sources. (MWCOC, June 2003)

The emission target level for 2002 is 347.4 tpy of VOC and 626.1 tpy of NOx. The emission target level for 2005 is 339 tpy for VOC and 538.8 tpy of NOx.

The draft Severe Area SIP is schedule to go to EPA for approval in March 2004. As the Severe Area SIP is still in draft form and is not yet finalized, the last approved SIP is still in effect, which has target emissions of 362.9 tons per day (tpd) of VOCs and 637.1 tpd of NOx.

4.3.1.3 Fort Belvoir Air Emissions

The point sources of air emissions at Fort Belvoir include boilers, generators, incinerators, underground storage tanks (USTs), a firefighting-training facility, and over 225 insignificant sources of air emissions. The insignificant sources include residential and other smaller No. 2 fuel oil and natural gas boilers, and emergency generators as well as closed sanitary landfills, aboveground storage tanks (ASTs), spray painting operations, welding operations, asphalt paving activities, degreasers, oil-water separators, woodworking activities, printing operations, and pesticide application activities (TAMS, July 2002).

Based on the type of pollutants emitted (criteria pollutants or HAPs), the CAA sets forth permit rules and emission standards for sources of certain sizes. The New Source Performance Standards (NSPS) apply to sources emitting criteria pollutants, while the National Emission Standards for Hazardous Air Pollutants (NESHAP) apply to sources emitting HAPs. The USEPA oversees programs for stationary source operating permits (Title V) and for new or modified major stationary source construction and operation (New Source Review) (TAMS, July 2002).

Table 4-3 summarizes the annual emissions of criteria pollutants from these stationary sources, as reported on the 2002 Emission Statement submitted to VDEQ. Emissions from residential heating units and generators were not included in the installation's Title V permit because VDEQ determined that they were insignificant and would be excluded. Additionally, US EPA's guidance, "*Major Source Determinations for Military Installations under the Air Toxics, New Source Review, and Title V Operating Permit Programs of the Clean Air Act,*" August 2, 1996, suggests that the housing can be disaggregated from other sources contributing to Title V. However, disaggregation under this 1996 white paper would need to be verified with VDEQ.

TABLE 4-3
Fort Belvoir Air Emissions- Baseline Conditions 2002

	Pollutants (tons per year)					
	SO_2	NO_x	CO	PM10	VOC	HAP Total
Stationary Sources	19.4	33.1	18.6	4.77	14.0	.065

Notes:
Actual emissions for stationary sources provided from the Fort Belvoir 2002 Emission Statement

The only sources of mobile emissions at Fort Belvoir are from Davison Army Airfield and the vehicular traffic associated with the regular operations of the post.

4.3.2 Consequences

4.3.2.1 Proposed Action

This section discusses the potential impacts to air quality that are associated with the proposed RCI construction projects at Fort Belvoir. The proposed action will involve installing up to 410 new natural gas furnaces and water heaters in New South Post Village and replacing each existing furnace and water heater in each new home in existing villages, totaling 1,630 homes. For the purposes of this EA, it is assumed that each heating unit in the 170 historic homes will also be replaced with new natural gas units. Additionally, new natural gas furnaces will be added with the construction of the Welcome Center, Recreation Center, and five new Village Centers.

The proposed action will also result in increased adverse impacts on air quality during the eight-year construction phase due to construction activities. These impacts are not expected to occur past the construction phase; therefore additional ambient air quality modeling has not been performed. All emissions are expected to be local (i.e., confined to the construction site area) and limited to the duration of the construction activities.

Site preparation, demolition, and rehabilitation, which will include stone crushing activities, a wall panel assembly facility, and possibly a concrete plant, will temporarily increase fugitive dust and air emissions (particularly particulate matter PM-10) during the construction period. The stone crusher, wall panel assembly facility, and concrete batch plant are all powered by electricity and therefore will not produce NOx or VOC emissions. The concrete plant (if an onsite plant is used) will be the same type as the offsite plant owned and operated by Clark Concrete, which can be powered either by a generator or by permanent electric power. The stone crusher will be one of the portable models manufactured by Kolberg-Pioneer/JCI. Although different crusher models may be used during the construction phase (depending on the volume and type of demolition material to be crushed and recycled for pavement at individual villages), all of their portable models can be powered either by a generator or by permanent electric power. FBRC will stipulate in demolition/construction subcontracts that the concrete plant and stone crusher must be powered directly from the electric power line (personal communication, Brad Koch, and Kolberg-Pioneer Website, July 2003).

Fugitive dust emissions also could be generated as a result of construction-related traffic and wind erosion of uncovered demolition and excavation areas. Fugitive dust emissions will be minimized throughout the construction period by use of conventional dust suppression and mitigation techniques such as soil erosion and sedimentation control, restrictions on where vehicles can travel onsite, speed controls for construction vehicles and equipment, and watering of exposed soil and demolition debris to control dust.

Paving operations, which typically produce VOC emissions, will also be conducted during the construction phase. Emissions from paving equipment have been incorporated in the emission estimates as part of construction vehicle emissions. Cutback asphalt (i.e., asphalt cement that has been liquefied by blending with petroleum (VOC) solvents) is sometimes used as a primer on the stone sub base prior to placing the base coat of paving. However, paving operations under the proposed action will not use VOC-containing materials; therefore, there will not be VOC emissions (personal communication, Tom Sedeski, July 2003).

There will also be emissions associated with engine exhaust from added personal vehicles and off-road construction equipment, including earth-moving equipment, paving equipment, cranes, and trucks. These emissions would primarily consist of NO_x, SO_2, PM, CO, and VOCs, which are typical of the type of emissions commonly observed at construction sites. Emissions will be minimized by assuring proper operation of the equipment.

Table 4-4 summarizes the projected total air emissions from stationary sources, vehicular (mobile) sources and construction activities. The projected emissions have been estimated for each year of construction activity. Detailed emission calculations for these sources are presented in Appendix B.

TABLE 4-4
Summary of Proposed Action Actual Emissions Fort Belvoir, Virginia

Activities	Annual Actual Emissions (tpy)				
	VOC	CO	NOx	SO2	PM-10
Year 2004					
Stationary Sources					
Heating Units (Net Change)	7.51E-04	0.005	0.013	8.19E-05	0.001
Stone Crusher[2]	--	--	--	--	0
Wall Panel Assembly Facility[2]	--	--	--	--	0
Concrete Batch Plant[2]	--	--	--	--	0.031
Subtotal	**7.51E-04**	**0.005**	**0.013**	**8.19E-05**	**0.032**
Mobile Sources					
On-Road Vehicles (Personal)	0.19	2.95	0.33	0.024	0.25
Off-Road Vehicles (Construction)	1.30	5.58	8.57	1.22	0.79
Subtotal	**1.50**	**8.53**	**8.90**	**1.25**	**1.04**
2004 Total	***1.50***	***8.54***	***8.91***	***1.25***	***1.08***
Year 2005					
Stationary Sources					
Heating Units (Net Change)	0.17	1.15	2.50	-0.96	0.18
Stone Crusher[2]	--	--	--	--	0.007
Wall Panel Assembly Facility[2]	--	--	--	--	0.001
Concrete Batch Plant[2]	--	--	--	--	0.031
Subtotal	**0.17**	**1.15**	**2.50**	**-0.96**	**0.22**
Mobile Sources					
On-Road Vehicles (Personal)	0.19	2.95	0.33	0.024	0.25
Off-Road Vehicles (Construction)	1.93	7.98	11.6	1.68	1.18
Subtotal	**2.12**	**10.9**	**11.9**	**1.71**	**1.43**
2005 Total	***2.29***	***12.1***	***14.4***	***0.75***	***1.66***
Year 2006					
Stationary Sources					
Heating Units (Net Change)	0.27	1.99	4.68	0.030	0.38
Stone Crusher[2]	--	--	--	--	0.003
Wall Panel Assembly Facility[2]	--	--	--	--	0.001
Concrete Batch Plant[2]	--	--	--	--	0.031
Subtotal	**0.27**	**1.99**	**4.68**	**0.030**	**0.41**
Mobile Sources					
On-Road Vehicles (Personal)	0.35	5.37	0.59	0.044	0.46
Off-Road Vehicles (Construction)	2.63	11.1	16.5	2.37	1.59
Subtotal	**2.98**	**16.4**	**17.1**	**2.42**	**2.05**
2006 Total	***3.26***	***18.4***	***21.8***	***2.45***	***2.46***
Year 2007					
Stationary Sources					
Heating Units (Net Change)	0.26	1.89	4.43	0.028	0.358

TABLE 4-4
Summary of Proposed Action Actual Emissions Fort Belvoir, Virginia

Activities	Annual Actual Emissions (tpy)				
	VOC	**CO**	**NOx**	**SO2**	**PM-10**
Stone Crusher[2]	--	--	--	--	0.003
Wall Panel Assembly Facility[2]	--	--	--	--	0.001
Concrete Batch Plant[2]	--	--	--	--	0.031
Subtotal	**0.26**	**1.89**	**4.43**	**0.028**	**0.39**
Mobile Sources					
On-Road Vehicles (Personal)	0.35	5.37	0.59	0.044	0.46
Off-Road Vehicles (Construction)	2.76	11.6	17.4	2.50	1.69
Subtotal	**3.11**	**17.0**	**18.0**	**2.55**	**2.15**
2007 Total	**3.37**	**18.9**	**22.4**	**2.57**	**2.55**
	Year 2008				
Stationary Sources					
Heating Units (Net Change)	0.19	1.36	3.21	0.020	0.26
Stone Crusher[2]	--	--	--	-	0.002
Wall Panel Assembly Facility[2]	--	--	--	-	0.001
Concrete Batch Plant[2]	--	--	--	--	0.031
Subtotal	**0.19**	**1.36**	**3.21**	**0.020**	**0.29**
Mobile Sources					
On-Road Vehicles (Personal)	0.35	5.37	0.59	0.044	0.46
Off-Road Vehicles (Construction)	2.28	9.63	14.5	2.08	1.37
Subtotal	**2.63**	**15.0**	**15.1**	**2.13**	**1.84**
2008 Total	**2.81**	**16.4**	**18.3**	**2.15**	**2.13**
	Year 2009				
Stationary Sources					
Heating Units (Net Change)	0.063	0.46	1.08	0.007	0.088
Stone Crusher[2]	--	--	--	--	0.001
Wall Panel Assembly Facility[2]	--	--	--	--	0.001
Concrete Batch Plant[2]	--	--	--	--	0.018
Subtotal	**0.063**	**0.46**	**1.08**	**0.007**	**0.11**
Mobile Sources					
On-Road Vehicles (Personal)	0.19	2.95	0.33	0.024	0.25
Off-Road Vehicles (Construction)	0.88	3.71	5.52	0.80	0.53
Subtotal	**1.08**	**6.67**	**5.85**	**0.82**	**0.79**
2009 Total	**1.14**	**7.13**	**6.93**	**0.83**	**0.90**
	Year 2010				
Stationary Sources					
Heating Units (Net Change)	0.009	-0.020	-0.32	-1.38	-0.050
Stone Crusher[2]	--	--	--	--	0.001
Wall Panel Assembly Facility[2]	--	--	--	--	0.001
Concrete Batch Plant[2]	--	--	--	--	0.009
Subtotal	**0.009**	**-0.020**	**-0.32**	**-1.38**	**-0.04**

TABLE 4-4
Summary of Proposed Action Actual Emissions Fort Belvoir, Virginia

Activities	Annual Actual Emissions (tpy)				
	VOC	CO	NOx	SO2	PM-10
Mobile Sources					
On-Road Vehicles (Personal)	0.12	1.79	0.20	0.015	0.15
Off-Road Vehicles (Construction)	0.22	0.86	1.15	0.17	0.14
Subtotal	**0.33**	**2.65**	**1.35**	**0.19**	**0.29**
2010 Total	**0.34**	**2.63**	**1.03**	**-1.20**	**0.25**
	Year 2011				
Stationary Sources					
Heating Units (Net Change)	0.039	0.28	0.67	0.004	0.054
Stone Crusher[2]	--	--	--	--	0.001
Wall Panel Assembly Facility[2]	--	--	--	--	0
Concrete Batch Plant[2]	--	--	--	--	0
Subtotal	**0.039**	**0.28**	**0.67**	**0.004**	**0.055**
Mobile Sources					
On-Road Vehicles (Personal)	0.12	1.79	0.20	0.015	0.15
Off-Road Vehicles (Construction)	0.056	0.19	0.18	0.030	0.033
Subtotal	**0.17**	**1.98**	**0.38**	**0.045**	**0.19**
2011 Total	**0.21**	**2.27**	**1.04**	**0.049**	**0.24**

Notes:

1-Due to phasing the construction work over the 8-year period, air emissions, specifically NOx, have been reduced below 25 tpy.

2-The stone crusher, wall panel assembly facility, and concrete batch plant are all powered by electricity. Therefore, only emissions from particulate matter are quantified.

New Source Review Program

CAA regulations require that any owner/operator proposing a "new source" such as proposing to 1) build a new major stationary source of criteria air pollutants; or 2) perform major modifications to an existing stationary source of criteria air pollutants, in an air quality control region must apply for a preconstruction air emissions permit and submit to certain preconstruction review requirements and mitigation. These preconstruction review regulations for new sources fall under two major programs: 1) Prevention of Significant Deterioration (PSD) provisions (for attainment areas) and 2) Nonattainment Area (NAA) provisions.

Upon final engineering designs, FBRC in coordination with DPW&L-ENRD will apply for any required permits for new or modified stationary sources and new construction support facilities under the proposed action and in accordance with all applicable state regulations, including but not limited to 9 VAC 5-50-260 (Emission Standards for New and Modified Stationary Sources) and 9 VAC 5-80 (Permits for New and Modified Stationary Sources).

PSD

The PSD program is designed to keep an attainment area in continued compliance with the NAAQS. This is accomplished by the major source or major modification obtaining a

preconstruction permit demonstrating it will implement best available control technologies (BACT) to control future emissions of pollutants. Additionally, an ambient air quality analysis of the impacts of construction and operation of a new or modified major source is required.

Major sources, according to 9 VAC 5-80-1710, are defined as any stationary source that emits or has the potential to emit 250 tpy or more of any pollutant regulated under the CAA.

Major modifications are defined as any physical or operational change that would result in a "significant net increase in emissions" from a stationary source located in an air quality control region. According to 9 Virginia Administrative Code (VAC) 5-80-1710, a significant net increase in emissions means a rate of emissions that would equal or exceed any of the following rates:

- CO—100 tpy
- NOx, SO_2, VOC—40 tpy
- PM10—15 tpy

Per the USEPA's guidance, "Major Source Determinations for Military Installations under the Air Toxics, New Source Review, and Title V Operating Permit Programs of the Clean Air Act", August 2, 1996, residential housing may be disaggregated from the installation in determining a major source. However, disaggregation under this 1996 white paper would need to be verified with VDEQ. If considered separate, then FBRC would need to evaluate the total emissions separately as a minor NSR or major NSR source for permitting purposes.

Even if not disaggregated, projected emissions from the heating units are well below the PSD major source or major modification threshold levels. Projected emissions due to construction activities are not a major modification and also do not meet the major source potential to emit threshold. Therefore, the proposed action would not be subject to PSD requirements. Projected emission estimates are shown in Table 4-5.

NAA

NAA provisions are designed to facilitate efforts to improve degraded ambient air quality and bring nonattainment areas into attainment. Achievement of the net improvement is done through the application of lowest achievable emission rate (LAER) technology, emission offsets, alternative site analysis, and compliance certification.

The provisions of NAA apply to the construction of any major stationary source or major modification to a major source, if the source or modification is or would be major for the pollutant for which the area is designated nonattainment (9 VAC 5-80-2000). Source modifications that result in a significant increase of a pollutant for which the source is major and designated nonattainment require NAA review. Fort Belvoir is located in a severe nonattainment area for ozone and is a major source for NOx and SO_2. Therefore, NAA requirements would apply to this proposed project for ozone precursors, VOC and NOx if emissions of these pollutants from the proposed action exceed NAA thresholds.

Major sources, according to 9 VAC 5-80-1710, are defined as any stationary source that emits or has the potential to emit 25 tpy or more of VOC or NOx in ozone nonattainment areas classified as severe in 9 VAC 5-20-204 A.

Major modifications are defined as any physical or operational change that would result in a "significant net increase in emissions" of qualifying nonattainment pollutant. According to 9 VAC 5-80-2010, a significant net increase in emissions means a rate of emissions that would equal or exceed any of the following rates:

- NOx, VOC- 25 tpy

Per US EPA's guidance, "Major Source Determinations for Military Installations under the Air Toxics, New Source Review, and Title V Operating Permit Programs of the Clean Air Act", August 2, 1996, heating units from residential housing may be disaggregated from the installation in determining a major source. However, disaggregation under this 1996 white paper would need to be verified with VDEQ. If considered separate, then FBRC would need to evaluate the total emissions separately as a minor NSR or major NSR source for permitting purposes.

Additionally, potential emissions from proposed heating units are below the NAA major modification thresholds and therefore would not be subject to NAA requirements. There are no emissions of nonattainment area pollutants from construction activities. The potential-to-emit-emission estimates are shown in Table 4-5. As the table shows, the highest year of potential emissions is 2007, with 22.5 tpy of NOx.

TABLE 4-5
Summary of Stationary Sources Potential Emissions
Fort Belvoir, Virginia

Activities	Annual Potential Emissions (tpy)				
	VOC	CO	NOx	SO2	PM-10
Year 2004					
Heating Units	0.010	0.070	0.16	0.001	0.013
Stone Crusher[2]	--	--	--	--	0
Wall Panel Assembly Facility[2]	--	--	--	--	0
Concrete Batch Plant[2]	--	--	--	--	0.066
Year 2004 Total (tpy)	**0.010**	**0.070**	**0.16**	**0.001**	**0.080**
Year 2005					
Heating Units	1.06	7.69	18.1	0.12	1.46
Stone Crusher[2]	--	--	--	--	0.016
Wall Panel Assembly Facility[2]	--	--	--	--	0.028
Concrete Batch Plant[2]	--	--	--	--	0.066
Year 2005 Total (tpy)	**1.06**	**7.69**	**18.1**	**0.12**	**1.57**
Year 2006					
Heating Units	1.19	8.64	20.3	0.13	1.64
Stone Crusher[2]	--	--	--	--	0.006
Wall Panel Assembly Facility[2]	--	--	--	--	0.028
Concrete Batch Plant[2]	--	--	--	--	0.066
Year 2006 Total (tpy)	**1.19**	**8.64**	**20.3**	**0.13**	**1.74**
Year 2007					
Heating Units	1.32	9.58	22.5	0.14	1.82
Stone Crusher[2]	--	--	--	--	0.006

TABLE 4-5
Summary of Stationary Sources Potential Emissions
Fort Belvoir, Virginia

Activities	Annual Potential Emissions (tpy)				
	VOC	CO	NOx	SO2	PM-10
Wall Panel Assembly Facility[2]	--	--	--	--	0.028
Concrete Batch Plant[2]	--	--	--	--	0.066
Year 2007 Total (tpy)	**1.32**	**9.58**	**22.5**	**0.14**	**1.92**
Year 2008					
Heating Units	0.94	6.82	16.0	0.10	1.30
Stone Crusher[2]	--	--	--	--	0.004
Wall Panel Assembly Facility[2]	--	--	--	--	0.028
Concrete Batch Plant[2]	--	--	--	--	0.066
Year 2008 Total (tpy)	**0.94**	**6.82**	**16.0**	**0.10**	**1.39**
Year 2009					
Heating Units	0.33	2.39	5.61	0.036	0.45
Stone Crusher[2]	--	--	--	--	0.001
Wall Panel Assembly Facility[2]	--	--	--	--	0.028
Concrete Batch Plant[2]	--	--	--	--	0.039
Year 2009 Total (tpy)	**0.33**	**2.39**	**5.61**	**0.036**	**0.52**
Year 2010					
Heating Units	0.18	1.31	3.07	0.020	0.25
Stone Crusher[2]	--	--	--	--	0.001
Wall Panel Assembly Facility[2]	--	--	--	--	0.028
Concrete Batch Plant[2]	--	--	--	--	0.019
Year 2010 Total (tpy)	**0.18**	**1.31**	**3.07**	**0.020**	**0.30**
Year 2011					
Heating Units	0.25	1.84	4.33	0.028	0.35
Stone Crusher[2]	--	--	--	--	0.001
Wall Panel Assembly Facility[2]	--	--	--	--	0
Concrete Batch Plant[2]	--	--	--	--	0
Year 2011 Total (tpy)	**0.25**	**1.84**	**4.33**	**0.028**	**0.35**

Notes:

1. Due to phasing the construction work over the 8-year period, air emissions, specifically NOx, have been reduced below 25 tpy.

2. The stone crusher, wall panel assembly facility, and concrete batch plant are all powered by electricity. Therefore, only emissions from particulate matter are quantified.

Other development projects on the post that have begun or will be in operation concurrently with the proposed action have projected emissions ranging from 19.8 tpy to 52.2 tpy for the years 2004-2008 (DIS-ENRD, August 2001). The combined impact of these sources, along with the proposed action will most likely cause stationary sources at the post to be subject to nonattainment NSR permitting requirements because of the potential post-wide NOx net increase above the NSR threshold of 25 tpy. The applicability of NSR requirements because

of the potential post-wide NOx net increase may need to be reviewed again as these projects reach the air permitting and facility final design stage.

General Conformity

The CAA General Conformity Rule (40 CFR Parts 6, 51, and 93 and 93 and 9 VAC 5-160) requires federal agencies to make written conformity determinations for federal actions in or affecting nonattainment or maintenance areas. Proposals for federal actions must include evaluations of potential changes in direct and indirect air emissions caused by the actions and must determine whether the actions conform to applicable state and federal implementation plans.

The maximum increase in air emissions that is exempt from a detailed air quality analysis is called the *de minimis* level. As defined by the general conformity rule, if the emissions of a criteria pollutant (or its precursors) do not exceed the *de minimis* level, the federal action has minimal air quality impact, and therefore, the action is determined to conform for the pollutant under study and no further analysis is necessary. Conversely, if the total direct and indirect emissions of a pollutant are above the *de minimis* level, a formal general conformity determination is required for that pollutant. The *de minimis* levels for each pollutant are defined in the Federal Conformity Rule and vary depending on the pollutant and the severity of the nonattainment status.

Fort Belvoir is in Fairfax County, Virginia, an attainment area for all NAAQS pollutants except ozone, and a severe nonattainment area for ozone. Because ozone is the only pollutant with a nonattainment status, the ozone precursors, NO_x, and VOCs are the only pollutants that require evaluation. For a severe ozone nonattainment area, the *de minimis* criterion is 25 tpy for both NOx and VOC.

Information provided by the post on existing air permits and current data was used to determine air emissions under the existing conditions. Where appropriate, the same methods were used to calculate emissions estimates for conditions under the proposed action. This technique establishes a basis for determining the change in emissions caused by the proposed action.

Table 4-6 summarizes the annual changes in emissions for the actions analyzed in this EA and how they compare with the *de minimis* levels for the area.

TABLE 4-6
General Conformity Analysis
Fort Belvoir, Virginia

Activities	Annual Actual Emissions (tpy)	
	VOC	NOx
2004 Total	*1.50*	*8.91*
2005 Total	*2.29*	*14.4*
2006 Total	*3.26*	*21.8*
2007 Total	3.37	22.4
2008 Total	*2.81*	*18.3*
2009 Total	*1.14*	*6.93*

2010 Total	*0.34*	*1.03*
2011 Total	*0.21*	*1.04*
***De minimis* level**	**25.0**	**25.0**

Due to phasing the construction work over an eight year period, the net increase in emissions associated with the proposed action, as shown in Table 4-6 is below the *de minimis* levels (25 tpy) for NOx and VOCs. The calculations in Appendix B show the detailed activities generating air emissions on a yearly basis from 2004 through 2011. On the basis of the *de minimis* level criteria set for the in the General Conformity rule, the proposed action is exempt from the CAA conformity requirements and does not require a detailed analysis of air quality. A "Record of Non-Applicability to the General Conformity Rule" (RONA) is attached in Appendix B.

The Phase I Attainment Plan (MWAQC, 1997) provides daily target levels of 362.9 tons per day (tpd) of VOCs and 637.1 tpd of NOx for the metropolitan Washington ozone nonattainment area (which includes Fairfax County). The increase in annual emissions would not make up 10 percent or more of the available regional emission inventory for VOCs or NOx (nonattainment pollutants), and thus would not be regionally significant, per 9 VAC 5-160-20. The project would also be regionally insignificant under the Draft Severe SIP proposed emission targets, which are 347.4 tpy of VOC and 626.1 tpy of NOx for 2002 and 339 tpy for VOC and 538.8 tpy of NOx for 2005.

Emission estimates have been calculated by phasing the proposed action over 8 years in order to reduce NOx emission levels to below 25 tpy. These conforming levels will be maintained by controlling the phasing of the construction and hours of equipment operation in order to remain below *de minimis*. Upon final engineering analysis and economic feasibility analysis for construction activities, estimated emissions might be reduced. The installation does have option to not grant leases for the temporary construction support facilities in order to reduce air emissions.

4.3.2.2 No Action Alternative

Under the no action alternative, air pollutant emissions associated with the proposed action would not occur. However, it is expected that there would be net increases in stationary source emissions on the post from the implementation of other post-wide development projects within the next few years.

4.4 Noise

4.4.1 Affected Environment

Noise is defined as unwanted sound that interferes with normal human activities. There is a wide diversity of human responses to noise, which vary according to the type and characteristics of the noise source. For the Army, high sound levels are both part of the job of operating weapons systems and a necessary training condition since soldiers must learn to function in an environment similar to what they will encounter on the battlefield. Noise also affects wildlife populations.

The basic unit used to represent given sound levels is the decibel. Table 4-7 presents a range of decibel sound levels. A straight, unmodified decibel level is not used, however. To quantify the intrusiveness of nighttime noise, the USEPA recommends a special type of 24-hour average known as the day-night level, or L_{dn}. The L_{dn} is calculated so that noises that occur after 10 p.m. and before 7 a.m. are treated as if they are 10 decibels more intense. (Acentech, Inc., cited in USACE Fort Worth District, 1998).

Noise naturally dissipates by atmospheric attenuation as it travels through the air. Some other factors that can affect the amount of attenuation are ground surface, foliage, topography, and humidity. For each doubling of distance from a noise source, the level can be expected to decrease by approximately 6 decibels.

Currently, the major noise sources on Fort Belvoir include the Davidson Army Airfield and the 249th Engineering Battalion (Prime Power). Prime Power uses diesel generators for training purposes. The noise level of the generators range from 107 decibel A-rated (dBA) to 114 dBA. These noise sources are not in the vicinity of any residential area or the newly proposed village areas (Adams, 2002).

The current noise around and within the New South Post Parcel Village area would be considered consistent with noise around a typical commercial or office area. The contributing noise around the South Post Parcel area include light traffic along 12th Street and Belvoir Road, activities within or near the commercial areas (i.e., Van Noy Library, Post Chapels, Child Development Center, Logan Dental Clinic, Body Shop fitness center, Barden Education Center, Soldier and Family Support Center), and activities within or near the Barden Education Center, Soldier, Family Support Center and the Youth Center. Currently the noise within the residential areas of the RCI footprint would be considered consistent with normal suburban residential noise conditions.

TABLE 4-7
Common Sound Levels

Location/Activity	Sound Levels (decibels)
Near Jet plane at takeoff	140
Near air-raid siren	130
Threshold of pain	120
Thunder	110
Garbage truck, trailer truck at roadside	110
Stone Crushing (Temporary Construction Site)	90 to 108*
Power lawnmower at 50 feet	90
Backhoe, Paver	85
Cement mixer, Power saw	80
Compressor	75
Freeway traffic at 50 feet	70
Conversational speech	60

TABLE 4-7
Common Sound Levels

Average residence	50
Bedroom	40
Soft whisper at 15 feet	30
Rustle of leaves	20
Breathing	10
Threshold of hearing	0

* - Estimated sound pressure levels for all activities involved in stone crushing (i.e., crusher, feeder, and screen)

Source: Acentech, Inc., 1990, cited in USACE Fort Worth District, 1998

4.4.2 Consequences

4.4.2.1 Proposed action

Short-term minor adverse effects would be expected. Given that construction activities will occur in phases throughout the RCI footprint, the project duration (8 years), and noise will be intermittent at some locations depending upon the activity (i.e., the stone crusher at the temporary construction site). These short-term minor adverse effects would be in the annoyance range (above 70 decibels) for residents and wildlife. Occupational Safety and Health Administration (OSHA) standards should protect any construction workers who would be closer to the source of any new noise.

Implementation of the proposed action would be expected to result in additional sources of noise during construction activities due to the operation of construction equipment and construction activities in general. Noise produced by construction equipment varies considerably depending on the type of equipment used and its operation and maintenance (Table 4-7). Typical equipment anticipated at the project sites includes backhoes, loaders, bulldozers, rollers, motor graders, power saws, and compressors.

During demolition, construction, and/or renovation, sensitive receptors to noise within the RCI footprint include the occupants of each nearby village area at the time of the project activities. Sensitive receptors to noise adjacent to the RCI footprint near the residential areas include the Fort Belvoir Elementary School and North Post Child Development Center near the Lewis Heights residential area; and the Dewitt Hospital and administrative offices adjacent to Colyer Village. The off-post residences closest to construction activities are located 100-150 feet south of Woodlawn Village across Pole Road; about 100 feet southeast side of River Village (separated by a 50-vegetated buffer); and about 200 feet northeast of River Village across Mount Vernon Memorial Highway.

Sensitive receptors to noise directly adjacent to the New South Post Village parcel include the Dewitt Hospital, administrative offices, Logan Dental Clinic, South Post Child Development Center, Van Noy Library, Religious Center, Barden Education Center, and the Youth Services Center. The closest residential area to the New South Post Village parcel is Colyer Village, which is adjacent to the parcel on the northeast corner. The next closest

residential areas to the New South Post Village parcel area are located approximately 1,500 feet to the east (Dogue Creek) and southeast (Park Village) of the parcel.

Sensitive receptors to noise near the stone crushing temporary construction site include the veterinary clinic, located approximately 200 feet east of the stone crushing temporary construction site. The noise produced at this site may be a nuisance to the animals within the clinic. However, the noise generated at this site will be intermittent. Rock crushing activities will not be conducted on a regular basis. Materials will be stockpiled during demolition and run through the crusher toward the end of major demolition activities or as needed for road building. Noise should not be a concern at the lumberyard temporary construction site, because the noisy panel construction activities will occur indoors.

During the duration of the project, wildlife might experience some annoyance from noise; however, the noise would be of short duration and intermittent. Wildlife living in the vicinity of the RCI footprint is acclimated to a suburban noise environment and would not be adversely affected by the closer proximity of the noise from a residential setting upon completion of the construction.

The noise generated during the demolition, construction, and/or renovation activities will be limited to daylight hours. Because the project will be implemented in phases, construction noise generated will be on-going for the full 8-year duration within the RCI footprint, but not on-going for the full project duration within each project site, except for the temporary construction sites (stone crushing and lumber yard).

FBRC will respect distances and sound-mitigation techniques in regards to all home replacement, new housing, and renovation activities and will consult and coordinate with the Fort Belvoir Industrial Hygienist and the representatives of each sensitive receptor during the project as needed.

4.4.2.2 No Action Alternative

No effects would be expected.

4.5 Geology and Soils

4.5.1 Affected Environment

4.5.1.1 Geology and Topography

Fairfax County lies within the Coastal Plain and Piedmont Physiographic Provinces. The fall line separating these provinces trends northeast to southeast, and is roughly parallel to Interstate 95 in the vicinity of Fort Belvoir. Fort Belvoir's Main Post lies within the Coastal Plain Physiographic Province. The Coastal Plain Physiographic Province consists of unconsolidated sand, silt, and clay underlain by residual soil and weathered crystalline rocks. Most of the Coastal Plain Physiographic Province deposits in the Fort Belvoir area consist of a sequence of unconsolidated Cretaceous sediments that belong to the Potomac Group (Larson and Froelich, 1977, as cited in US Army Garrison, March 2001). These sediments consist of predominantly lenticular deposits of sand, silt, clay, and gravel of non-marine origin (Force, 1975, as cited in US Army Garrison, March 2001). The Potomac Group

is about 600-feet thick beneath most of the installation (Law and Froelich, 1977, as cited in US Army Garrison, March 2001).

The topography of Fort Belvoir consists of two nearly level plateaus that run south-southeast towards the Potomac River, and slope steeply to lowlands that are primarily associated with the floodplains of Accotink and Dogue Creeks (US Army Garrison, September 2001). Steep slopes, ravines, and stream valleys surround the two plateaus on the east, south, and west sides. The installation ranges in elevation from approximately mean sea level (msl) along the Potomac River to 230 feet above msl at the intersection of Beulah and Woodlawn Roads. Uplands and plateaus make up about 40 percent of the Main Post's land area, lowlands make up another 40 percent, and steep slopes make up 20 percent.

A combination of weakly cemented sedimentary substrates and exposure to erosive forces of wind and water near the Potomac River are mainly responsible for unstable steep slope conditions. Steep and highly erodible slopes are also found along the eastern and western edges of the western plateau and in deeply cut stream channels (US Army Garrison, March 2001).

4.5.1.2 Soils

Fort Belvoir's uplands are underlain by sands, silts, and clays of riverine origin. Uplands underlain by sands and silts tend to be more stable than those underlain by clays. Uplands that are underlain by clayey soils form undulating and rolling hills and the dominant geomorphic process in these areas is mass wasting that includes downhill creep, landslides, slumping, and rock falls. Lowlands and valley bottoms are typically underlain with alluvium. The dominant geomorphic process is active riverine erosion and deposition during overbank flooding. Surface drainage is commonly poor due to the shallow water table. Drainage usually occurs as surface runoff, with runoff greatest on the steeper slopes and increasing with construction activity and the removal of vegetation, which greatly increases the rate of erosion and the probability of creep and slumping (US Army Garrison, March 2001).

The Soil Conservation Service (SCS) surveyed soils at Fort Belvoir in 1982. According to the survey, there are nineteen named soil series on Fort Belvoir, as well as areas of mixed alluvium (Entisols) and tidal marsh (Histosols) that are not sufficiently defined to be classified as series. The urban built-up unit (UB [1,898 acres]) includes primarily ridge top or other well-drained flatter areas that have been minimally to drastically disturbed by construction and development over the years. The cut and fill unit (587 acres) is generally of unknown source, but it is likely to be material selected for high structural stability following placement. Table 4-8 lists the soils mapped within Fort Belvoir and the housing parcels in which they fall. Soils within the villages consist mostly of the UB unit. A complete table of the soil units at Fort Belvoir and detailed descriptions of each is provided in Appendix C. In addition, soil units on Fort Belvoir are shown on Figure 4-3.

TABLE 4-8
Soil Types by Village

Village	Soil Type	Acres
Belvoir Village	61E	3.5
Belvoir Village	61 C	0.2
Belvoir Village	UB	58.1
Colyer Village	61D	0.5
Colyer Village	37 B	3.2
Colyer Village	UB	11.3
Dogue Creek Village	26 A	0.1
Dogue Creek Village	46B	0.8
Dogue Creek Village	53A	3.2
Dogue Creek Village	61 C	0.3
Dogue Creek Village	61D	1.5
Dogue Creek Village	61 E	0.2
Dogue Creek Village	85 A	0.2
Dogue Creek Village	UB	36.5
Fairfax Village	100 C	0.4
Fairfax Village	37 B	0.8
Fairfax Village	61 D	2.3
Fairfax Village	UB	38.2
George Washington Village	51B	0.4
George Washington Village	61D	7.6
George Washington Village	UB	36.7
Gerber Village	UB	34.7
Jadwin Village	61 C	0.002
Jadwin Village	61D	0.4
Jadwin Village	61E	0.1
Jadwin Village	UB	28.6
Lewis Heights Village	54B	0.9
Lewis Heights Village	UB	46.8
New South Post Village	37 B	21.5
New South Post Village	45 B	0.7
New South Post Village	46 A	7.1
New South Post Village	46 C	4.1
New South Post Village	54 B	0.9
New South Post Village	61 C	7.3
New South Post Village	61 D	0.04

TABLE 4-8
Soil Types by Village

Village	Soil Type	Acres
New South Post Village	61E	1.1
New South Post Village	CF	3.3
New South Post Village	UB	34.3
Park Village	61C	9.6
Park Village	61 E	0.5
Park Village	UB	4.3
River Village	34 C	0.01
River Village	UB	37.7
Rossell Loop Village	61E	0.1
Rossell Loop Village	UB	18.5
Woodlawn Village	26A	1.4
Woodlawn Village	34B	2.6
Woodlawn Village	35A	6.1
Woodlawn Village	51A	16.2
Woodlawn Village	53A	13.3
Woodlawn Village	CF	4.3
Woodlawn Village	UB	112.8
Construction Support Sites	37 B	4.8
Construction Support Sites	46 B	7.4
Construction Support Sites	61 C	0.2
Construction Support Sites	61 D	0.02
Construction Support Sites	UB	13.6

The Fort Belvoir Master Plan (Fort Belvoir 1993) designates soils with slopes of 15 percent or greater as steep slopes. Soils on these slopes have a greater tendency to erode and wash away during rain events than soils on slopes of less than 15 percent. Because construction activities are discouraged on Fort Belvoir on these unstable slopes, these areas are designated as a severe land constraint. The Appling gritty loam, Dumfries sandy loam, Louisberg coarse sandy loam, Lunt fine sandy loam, and Quantico fine sandy loam units are considered to be steep. According to the soils information in the Fort Belvoir GIS, these units are not found within the family housing units.

4.5.1.3 Prime Farmland

Prime farmland soils are protected under the Farmland Protection Policy Act (FFPA) of 1981. The intent of the act is to minimize the extent to which federal programs contribute to the unnecessary or irreversible conversion of farmland soils to nonagricultural uses. The act

also ensures that federal programs are administered in a manner that, to the extent practicable, will be compatible with private, state, and local government programs and policies to protect farmland. The National Resources Conservation Service (NRCS) is responsible for overseeing compliance with the FPPA and has developed the rules and regulations for implementation of the act (see 7 CFR, Part 658, revised January 1, 1998).

According to the 1993 Master Plan, development in areas containing prime farmlands is allowed at Fort Belvoir due to the impracticality of farming on a military installation (US Army Garrison, 1993). Approximately 1,600 acres (19 percent) of Fort Belvoir's soils have been designated as "prime" farmlands. Map units that are complexes or associations containing components of urban land or miscellaneous areas as part of the map unit name cannot be designated as prime farmland. Twelve soils on Fort Belvoir have been identified as prime farmlands, four of which fall within the housing villages (20.5 acres total).

4.5.1.4 Seismic Activity

Major seismic activity is not a significant concern for buildings in Fairfax County.

4.5.2 Consequences

4.5.2.1 Proposed action

Geology, Topography, Prime Farmland, and Seismic Activity

No effects to geology, topography, prime farmland, or seismic activity would be expected from the proposed action.

Within currently developed areas, there will be some modification to some areas with slopes greater than 15%. These areas are small and independent sloping areas (most likely created during previous construction activities) that do not connect to larger riparian systems, typically located around the perimeter of these developed sites. Where this is the case, and the modification is needed to properly provide interconnected streets and a logical neighborhood framework, these small sloped areas may be regraded.

Within currently undeveloped areas, development on slopes greater than 25% will be avoided completely. Development of roads and buildings will be avoided on natural slopes between 15 and 25%, with a few minor exceptions: small increments of the eastern edge of the perimeter road in New South Post Village in areas needed to provide proper connectivity for the residents, and in isolated areas in increments of no more than 5,000 square feet where edges of roads or buildings may encroach.

The use of retaining walls will be explored and used in conjunction with other techniques to minimize grading and reduce impacts to vegetative plant communities within the footprint.

Areas designated as prime farmland are currently developed. Redevelopment will not cause adverse effects to these areas.

Soils

Both short-term minor adverse effects and long-term minor beneficial effects would be expected. Effects on soils would be limited to those areas within the villages where demolition of existing houses and new construction are expected.

In the short term, increased runoff and erosion would occur during site construction due to removal of vegetation, exposure of soil, and increased susceptibility to wind and water erosion. However, these effects would be minimized by the use of appropriate best management practices (BMPs) for controlling runoff, erosion, and sedimentation. (See Section 4.6 for a discussion of storm water management.)

In the long term, implementation of the proposed action would decrease soil erosion from storm water runoff through the creation of storm water BMPs. Although overall impervious areas will increase with the proposed action, water flowing from those surfaces would be routed to the storm water BMPs to prevent flooding, minimize erosion, and improve the quality of storm water before it is discharged to receiving streams and ultimately into Chesapeake Bay. (See Section 4.6 for a discussion of storm water management.)

4.5.2.2 No Action Alternative

Geology, Topography, Prime Farmland, and Seismic Activity

No effects would be expected.

Soils

No significant effects would be expected for soils under the no action alternative. Construction activities related to normal maintenance and repair of housing units would result in some disturbance to soils. Over time, erosion could result from the lack of stormwater management facilities in many of the existing housing villages under existing conditions.

4.6 Water Resources

4.6.1 Affected Environment

4.6.1.1 Surface Water

Fort Belvoir lies within the 64,000 square-mile Chesapeake Bay watershed. The Chesapeake Bay is a complex ecosystem that has received study by a variety of federal and state agencies. These studies have provided significant insight into the system's workings and into some of the reasons why the Bay has experienced adverse effects to water, sediments, and living organisms.

Fort Belvoir lies on the Potomac River, the second largest tributary to the Chesapeake Bay. Surface water resources on Fort Belvoir include Dogue Creek, Pohick Creek, Accotink Creek, Mason Run, several unnamed tributaries, groundwater seeps, three manmade ponds, Gunston Cove, and Accotink and Pohick Bays. (Wetlands are discussed in Section 4.7 – Biological Resources.)

The baseline watershed survey (US Army Garrison, March 2001) identified seven main watersheds on Fort Belvoir. Fort Belvoir's three largest watersheds originate off-post and discharge from Fort Belvoir: the Accotink Creek watershed, the Dogue Creek watershed, and the Pohick Creek watershed. The majority of water from within installation boundaries flows into these three watersheds. The remaining installation areas belong to four smaller on-post watersheds: the Accotink Bay watershed, the Pohick Bay watershed, the Gunston

Cove watershed, and the Potomac River watershed. These watersheds drain directly into these four water bodies without first entering Accotink Creek, Dogue Creek, or Pohick Creek. These major watersheds have been subdivided into a total of 52 subwatersheds (Figure 4-4).

DoD and the Department of the Army (DA) became a partner in watershed management in the Chesapeake Bay by signing the commitments outlined in the Chesapeake Bay Program and federal agencies' agreements (U.S. DoD, 1998). The Chesapeake Bay Restoration Act of 2000 amends the Federal Water Pollution Control Act to assist in the restoration of the Chesapeake Bay. The Chesapeake Bay Restoration Act of 2000 requires federal agencies that own or operate a facility within the Chesapeake Bay watershed to participate in regional and subwatershed planning and restoration programs. In addition, the Act requires federal agencies that own or occupy real property in the Chesapeake Bay watershed to ensure that the property, and actions taken with respect to the property, comply with the Chesapeake Bay Agreement, the Federal Agencies Chesapeake Ecosystem Unified Plan, and any subsequent agreements and plans. (US Army Garrison, March 2001).

The 1987 Chesapeake Bay Agreement set forth specific goals in a number of areas, including water quality. Most recently, the Chesapeake Bay Program partners signed a new Bay agreement designed to renew the historically significant 1987 agreement. This new agreement, Chesapeake 2000, guides the Chesapeake Bay Program partnership from 2000 until 2010. Fort Belvoir views these agreements, as the "overarching definers of its water resources management program. The agreements consider and integrate all of the forces influencing water resources management through initiatives addressing water quality and living resources" (US Army Garrison, March 2001).

In addition, as detailed in Section 4.7, the Coastal Zone Management Act of 1972 requires that federal projects that affect land uses, water uses, or coastal resources of a state's coastal zone must be consistent to the maximum extent practicable with the enforceable policies of that state's federally approved coastal zone management plan.

Fort Belvoir currently holds a Phase I VPDES permit for storm water discharges from industrial activity at Davison Army Airfield. The installation will also be covered under a general Virginia Pollutant Discharge Elimination System (VPDES) Phase II Storm Water permit as a regulated small municipal separate storm sewer system (MS4). The VPDES Phase I permit program also governs any construction activity including clearing, grading, and excavation activities, except for operations that results in the disturbance of less than 5 acres of total land area that is not part of a larger common plan of development or sale (Gillett, personal communication, June 2003). The Phase II VPDES program expands permit coverage to storm water discharges from construction activity that results in the disturbance of total land area of 1 acre or more.

The Chesapeake Bay Preservation Area Designation and Management Regulations (CBLAD, 2002) and the related Fairfax County Chesapeake Bay Preservation Ordinance (Fairfax County, 2003) restrict development within Resource Protection Areas (RPAs) and Resource Management Areas (RMAs). RPAs are defined by CBLAD as all tidal and contiguous non-tidal wetlands and perennial water bodies, plus a buffer of 100-foot width, landward of these features. In addition Fairfax County has included all land within the designated major floodplains as part of the RPA. Fairfax County is currently delineating the perennial/

intermittent boundary for all of the streams in the County based on newly developed field assessment protocols in an effort to define the perennial streams, for use in determining RPA boundaries.

Fairfax County expanded the protection provided through the RPA regulations, to include a variable width buffer around environmentally sensitive areas associated with streams, based on topographic slope and habitat quality. These buffers are defined in the Fairfax County Environmental Quality Corridor Policy. Fort Belvoir and its selected partner have agreed that the new development and re-development projects will be consistent with the Environmental Quality Corridor Policy, to the extent practicable.

ENRD conducted a installation-wide stream survey in 2001-2002, and submitted the perenniality designations that resulted from the survey to the U.S. Army Corps of Engineers (USACE). The stream channels were divided into four categories: perennial, intermittent, ephemeral, and storm channel. These delineations will be verified, using the Perennial Stream Field Identification Protocols (Fairfax County, 2003) to ensure consistency with the Fairfax County program. Table 4-9 summarizes the approximate length of each stream type located within each village footprint, based on the Fort Belvoir delineation. The majority of the channels within the proposed village footprints are storm channels, and these are considered to provide a marginal service.

TABLE 4-9
Linear Feet of Stream in Each Village Footprint

	Perennial Channel	Intermittent Channel	Storm Channel	Total
Belvoir Village	42	438	1547	2027
Colyer Village			373	373
Dogue Creek Village	45	171	3928	4144
Fairfax Village			474	474
George Washington Village	819	100	1824	2743
Gerber Village				
Jadwin Village		272	1112	1384
Lewis Heights Village		50	152	202
Park Village			869	869
River Village			897	897
Rossell Loop Village		22	768	790
Woodlawn Village			12,718	12,718
New South Post Village	1169	553	2035	3757

TABLE 4-9
Linear Feet of Stream in Each Village Footprint

	Perennial Channel	Intermittent Channel	Storm Channel	Total
Total	**2075**	**1605**	**26,697**	**30,377**

Note: Stream lengths are based on stream perenniality delineations in 2000 and 2001 by Performance Group Incorporated for DPW&L[3]-ENRD. These delineations and the locations of wetlands contiguous and connected by surface flow to perennial streams will be verified through field assessments prior to final design.

Based on the current RPA coverage from Fairfax County, Ft Belvoir has approximately 1,700 acres of land designated as RPA (Figure 4-4). The limits of the RPA currently include approximately 14.2 acres in the middle of River Village, 2.4 acres at the north end of George Washington Village, and 3.3 acres along the western boundary of Woodlawn Village. In addition, small areas associated with Building 409 in Rossell Loop Village, Building 67 and its associated detached garage in Belvoir Village, and Building 937 in Dogue Creek Village are also located within the RPA. Based on the current Fairfax County RPA coverage, the approximate impervious surface within the RPA, under existing conditions is summarized in Table 4-10 for each village.

TABLE 4-10
Existing Impervious Cover within the RPA

	RPA Area (acres)	Impervious in RPA (acres)	Percent Impervious in RPA
Belvoir Village	0.8	0.2	25
Dogue Creek Village	0.9	0.2	22
George Washington Village	2.4	0.85	37
River Village	14.2	5.1	36
Rossell Loop Village	0.1	0.0	0
Woodlawn Village	3.3	0.6	18
Proposed New South Post Village	0.2	0.0	0

Note: Data based on current Fairfax County RPA Layer. Stream pereniality will be verified through field assessments and RPA boundaries will then be adjusted, prior to final design.

The remaining housing villages (including the proposed New South Post Village) and the two construction support sites lie outside of the RPA. The Fort Belvoir stream mapping identifies some segments of perennial stream that are currently not included within the Fairfax County RPA and some segments of intermittent streams or storm channels that are included within the RPA. New field surveys will confirm stream perenniality and formally delineate the RPA. It is likely that an additional RPA area will be added within the New South Post Village as a result of this process.

[3] Formerly DIS (Directorate of Installation Support)

Additional land areas, identified as environmentally sensitive due to site-specific land characteristics (erodible soils, steep slopes, etc.), can be designated as RMAs. Most of Fairfax County (including all of Fort Belvoir) has been designated as a RMA.

Most of the storm water runoff from the villages proposed for redevelopment is currently collected in a curb and gutter system and discharged directly to the stream channels. The original construction of the villages predated any storm water management regulations requiring post-construction detention of storm water. There are two villages, for which there are stormwater management facilities. Most of the runoff from Woodlawn Villages is treated through multiple ponds located around perimeter of the village. Also portion of the stormwater from Lewis Heights Village is treated in a pond, along with the runoff from the adjacent Child Development Center. In recent retrofit opportunities, the ENRD has also installed risers in two locations in an attempt to temporarily pond water and protect the channels downstream. One riser was located outside New South Village, on the south side of 9th Street, and a second south and west of Gerber Village, off Gunston Road. ENRD has also installed outlet protection in several locations.

4.6.1.2 Groundwater

Fort Belvoir is underlain by three main groundwater aquifers: the lower Potomac, middle Potomac, and Bacons Castle Formation. The lower Potomac aquifer is the primary aquifer in eastern Fairfax County and on the installation. This aquifer exists between a layer of crystalline bedrock and a thick wedge of clay. Water in the lower Potomac aquifer flows to the southeast and is recharged in the western section of Fort Belvoir and to the north and west of the installation (US Army Garrison, March 2001). Water from this aquifer below Fort Belvoir is potable, however it is not currently a drinking water source. Any abandoned potable wells on the post have been closed and filled over the last 2 years. Additionally, there are five groundwater wells used for irrigation purposes, four at the North Post golf course and one at DLA (Bolton, June 25, 2002).

The middle Potomac aquifer consists of inter-fingering lenses of medium sand, silt, and clay of differing thickness. The middle Potomac confining unit is not present in the Fort Belvoir area. Water flow in the middle Potomac aquifer has not been well studied. The Bacons Castle Formation is the shallowest aquifer in the North and South Posts. This aquifer's flows are localized, originating from various recharges on the installation and draining to nearby streams, creeks, and large surface water bodies (US Army Garrison, March 2001).

Although the water table fluctuates based on precipitation, leakage, and evapo-transpiration, depth to the water table at Fort Belvoir is typically 10 to 35 feet below the ground surface. However, in some areas, fine-grained sediment (e.g., clay or fine silt) with low permeability is present in the subsurface, creating isolated local or regional confining layers. These confining layers may locally restrict vertical movement of ground water. The water table may be at or near the surface in areas near streams. Under saturated conditions, artesian wells (in which water rises to the surface) have been encountered at Fort Belvoir. This suggests that shallow groundwater flow closely relates to surface drainage features (US Army Garrison, March 2001).

4.6.1.3 Floodplains

Floodplains are important as a physical feature of the landscape, as a master planning designation for conservation of certain resource values, flood insurance planning, and as a regulatory designation for Executive Order (EO) 11988 (Floodplain Management), National Flood Insurance Program and Fairfax County Zoning Ordinance. From a planning perspective, EO 11988 sets forth the responsibilities of federal agencies in reducing the risk of flood loss or damage to personal property, minimizing the impact of flood loss, and restoring the natural and beneficial functions of floodplains. Under this order, Fort Belvoir is required to evaluate potential effects of any action occurring in a floodplain.

Floodplain and RPA management has primarily involved avoidance during development planning. Within this environmentally sensitive designation, 100-year floodplains are considered a moderate constraint and RPAs are considered a severe constraint. Moderately constrained areas are considered to be compatible only with lower intensity development, and must be thoroughly investigated before development. Severely constrained areas have the greatest degree of limitation, and are compatible only with very low-density or no development.

Fairfax County has mapped portions of the post. The 2003 Fairfax County 100-year floodplain is shown in Figure 4-4. The FEMA flood insurance map was also reviewed for comparison purposes.

George Washington Village. 1.0 acres in the George Washington Village, north of Mt Vernon Road are located within the Fairfax County 100-year floodplain, as currently mapped. There are currently 2 houses (Buildings 1569 and 1570) and a segment of Statesman Road located within the Fairfax floodplain. According to Fairfax County staff, the study that produced the floodplain along Dogue Creek was conducted in 1958 and FEMA conducted a re-study in 1986. Fairfax County is currently evaluating the two studies to determine which one will be recognized by the County. The Base Flood Elevation (BFE) in the FEMA 100-year floodplain in this area is 10 ft in the National Geodetic Vertical Datum of 1929 (NGVD29) datum, and approximately 9 ft in North America Vertical Datum of 1988 (NAVD88) datum. This elevation is 2 to 3 feet lower than the Fairfax County Floodplain BFE, which is approximately 12 ft (NAVD88). Because the Fairfax floodplain is older and currently under review, it is assumed for the purpose of this EA that the FEMA floodplain is the appropriate floodplain in this area.

River Village. Approximately one-third of River Village (13.8 acres) is located within the current Fairfax County 100-year floodplain of Dogue Creek. Similar to George Washington Village, the FEMA and Fairfax floodplains differ somewhat, FEMA being several feet lower. Again, because the Fairfax floodplain is under review and the FEMA study is more recent, the FEMA floodplain elevation will be assumed.

Dogue Creek Village. Dogue Creek Village is located immediately adjacent to but not within either the FEMA or Fairfax 100-year floodplain of Dogue Creek.

Belvoir Village. A portion of Belvoir Village (0.2 acres), along the Potomac River is designated as the Fairfax County 100-year floodplain. The only impervious surface within the floodplain is a small portion of Patrick Road.

The remaining housing villages (including the proposed New South Post Village) and the two construction support sites lie outside of the 100-year floodplain.

4.6.2 Consequences

4.6.2.1 Proposed Action

Surface Water

Both long-term beneficial and short-term minor adverse effects would be expected for surface water as a result of storm water management during and after the construction of new housing villages. The proposed action will first and foremost avoid impacts to stream channels where practicable through proper development planning. As detailed in section 4.5 Geology and Soils, the plans minimize development on slopes of greater than 15 percent, reducing erosion problems and its corresponding effect on water quality. In addition, where perennial streams remain near (or within) the village footprint boundary, development will be conducted in accordance with the Fairfax County Chesapeake Bay Preservation Ordinance and Environmental Quality Corridor Policy, in order to minimize impacts on the existing stream buffer. The increased impervious surface outside the RPA that will result from this action will be mitigated through standard storm water management practices, to meet the minimum standards and specifications in the Fairfax County Public Facilities Manual. Where practicable, infiltration-type storm water management practices will be implemented, in an attempt to more closely mimic the hydrology of a vegetated site and reduce the impacts of concentrated flows.

FBRC will evaluate the stream channels within the footprints, using the Fairfax County Perennial Stream Field Identification Protocols, to verify current stream designations. FBRC will also work with the Army Corps of Engineers, during wetland delineations, to identify any waters of the U.S., including jurisdictional wetlands and streams, within the footprints. The site plans will be modified, where practicable to avoid and minimize impacts to any waters of the US and to minimize impacts to intermittent or perennial streams. Mitigation for unavoidable impacts will be determined, in consultation with USACE, VDEQ and DPW&L-ENRD. Mitigation may include restoration and enhancement of stream channels and upland buffers, within the impacted subwatershed and within the installation to the extent practicable. At a minimum the storm water function of the impacted channels will be replaced through proper storm water management and outlet protection.

The proposed action is not expected to have significant direct impact to the streams on the installation, with one exception. There is one 530 foot stream channel that is currently designated as intermittent that drains a portion of the New South Post Village. The high density development in New South Post prevents the potential for entirely avoiding this channel. Approximately 150 feet of the channel will be preserved within the RPA buffer around the downstream perennial channel. The remaining 380 feet is likely to be piped. Mitigation for this impact will be determined through the process defined above.

There are two stream channels within the footprints that are currently designated as perennial. The 820 foot channel in George Washington village currently drains through the village in a large storm drain. This pipe will not be modified, therefore no impact is anticipated. The 1170 foot perennial channel through the New South Post Village will be maintained, with a 100-ft natural forested RPA buffer, therefore no impact is anticipated.

Although this is not currently part of the Fairfax RPA map, it is anticipated that field evaluations will result in an RPA through this area. All other streams currently designated as perennial or intermittent are small segments along the periphery of the footprints, and are not expected to be impacted by this action.

There are approximately 27,000 linear feet of storm channel that have a potential to be impacted by this action. The storm channel designation is an indication that these channels do not currently provide significant biological value, therefore they will be adjusted and moved as needed for this action, and proper storm water management and outlet protection will be provided to replace the storm water function of the channels.

No significant impacts to the RPAs are expected. Currently, significant portions of River Village and George Washington Village and small sections of several other village footprints are located within the current Fairfax County RPA. In Fairfax County, development within the RPA is regulated through the Chesapeake Bay Preservation Ordinance. The intent of the ordinance is to prevent clearing in the RPA as a result of new development, and to prevent additional encroachment or increase in impervious surface within the RPA for re-development projects. There are some exceptions, such as road or driveway crossings, flood control or storm water management facilities (Fairfax County, 2003). Based on the current Fairfax County RPA coverage, the approximate impervious surface within the RPA under existing conditions is summarized in Table 4-10 for each village. As noted previously, field assessments will be conducted by FBRC to determine stream perenniality and delineate wetlands contiguous and connected by surface flow to perennial streams. The results of the field assessments will be used to revise RPA boundaries. The site plans will then be modified to ensure consistency with the Fairfax County Chesapeake Bay Preservation Ordinance. Because Fairfax County ordinances do not apply to federal property, in lieu of the County's review process for exceptions, any exceptions and resulting mitigation requirements for the RCI project will be coordinated with ENRD and will be reviewed and approved by the Garrison Commander, on a case-by-case basis. No significant impacts to the RPA are anticipated.

FBRC will also review the sites, after completion of field surveys, for consistency with the Fairfax County Environmental Quality Corridor Policy. Site plans will be modified to the extent practicable to protect high quality habitats or sensitive areas identified.In addition to preservation of the 100-foot RPA buffers on perennial streams and wetlands contiguous and connected by surface flow to perennial streams, required by the Fairfax County Chesapeake Bay Preservation Ordinance, a vegetated buffer of up to 25 feet from the top of bank around intermittent streams and ecologically significant ephemeral streams and wetlands, will be maintained to the extent practicable.

The entirety of Fort Belvoir is located within the RMA. General statewide and local storm water regulations are applicable in these areas. As described in Section 4.6.1.1, these regulations require storm water management controls if there is an increase in impervious cover. The approximate amount of impervious area within each village (including the RPA) was computed based upon preliminary designs. The proposed action will increase impervious surface in all of the villages at which there are proposed changes. The percent impervious surface within the impacted areas will increase by 36 percent over existing conditions from 24 percent impervious surface to 33 percent. The largest change was in the

New South Post Village, where there are currently no buildings. Table 4-11 shows changes to impervious surface for each village.

The current percent impervious surface for each subwatershed impacted by the proposed action, and a list of villages that are at least partially located in each subwatershed is summarized in Table 4-12. The proposed changes are difficult to quantify because siting plans are not yet final; therefore a qualitative evaluation was conducted. The largest increases appear to be in Subwatersheds 03, 14, 19, 22, 24, and 34. The majority of these subwatersheds are currently between 18 percent and 20 percent impervious surface. Subwatershed 22 is at 22 percent and subwatershed 34 is at 28 percent impervious.

TABLE 4-11
Comparison of Impervious Cover by Village

	Existing		Proposed		Change	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Belvoir Village	10.7	17	13.0	21	2.3	21
Colyer Village	4.8	32	6.1	41	1.3	27
Dogue Creek Village	13.6	32	13.6	32	0.0	0
Fairfax Village	9.7	23	12.8	31	3.1	32
George Washington Village	13.4	30	14.4	32	1.0	7
Gerber Village	9.5	27	10.8	31	1.3	14
Jadwin Village	6.5	22	8.0	28	1.5	23
Lewis Heights Village	17.6	37	21.3	45	3.7	21
Park Village	3.6	25	4.6	32	1.0	28
River Village	12.7	34	12.7	34	0.0	0
Rossell Loop Village	5.2	28	7.4	40	2.2	42
Woodlawn Village	35.7	23	44.3	28	8.6	24
Proposed New South Post Village	10.4	13	39.1	49	28.7	278
Project Total	**153.4**	**24**	**208.1**	**33**	**54.7**	**36**

There is evidence to indicate that impervious cover can directly relate to stream conditions (Schueler and Holland, 2000). According the Schueler and Holland (2000) streams with less than 10 percent impervious surface are considered relatively unimpaired, those between 10 and 25 percent are stressed, and those greater than 25 percent are considered impaired.

During final design, FBRC will review the impacts on total impervious cover in the subwatershed. Special attention will be paid to provide the most effective BMPs in any watersheds where impervious surface is nearing this 25 percent threshold. While several subwatersheds are expected to have notable increases in impervious surface, the additional storm water management that will be provided, is expected to mitigate for this impact.

In the short term, construction activities would increase surface erosion and increase the dissolved solid and sediment content in the storm water runoff water, in turn reducing water quality in the surface waters. However, storm water runoff during the construction phase in the villages and in the construction areas will be adequately controlled through implementation of a erosion and sediment control plan, consistent with the Public Facilities Manual of the County of Fairfax (Fairfax County, 2001) and the Virginia Erosion and Sediment Control Handbook (VDCR, 1992). Temporary erosion and sediment control such as silt fencing to trap waterborne sediments, and permanent measures, such as reseeding and revegetation and rip rap at storm water discharge points, will be used to minimize adverse effects on water quality and stream channel habitat. These procedures will be summarized in an Erosion and Sediment Control Plan. This plan, as well as the standard operating practices for construction, spill control and response, and inspection and maintenance procedures will be summarized in a SWPPP to reduce any surface water impacts. The proposed erosion and sediment control practices will reduce the sediment load in the runoff, however minor short-term effects are anticipated from this activity.

TABLE 4-12
Summary of Subwatersheds Affected

Subwatershed	Current Percent Impervious	Villages Included
03	18%	New South Post
04	31%	Temporary Construction; Gerber
05	16%	Temporary Construction
06	2%	Temporary Construction
10	7%	Temporary Construction
11	19%	Temporary Construction; Gerber
14	20%	Fairfax; Belvoir; Gerber
17	7%	Belvoir
18	12%	Belvoir
19	18%	Belvoir; Rossell Loop, Jadwin
20	3%	Jadwin
21	17%	Jadwin; Dogue Creek
22	24%	Dogue Creek; Park; New South
24	18%	New South Post; Colyer; George Washington
25	13%	Colyer; George Washington
26	10%	George Washington
27	12%	George Washington
30	17%	Lewis Heights
31	21%	Lewis Heights
33	8%	Woodlawn

TABLE 4-12
Summary of Subwatersheds Affected

Subwatershed	Current Percent Impervious	Villages Included
34	29%	Woodlawn

Storm water management Best Management Practices (BMPs) will be provided in all neighborhoods, developed or redeveloped, in the proposed action. After construction is complete, storm water runoff will be managed by installing and maintaining storm water management facilities designed in accordance with the Public Facilities Manual of the County of Fairfax (Fairfax County, 2001) and the Virginia Storm Water Management Handbook (VDCR, 1999). Where practicable, infiltration-type stormwater management practices will be implemented, in an attempt to more closely mimic the hydrology of a vegetated site, and reduce the impacts of concentrated flows.

Water quality BMP programs and facilities will be provided for all villages to achieve 40 percent decrease in phosphorous run off leaving the site. This will be achieved by a combination of devices designed into each neighborhood, typically including more than one of the following methods within each neighborhood; BMP methods may include:

- Infiltration Trenches - Infiltration trenches will be utilized throughout most or all the villages, based on wherever soil conditions are favorable.
- Bioretention - Bioretention facilities are landscaped shallow depressions that provide surface storage. Ponding depths are 6 inches or less, and are intended to drain within 48 hours.
- Amended Soil - Amended soil is used in narrow strips where space is limited. Planting soil to a depth of 18 inches is utilized. The area can be flat, have a slight slope or have a shallow depression. Plant with grass, trees, or shrubs.
- Infiltration below underground Storm Water Management - Additional volume will be provided in the gravel bed below the underground storm water management facilities in order to provide infiltration.
- Structural BMPs - Structural BMPs such as Stormceptor, Filterra, or Baysaver may be utilized for small areas where space does not permit the use of other treatments.
- Retrofit existing SWM facilities - Where feasible existing SWM facilities will be retrofitted to provide additional BMP benefits. Retrofits may include enlargement, modification of control structure, and addition of forebays or pretreatment.

Neighborhoods will also include quantity management facilities in order to meet the adequate outfall requirements of the Public Facilities Manual. This will be achieved by providing a total volume of storage equal to the volume required to provide extended detention for the 1-year 24 hour storm. Quantity management will be provided on a sub watershed basis, generally with one facility for each major outfall point. Some neighborhoods will have only one quantity control facility, while others will have more than one. Another goal will be to oversize the water quality BMP facilities in some areas, reducing the

1-year extended detention storage. This will provide the total storage volume required for 1-year 24-hour storm controls, but will reduce the size of the water quantity facilities. The overall result is better BMP quality controls while still providing 1-year extended detention controls. The 1-year storage will be provided in either surface ponds or underground facilities to be determined during final design.

Currently, in most locations, storm water discharges directly to the stream channel without any water quality or quantity improvements. Therefore, stormwater flows will be reduced and water quality will be improved, compared to existing conditions, in any areas where stormwater management is provided. As a result of this addition of water quality and quantity controls, the proposed action is expected to have a long-term beneficial effect on the surface waters.

A storm water management plan to manage the quantity and quality of stormwater runoff from the housing areas will be prepared and executed for the development and redevelopment of the housing areas. The installation will develop a storm water management plan as part of compliance with the Phase II Storm Water general permit as a regulated small municipal separate storm sewer system (MS4). The storm water management plan developed by FBRC will be modified, as necessary, to ensure consistency with the future installation-wide Storm Water Management Plan. The plan will include a description of the storm water management BMPs proposed as part of this project. Plans for inspection and maintenance of the storm water management facilities will be documented in the storm water management plan. The following aspects will be incorporated into the planning process:

- Minimal use of detention basins within the currently established neighborhoods. These facilities can have limited benefits to quantity and quality of storm water flows.
- Modern infiltration practices will be implemented that will allow storm water to infiltrate into the sandy soils.
- Drainage swales will be planted with native, wet tolerant plants to promote water quality through infiltration and/or filtration.
- Designs will allow for solids to settle from the storm water prior to discharge to streams

In addition to the storm water management plan, a SWPPP will be completed for any industrial facilities (e.g., maintenance shop) that may be constructed as part of the CDMP. The SWPPP will summarize standard operating procedures (i.e., spill response) and inspections needed to minimize future impacts to surface water and will be prepared in accordance with VDEQ VPDES regulations.

All impacts to storm water at the temporary construction support facilities will be limited to the duration of construction. Spill controls and erosion and sediment controls will be provided at these facilities and outlined in a SWPPP to minimize impacts to storm water quality. Because these control practices can not remove the entire pollutant load, these facilities may have a minor temporary impact to storm water quality, however the impact will not be significant.

If a concrete batch plant is utilized it will generate concrete wash out water as a byproduct. The wash out water contains suspended sediment particles causing the water to have high pH. A standard treatment system will be provided to clean the wash-out water, prior to discharge to the surface waters. A VPDES Phase I permit will be obtained, and all provisions of this program will be met to ensure no water quality impact from this discharge. Storm water runoff from this facility will be contained and treated through the same process.

A stone crusher will be installed at one of the two temporary construction sites. No process water will be utilized for the stone crusher; small quantities of water will be used to control dust, from which there will be no discharge. However, storm water runoff will be managed through standard erosion and sediment control practices. These practices will be specified in the Erosion and Sediment Control Plan.

Ground Water

Long-term minor beneficial effects would be expected on groundwater because of storm water management measures envisioned that will promote infiltration. This would be expected to have a positive impact on groundwater recharge.

Floodplains

No significant effects would be expected on the floodplains. Currently, only small portions of the existing housing areas are located within the FEMA 100-year floodplain. Under current National Flood Insurance Program and Fairfax County Zoning limitations, permanent dwellings are not permitted to be constructed within the 100-year floodplain, however some roadway and storm water facilities are permitted. The villages in the vicinity of the floodplains will be further evaluated with detailed topography to confirm the flood-plain boundaries. Because the Fairfax County definition of the RPA includes the 100-year major floodplains, and FBRC will commit to consistency with the Fairfax Chesapeake Bay Preservation Ordinance, there will be no increase in impervious surface in the floodplain areas.

There are no anticipated impacts to the floodplain in any of the affected villages. There are currently no changes to the grading or impervious surface within Dogue Creek. The action at River Village will be limited to demolition of the buildings down to the slab and foundation. Minor grading may be conducted to facilitate storm water runoff and prevent ponding. This action is not anticipated to have a significant impact on the floodplain. The only area within the floodplain in George Washington Village is a small segment of proposed road. This road will be evaluated for the possibility of raising the elevation above the floodplain if appropriate. None of the proposed buildings are inside this floodplain. In Belvoir Village there are not anticipated changes to Patrick Road, as it crosses through the floodplain, therefore there will be no impacts to the floodplain.

4.6.2.2 No Action Alternative

No significant effects would be expected on surface water as a result of continuation of current storm water management practices in conjunction with maintenance and repair of the housing within the existing villages. However, long term minor adverse effects would be expected, due to the lack of storm water management under existing conditions. Streams will continue to erode and adjust, creating steep and undercut stream banks, until a new,

stable channel alignment is reached. This process can continue indefinitely if the watershed continues to develop or if the stream can not find a stable equilibrium.

No effects would be expected on groundwater or floodplains under the no-action alternative.

4.7 Biological Resources

4.7.1 Affected Environment

4.7.1.1 Vegetation

Fort Belvoir has set aside 2,524 acres of relatively undisturbed land, including the Accotink Bay Wildlife Refuge, the Jackson Miles Abbott Wetland Refuge (JMAWR), and a Forest and Wildlife Corridor. In addition, there are large areas of undisturbed vegetation along steep slopes and stream valleys. The plant communities in these undeveloped areas at Fort Belvoir contain predominantly native species as compared to surrounding developed areas in Northern Virginia area where introduced invasive species often dominate.

Fort Belvoir's natural plant communities are highly influenced by the wide variety of landforms found on the installation, which include gently rolling plateaus, high bluffs that descend sharply into adjacent stream valleys, and tidal shorelines. Factors such as topographic location, soil, moisture, slope, and natural and human disturbances influence vegetation composition within each plant community type (US Army Garrison, 2002).

Vegetation along the edges of the existing housing villages consists of fringes of wooded areas. Vegetation within the villages consists mostly of landscaped trees, shrubs, and grasses with small pockets or clusters of trees existing in some villages. Based upon an aerial photograph of Fort Belvoir (November 2002), there are approximately 27 acres of heavily wooded areas and 44 acres of park-like land (mature trees with mowed grass and no understory) in the Proposed New South Post Village.

An installation wide vegetation study of Fort Belvoir conducted by Paciulli-Simmons identified the 16 community types, shown in the following table (US Army Garrison, September 2001). The survey also developed a floristic list of all plants occurring on the Main Post. Detailed descriptions of each of these communities including dominant vegetation and the list of plants on Fort Belvoir are provided in Appendix D. Table 4-13 and Figure 4-5 portray the vegetative communities present in each village.

TABLE 4-13
Vegetative Communities in Housing Parcels

Village	Community	Acres (Existing)
Belvoir	Beech Mesic – Mixed Oak Forest	0.3
	Oak Submesic – Ericad Forest	19.0
	Tulip Poplar Mesic – Mixed Hardwood Forest	1.2
Colyer	Beech Mesic – Mixed Oak Forest	0.1
	Oak Submesic – Ericad Forest	2.4

TABLE 4-13
Vegetative Communities in Housing Parcels

Village	Community	Acres (Existing)
Dogue Creek	Beech Mesic – Mixed Oak Forest	6.9
	Oak Submesic – Ericad Forest	2.0
	Tulip Poplar Mesic – Mixed Hardwood Forest	0.2
	Tidal Freshwater Marsh	0.02
Fairfax	Oak Submesic – Ericad Forest	14.7
George Washington	Beech Mesic – Mixed Oak Forest	3.6
	Tulip Poplar Mesic – Mixed Hardwood Forest	1.8
	Seeps (associated with Forested Wetlands)	0.5
Gerber	Landscaped throughout village	N/A
Jadwin Loop	Beech Mesic – Mixed Oak Forest	0.8
	Oak Submesic – Ericad Forest	6.0
Lewis Heights	Tulip Poplar Mesic – Mixed Hardwood Forest	0.5
Park	Beech Mesic – Mixed Oak Forest	1.1
	Oak Submesic – Ericad Forest	1.8
River	Landscaped throughout village	N/A
Rossell Loop	Beech Mesic – Mixed Oak Forest	0.7
	Oak Submesic – Ericad Forest	3.4
Woodlawn	Beech Mesic – Mixed Oak Forest	3.3
	Loblolly Pine Forest	3.9
	Mixed Pine-Hardwood Forest	3.1
	Old Field Grassland	3.3
	Tulip Poplar Mesic – Mixed Hardwood Forest	4.6
	Virginia Pine Forest	2.4
New South Post	Beech Mesic – Mixed Oak Forest	10.1
	Mixed Pine-Hardwood Forest	4.6
	Tulip Poplar Mesic – Mixed Hardwood Forest	3.4
Construction Site 1	Oak Submesic – Ericad Forest	0.002
Construction Site 2	Beech Mesic – Mixed Oak Forest	0.8
	Mixed Pine-Hardwood Forest	0.9
	Oak Submesic – Ericad Forest	2.1

Note: Detailed descriptions of each of these communities are provided in Appendix D.

Three tree surveys identifying the location, species, age, and health of each tree have been conducted at Fort Belvoir between 1998 and 2000. These surveys identify up to 2000 trees in the existing village which are considered to be mature, historical, or significant trees.

4.7.1.2 Wildlife

The Accotink Bay Wildlife Refuge, the JMAWR, the Forest and Wildlife Corridor, and other undeveloped areas of Fort Belvoir, such as stream valleys and slopes, are home to numerous wildlife species. Based on information from installation-wide surveys that were conducted for the preparation of the Fort Belvoir INRMP (Ernst and Miller, 1997; Ernst and Belfit, 1997 in US Army Garrison Fort Belvoir, March 2001), the installation contains potential habitat for any one of 42 species of mammals, 260 species of birds, 32 species of reptiles, and 27 species of amphibians.

In general, the housing villages are edged by wooded areas, some with steep ravines. A variety of wildlife species including mammals, amphibians, reptiles, and birds live in the wooded areas surrounding the housing villages. Substantial habitat, other than fringe woods, does not presently exist inside the villages. Existing and proposed housing villages are characteristically suburban settings. Therefore, wildlife in these areas primarily consist of species typical to residential settings such as squirrel, deer, and raccoon. Presence of the species can be both positive (wildlife watching) and negative (deer browsing on landscaped vegetation). Because some of the housing villages are adjacent to the Potomac River and other natural areas on-post, migratory birds species can be observed in and near the housing areas.

Species of management concern near the housing villages at Fort Belvoir include raccoons (*Procyon lotor)*, woodchucks (*Marmota monax)*, beavers (*Castor canadensis*), striped skunks (*Mephitis mephitis*), house mice (*Mus musculus*), Norway rats (*Rattus norvegicus*), and feral cats (*Felis domesticus*). FBRC will adopt the current Post policy regarding nuisance animal control. Residents are instructed to keep garbage picked up and stored inside until refuse pickup times.

Many of the bird species at Fort Belvoir are migratory birds. The Migratory Bird Treaty Act prohibits the taking, killing, or possessing of migratory birds. Under the act, it is unlawful, unless permitted by regulations, to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess, offer to sell, barter, purchase, deliver, or cause to be shipped, exported, imported, transported, carried, or received any migratory bird part, nest, egg, or product, manufactured or not.

A variety of aquatic species (27 species of amphibians, 60 species of fish, and 197 taxa of benthic invertebrates have been identified) have potential habitat in the streams that surround and run through Fort Belvoir.

A table of mammals, birds, fish, amphibians, and reptiles known or expected to occur at Fort Belvoir is located in Appendix E.

4.7.1.3 Rare, Threatened, and Endangered Species

The Endangered Species Act (ESA) of 1973 and subsequent amendments provide for the conservation of threatened and endangered species of animals and plants and the habitats in which they are found. The Department of the Army ensures that consultations are conducted as required under Section 7 of the ESA for any action that may affect a federally listed threatened or endangered species according to guidance in Army Regulation (AR) 200-3. The Army also complies to the extent practicable with state threatened and endangered species regulations.

A Natural Heritage Inventory of Fort Belvoir was performed by DCR-NHP in 1996. The inventory identified four rare plant species (velvety sedge (*Carex vestita*), vetchling (*Lathyrus palustris*), water plantain crowfoot (*Ranunculus ambigens*) and river bulrush (*Scirpus fluviatilis*)) and three watchlist plant species (creeping spikerush (*Eleocharis smallii*), blueflag (*Iris versicolor*) and giant bur-reed (*Sparganium eurycarpum*)). None of these rare or watchlist species occur within the housing areas.

The inventory identified six locations of significant vegetation communities, all of which are wetlands: three associated with Accotink Bay wetlands within the ABWR, two within the lower parts of two training areas, and one within Humphrey's Engineering Center. The 1996 DCR-NHP inventory defined the boundaries of two recommended conservation areas to protect these resources. A third conservation area, located in the vicinity of training area T-17, was recommended based on the results of a 1997 DCR-NHP zoological inventory. The recommended conservation areas are watershed-based and encompass large areas within Fort Belvoir. The ecological communities survey conducted in 2000, identified rare communities associated with groundwater seep areas near Dogue Creek, George Washington, and Rossell Loop Villages.

In 1994 and 1995, the Virginia Department of Conservation and Recreation, Division of Natural Heritage (VDCR/DNH) conducted a field survey for endangered, threatened, and state rare species at Fort Belvoir, concentrating on the most likely habitats to find rare species (US Army Garrison, March 2001). One species listed as both federally and state-threatened and one state-listed threatened species were identified. The first of these, the bald eagle *(Haliaeetus leucocephalu*s), has since been proposed for de-listing by the federal government, but is still listed as threatened. The shorelines of major creeks, rivers, and lacustrine areas on Fort Belvoir provide valuable nesting, foraging, and loafing habitat for resident and migratory bald eagles.

Fort Belvoir has implemented a USFWS- and VDGIF-approved Bald Eagle Management Plan (BEMP). The BEMP has been incorporated into the installation's INRMP. The BEMP establishes eagle management zones to protect nest and foraging habitat on the installation Eagle foraging areas are shown on Figure 4-6. Land use restrictions in the eagle foraging areas include no additional land clearing, no timber clear cutting, no land-disturbing training activities, no shoreline training activities, and no recreation other than fishing, hunting, and low-intensity passive recreation. In addition, management actions such as measures to prevent electrocution hazards and developing and implementing eagle awareness for residents have been implemented. Eagle management is a function of the ENRD, which coordinates closely with USFWS and VDGIF on eagle management.

Portions of the project area fall within designated bald eagle foraging areas along Fort Belvoir's shoreline of the Potomac River and Dogue Creek. Two active bald eagle nests are located on Fort Belvoir. One of the nests is located adjacent to one of the existing housing areas.

The state-listed threatened wood turtle *(Clemmys insculpt*a) has been documented on Fort Belvoir. The wood turtle inhabits forested floodplains and nearby fields, wet meadows, and farmlands. Because this species over-winters on the bottoms of creeks and streams, a primary habitat requirement is the presence of water (US Army Garrison 2002; TAMS, July 2002). There is an established population of these turtles at Huntley Meadows Park,

northeast of the JMAWR. There have been three wood-turtle sightings within Fort Belvoir in the last 4 years, indicating that this species may have become established on the Installation. Sightings occurred along the shoreline of Dogue Creek in 1998 near the JMAWR, along the shoreline of Accotink Creek near U.S. Route 1 in 1998, and about 75 feet north of the Accotink Bay Wildlife Refuge, at the Poe Road bridge in 1999. None of the sightings occurred within or near the housing parcels.

A survey for the wood turtle was conducted by Dr. Joseph Mitchell on Fort Belvoir between April and June of 2002. The survey evaluated the three major watershed on Fort Belvoir (Accotink Bay, Dogue Creek, and Pohick Bay) and divided the areas into three categories; suitable, unsuitable, and marginal). Streams in habitat areas designated as marginal or suitable were trapped in May and June. During the surveys, five species of freshwater turtle were found, however no wood turtles were located. Woodlawn Village is the most likely area of the installation where wood turtle might be encountered, because it is adjacent to Huntley Meadows Park, however, the habitat within the housing footprint was not considered to be highly suited. The conclusion of the investigation was that wood turtles were likely historical residents on Fort Belvoir, however, no viable wood turtle populations have been residents in recent times.

The peregrine falcon *(Falco peregrinus*) is a state-listed endangered species. The peregrine falcon occurs along the Accotink Creek/Accotink Bay stream corridor during fall migration. This area of Fort Belvoir provides valuable foraging habitat for migratory falcons. Falcons have been recorded on Fort Belvoir during fall migrations (six sightings in 1998, four in 1999, and three in 2000). Potential threats to the peregrine falcon foraging habitat include disturbances near the shoreline, shoreline development, and waterfowl hunting. There are no housing parcels located along Accotink Creek shoreline. The construction support sites are located on the plateau east of Accotink Creek, but are not along the shoreline.

The Northern Virginia well amphipod *(Stygobromus phreaticus*) was first discovered during surveys at Fort Belvoir conducted by VDCR-NHP from April 1996 through October 1996. This was the first known sighting of the amphipod since its collection from wells in Vienna, VA, in 1941 and Alexandria, VA, in 1948. Little is known about the amphipod; it is not state or federally listed but is referred to as globally rare. According to "*Ecology and classification of North American Freshwater invertebrates*" (1991) cited in the Fort Belvoir INRMP, this species may be particularly sensitive to groundwater contamination and pollution as well as withdraw of water from subterranean habitats (US Army Garrison, March 2001). The amphipod was discovered in a ravine in the southern peninsula of Fort Belvoir. This area is not located within the housing parcels; however, it is in the vicinity of the construction support areas and Gerber Village. This species is under consideration for listing by the U.S. Fish and Wildlife Service (USFWS) having been petitioned for Emergency Listing under the Endangered Species Act approximately 2 years ago. USFWS requires that, as part of the NEPA assessments for the RCI Program, Fort Belvoir perform an evaluation of the potential for project construction and operation to impact this species. Such an evaluation requires aquifer testing and zoological survey. Results of this survey are expected to be available in June 2003.

Agency Correspondence

According to correspondence with the USFWS dated October 3, 2002, occurrences of small whorled pogonia *(Isotria medeoloide*s), which is federally and state-listed as threatened, have been documented in Prince William County. As appropriate habitat for this species potentially exists on Fort Belvoir, the USFWS recommends that a survey be conducted within appropriate habitat between June 1 and July 20 of any given year, to determine the presence or absence of this species prior to any construction activities. Suitable habitat for this diminutive orchid is "very ordinary looking third-growth upland forests on terrain that is almost level or gently to moderately sloping in northerly or easterly directions. The understory is distinctly open, and flecks of sunlight play on the forest floor throughout the day. Some and perhaps all of the colonies occur on land that has been previously cultivated. Soils are acidic sandy loams with low to very low nutrient contents by agricultural standards." (US Army Garrison, 2002; TAMS, July 2002)."

[Preparer's Note: Request for information regarding essential fish habitat or other marine resources was sent to the National Marine Fisheries Service on April 1, 2003. A response has not yet been received. See Appendix F for correspondence.]

Correspondence with the Virginia Department of Game and Inland Fisheries (VDGIF, September 11, 2002) confirmed the potential for the federally and state-listed threatened bald eagle and the state threatened wood turtle to occur at Fort Belvoir. In addition, VDGIF noted that there are documented occurrences of alewife (*Alosa pseudoharengus*), striped bass (*Morone saxatilis*), and blueback herring (*Alosa aestivalis*) in stream reaches near the housing villages and recommended that Fort Belvoir coordinate with VDGIF regarding potential impacts to these species prior to construction. Anadromous fish surveys conducted by the Army on and around Fort Belvoir indicate that alewife, striped bass, and blueback herring occur in the larger waterways adjacent to Fort Belvoir (e.g., Potomac River, Dogue Creek, Gunston Cove, Accotink Bay/Creek and Pohick Bay/Creek) and not within the small streams within and adjacent to the housing villages. Therefore, no further surveys for these species will be conducted for this project.

[Preparer's Note: Request for confirmation, that no additional consultation is required for the three fish species, from VDGIF was requested on April 1, 2003. A response has not yet been received. See Appendix F for correspondence.]

VDGIF also noted that the bridle shiner (*Notropis bifrenatus*), brown creeper (*Certhia americana*), great egret (*Ardea alba egretta*), and the yellow-crowned night heron *(Nyctanassa violacea violacea*), all species of state special concern, have been documented nearby. However, as this designation is not a legal description, further coordination is not necessary.

An installation wide survey for the wood turtle was conducted by Dr. Joseph Mitchell at Fort Belvoir in 2002. According to discussions on December 4, 2002 during an interagency meeting (USFWS, VDGIF, and VDCR) at Fort Belvoir and from an e-mail correspondence between Jeff Cooper (VDGIF) and Dorothy Keough (Fort Belvoir) on January 7, 2003, no further surveys are required for wood turtle. [See Appendix F for correspondence.]

According to correspondence from the VDCR dated May 12, 2003, this project is not believed to adversely affect natural heritage resources or any documented state-listed plants or insects.

Based upon correspondence with federal and state agencies, there are no known rare, threatened, or endangered plant or animal species residing in the project areas, with the possible exception of small whorled pogonia. Surveys for pogonia will be conducted in June 2003 on the parcels proposed for construction in the near term. Other parcels scheduled for construction in subsequent years will be surveyed later on, prior to their disturbance. According to a letter from USFWS dated June 18 June, 2003, the USFWS concurred with the approach being taken to protect the small whorled pogonia, provided that consultation is conducted prior to finalizing and proceeding with construction plans in any of the surveyed woodland areas which are found to support the species.

4.7.1.4 Wetlands

Activities in wetlands are regulated under Section 404 of the CWA and under state wetlands protection laws. In addition, wetlands protection and management applies to all Army facilities' engineering activities in accordance with AR 200-1 Environmental Protection and Enhancement, AR 200-3 Natural Resources – Land, Forest and Wildlife Management, and E.O. 11990 Protection of Wetlands. Army actions seek to avoid adverse impacts, strive to achieve no net loss of value or functions, protect existing and restore former wetlands, and target no net loss of wetlands on Army controlled lands.

Fort Belvoir completed a baseline inventory of the wetlands on Main Post in 1997 (Figure 4-7). The purpose of these planning surveys was to identify and map the general locations and types of wetlands on post. The surveys were not intended to serve as jurisdictional delineations. The baseline wetland surveys were accomplished by reviewing and interpreting aerial photography of Fort Belvoir. After this desktop analysis was completed, limited field surveys were conducted to ground truth the data.

Approximately 1,250 acres of wetlands were identified on Fort Belvoir's Main Post through the baseline wetland surveys. The predominant wetland type on Fort Belvoir is palustrine forested, which tends to occur in association with the riparian areas of Accotink, Dogue, and Pohick Creeks (US Army Garrison, March 2001). A total of almost 18 acres of wetlands exist in seven of the thirteen villages, however, approximately 16.8 of these 18 acres are found in Woodlawn Village.

Wetlands associated with streams at Fort Belvoir are characterized by somewhat poorly-drained to very poorly-drained floodplain bottomlands and sloughs. The composition is variable, and they are generally located on hydric soils dominated by hydrophytic vegetation. The vegetative communities consists of a variable mix of pin oak (*Quercus palustris*), willow oak (*Quercus phellos*), green ash (*Fraxinus pennsylvanicus*), sycamore (*Platanus occidentalis*), red maple (*Acer rubrum*), river birch (*Betula nigra*), and sweet gum (*Liquidambar styraciflua*). The understory usually contains highbush blueberry (*Vaccinium corymbosum*) (Paciulli, Simmons and Associates, Ltd., 1998).

Seep forests are often open-canopy forests of groundwater-saturated flats and slopes, generally surrounded by mixed hardwood forests. They occur along slopes where groundwater flows to the surface. Characteristic species are red maple, black gum (*Nyssa sylvatica*), sweetbay magnolia (*Magnolia virginiana*), skunk cabbage (*Symplocarpus foetidus*), sensitive fern (*Onoclea sensibilis*), and royal fern (*Osmunda regalis*). Key indicators are large mats of skunk cabbage and other herbaceous wetland vegetation.

Vegetation composition in marsh and emergent wetlands is variable, consisting of emergents including arrow arum (*Peltandra virginica*), rice cutgrass (*Leersia oryzoides*), sedges (*Carex sp.*), rushes (*Juncus sp.*), smartweeds (*Polygonum sp.*), and swamp rose mallow (*Hibiscus moscheutos*). Common shrubs are buttonbush (*Cephalanthus occidentalis*), swamp rose (*Rosa palustris*), and swamp dogwood (*Cornus amomum*) (Paciulli, Simmons and Associates, Ltd. 1998).

The following is a description of wetlands found in each village. (See also Table 4-14.)

Woodlawn Village. The western and northern borders of Woodlawn Village lie immediately adjacent to the Jackson Miles Abbott Wildlife Refuge. The western limits of the village overlap approximately 0.47 acres of palustrine forested deciduous saturated (PFO1B) wetlands on the far western boundary of Woodlawn Village. Approximately 1.88 acres of palustrine emergent temporarily flooded (PEMA) wetlands fall within Plantation Drive, north of Pole Road. Approximately 14.41 acres of palustrine forested deciduous seasonally flooded (PFO1C) wetlands are found between the eastern segment of Plantation Drive and the eastern edge of Fort Belvoir's property line.

Rossell Loop Village. There are only 0.01 acres of palustrine forested deciduous temporarily flooded (PFO1A) wetlands in Rossell Loop Village. These wetlands are associated with the headwaters of a small stream that originates in the parcel.

Belvoir Village. There are 0.10 acres of PFO1A wetlands, and 0.001 acres of PFO1B wetlands in Belvoir Village. These wetlands are associated with the headwaters of small streams that originate within the village.

Colyer Village. There are 0.03 acres of PFO1A wetlands in Colyer Village. These wetlands are associated with the headwaters of a small stream that originates within the village.

Dogue Creek Village. There are 0.10 acres of PFO1A wetlands in Dogue Creek Village. These wetlands are associated with the headwaters of small streams that originate within the village.

George Washington Village. There are 0.08 acres of PFO1A wetlands, and 0.36 acres of PFO1B wetlands in George Washington Village. These wetlands are associated with the headwaters of small streams that originate within the village.

Jadwin Village. There are 0.05 acres of PFO1A wetlands in Jadwin Village. These wetlands are associated with the headwaters of small streams that originate within the village.

New South Post Village. There are approximately 0.31 acres of PFO1A wetlands in New South Post Village. These wetlands are associated with a small stream that originates in the parcel.

According to the baseline wetland survey and GIS mapping, there are no wetlands located in Fairfax Village, Gerber Village, Lewis Heights Village, River Village, or Park Village, or in either of the temporary construction support sites.

TABLE 4-14
Summary of Wetlands by Parcel/Village

Parcel/Village	Wetland Type	Acres (Existing)
Belvoir Village	PFO1A PFO1B	0.10 0.001
Colyer Village	PFO1A	0.03
Dogue Creek Village	PFO1A	0.10
Fairfax Village	--	--
Gerber Village	--	--
George Washington Village	PFO1A PFO1B	0.08 0.36
Jadwin Loop Village	PFO1A	0.05
Lewis Heights Village	--	--
Park Village	--	--
River Village	--	--
Rossell Loop Village	PFO1A	0.01
Woodlawn Village	PFO1B PFO1C PEMA	0.47 14.41 1.88
New South Post Village	PFO1A	0.31
Construction Site 1	--	--
Construction Site 2	--	--

Note: Based upon baseline wetland survey.

4.7.1.5 Coastal Zone Management

The Coastal Zone Management Act (CZMA) of 1972 (16 USC § 1451, et seq., as amended) provides assistance to states, in cooperation with federal and local agencies, for developing land and water use programs in coastal zones. Section 307 of the CZMA stipulates that federal projects that affect land uses, water uses, or coastal resources of a state's coastal zone must be consistent to the maximum extent practicable with the enforceable policies of that state's federally approved coastal zone management plan. The Commonwealth of Virginia has developed and implemented a federally approved Coastal Resources Management Program (CRMP) describing current coastal legislation and enforceable policies. Virginia's enforceable policies subject to federal consistency include commercial fishing; recreational fishing in freshwater tidal rivers; encroachments on subaqueous lands; encroachments on wetlands; encroachments on primary sand dunes; land-disturbing activities needing erosion and sediment control; actual or potential wastewater discharges; control of septic and other onsite domestic waste systems; coastal land management; and air pollution control. Virginia's coastal zone encompasses the eastern third of the state including the Chesapeake Bay and its tributary rivers. Therefore, all of Fort Belvoir and all housing parcels and construction support sites are considered to be within the jurisdiction of the CZMA.

4.7.2 Consequences

4.7.2.1 Proposed Action

Vegetation and Wildlife

Significant adverse effects to vegetation would be expected to occur due to the necessary removal of vegetation during the construction process prior to mitigation. However, in order to minimize impacts to vegetative communities (including contiguous tree stands and park/urban trees) a tree survey will be conducted prior to construction. This survey will be conducted by a qualified professional who will assess the species, age, size, and health of each tree. Every park tree and tree stand location within the footprint of the existing housing villages, the proposed New South Post Village, and the two construction sites will be surveyed. Drip lines and canopy edges will be identified.

After the survey is conducted, a list of possible trees to save and/or relocate within the plan will be identified by the development partner in concert with ENRD. Each home, garage and road location will be considered for opportunities to reduce tree and viewshed impacts. Impacts will be reviewed on a tree-by-tree and house-by-house basis prior to completing any of the final construction site plans in an attempt to reduce impacts to vegetative communities on Fort Belvoir.

In addition, as part of the effort to reduce impacts to existing vegetation, the following areas are expected to be removed from the land lease during the metes and bounds survey:

- portions of Belvoir Village that are located behind Buildings 34 through 39 that are undeveloped and that are not needed for future storm water management areas,
- a portion of Colyer Village that is currently used as a wooded buffer alongside an ephemeral stream,
- portions of George Washington Village that are on the southwestern boundary located near a small groundwater seep,
- portions of Jadwin Village that are located on the southeastern side that are undeveloped and that are not needed for future storm water management areas,
- portions of Lewis Heights Village that are located on the eastern side that are undeveloped and that are not needed for future storm water management areas,
- portions of Rossell Village that are currently undeveloped and on steep slopes, and
- portions of Woodlawn Village that are located on the far eastern side of Plantation Drive.

As discussed in Section 4.6, field surveys will be conducted to determine perenniality of streams within the housing villages. One-hundred-foot vegetated buffers around perennial streams (and vegetated buffers of up to 25 feet from top of bank around intermittent streams, ecologically significant ephemeral streams, and wetlands, to the maximum extent practicable) will be maintained and protected (see Section 4.6 for detailed discussions).

As discussed in Section 4.5, slopes of 25 percent or greater that are not currently developed, will be avoided during the construction process. Construction in areas with slopes of 15

percent or greater that are currently developed will be minimized to the extent practicable. In addition, a jurisdictional wetland delineation will be performed to identify all existing wetlands within the housing villages. Construction in wetlands will be avoided to the extent practicable and any unavoidable impacts will be compensated for. All of these measures, seek to minimize impacts to vegetation and vegetative communities at Fort Belvoir.

Based upon worst case scenarios, impacts to vegetation were determined by assuming that all vegetation within the existing housing villages, the proposed new housing village, and the two construction sites will be removed due to construction activities. The following table presents these impacts by community.

TABLE 4-15
Maximum (Worst Case) Impacts to Vegetation

Vegetative Community	Total Acres on Fort Belvoir	Acres in Housings Villages and Construction Sites	Percent Impacts
Beech – Mixed Oak Forest	1119	27.0	2.4
Loblolly Pine Forest	245	3.9	1.6
Mixed Pine – Hardwood Forest	198	7.7	3.9
Non-Tidal Freshwater Marsh/Beaver Pond	129	--	--
Oak Forest	1262	49.3	3.9
Old Field Grassland	233	3.3	1.4
Groundwater Seeps	37.1	0.5	1.4
Tidal Freshwater Marsh	33.6	0.02	0.06
Tidal Freshwater Scrub-Shrub	12.4	--	--
Tidal Freshwater Swamp Forest	38.5	--	--
Tulip Poplar – Mixed Hardwood Forest	989	11.7	1.2
Urban (Street and Park Trees)	2771	503	18.2
Virginia Pine Forest	514		0.5
White Pine Forest	6.3	--	--
Total	7589	609	8 percent of total vegetation

Tree surveys have been conducted in some areas of Fort Belvoir and identify up to 2000 trees in the existing villages which are considered to be mature, historical, or significant trees.

Despite all of the efforts to avoid impacts to vegetation described above, there will be an overall loss to the trees, shrubs, and grasses at Fort Belvoir from this project prior to mitigation (tree and shrub replacement). The proposed action has the potential to impact approximately 609 acres (8 percent) of a total of 7,589 acres across Fort Belvoir. This amount of impact would be a significant effect on the environment.

Proposed mitigation for these losses include tree replacement on Fort Belvoir at a 1:1 ratio for every lost tree over 6 diameter at breast height. All trees planted by FBRC must be approximately 2.5 inch caliper, nursery grown. Planting locations for the replacement trees will be chosen in coordination with ENRD and will consider such aspects as species requirements (i.e., soil types, hydrologic conditions, and light requirements) planned land use, and land use restrictions (i.e., utility easements). Trees planted by FBRC within the landscaped portions of the housing villages and individual yards will be included in the replacement tallies. FBRC will coordinate with ENRD in order to develop a landscape planting and maintenance plan which will include planting with native, non-invasive, non-exotic plants. FBRC will also coordinate with ENRD on all installation-wide initiatives for vegetation management, such as invasive and exotic vegetation control, as appropriate. After mitigation measures are employed, overall impacts to vegetation from this project are not expected to be significant. (Cumulative impacts from other planned/expected projects are assessed in Section 4.13.)

Replacement of mature trees with younger trees results in a loss of service to the environment (shade and cover and food for wildlife) from the time of removal until the time that the younger trees begin to provide equally beneficial services and benefits. However, trees are a renewable resource, and the younger replacement trees will provide these services at a lesser level as soon as they are planted and will continue to increase their services each year until they reach full maturity.

Based upon the site layouts presented in the 30 percent conceptual drawings, two areas have been identified as potential mitigation/reforestation sites. The first is in Jadwin Village. Existing buildings along the northern portion of the village are located adjacent to steep slopes. Development plans for Jadwin Village are to demolish these buildings and place the new buildings further south and away from the steep slopes. The area where the buildings currently stand has potential to be used as a site for reforestation as mitigation for losses. The second site is in the northeastern portion of Rossell Loop. The housing unit that is currently located in this corner will be demolished and another building will not be put within the same footprint. This area also has potential to be used as a site for reforestation as mitigation for losses.

Shade trees will be planted along new streets to reduce the heat-island effect. Any trees planted along streets, in yards, open areas and elsewhere in the new housing villages will count towards the final mitigation numbers of trees to be replaced. The appropriate use of BMPs, such as erosion control practices and tree protection devices at all proposed construction sites, would protect vegetation and habitat adjacent to the construction areas. In addition, any activity would be coordinated to minimize encroachment upon the RPAs and be consistent with Fort Belvoir's Integrated Natural Resources Management Plan. To reduce the amount of construction upkeep following construction activities, native trees and native drought-tolerant vegetation would be planted near homes, in parks, and in open spaces. Storm water management ponds would be planted with native species used by wildlife for forage and cover.

Therefore, after mitigation measures have been implemented, no significant adverse effects to vegetation are expected.

Impacts to stream channels due to construction activities will affect the fish, amphibian, and benthic invertebrate populations that live in these segments. Mitigation to compensate for stream impacts (see Section 4.6 for details) will also compensate for lost habitat if the impacts are significant. Based upon the 30 percent conceptual drawings, no impacts to perennial streams (where the majority of fish, amphibians, and benthic invertebrates are expected to spend most of their time) are expected. In addition, storm water and sediment and erosion control practices will be implemented to prevent adverse effects to the stream communities. Therefore, although minor short-term adverse effects to the fish, amphibians, and benthic invertebrates may occur, they are not significant, and mitigation for these species is not necessary.

Rare, Threatened, and Endangered Species

In accordance with the Army's policy on natural resource protection, construction activities will avoid impacts to the habitats of sensitive species. Therefore, no long-term adverse effects are expected for sensitive species. Short-term minor adverse effects would be expected to sensitive wildlife from noise generated during construction. (See Section 4.4 for a discussion of impacts from noise.)

Pursuant to the Fort Belvoir Bald Eagle Management Plan (Paciulli, Simmons & Associates, Ltd. 2000), bald eagle foraging areas will be protected by enforcing the 750-foot linear buffer from the shoreline inland (with the exception of previously disturbed areas). On March 12, 2003, Craig Koppie of USFWS, visited Fort Belvoir and confirmed the presence of an active bald eagle nest adjacent to one of the housing villages. To protect this nest, and in accordance with federal and state law and Fort Belvoir policy, the Army will establish and maintain a primary nest protection zone (750 feet) and a secondary nest protection zone (from 750 to 1,320 feet) around this new nest. The Army is coordinating with USFWS and Virginia Department of Game and Inland Fisheries (VDGIF) to develop the restrictions for these areas. Such restrictions will take into account that developed land uses already exist within those areas. They will include restrictions on activity within the protection zones during the breeding season, protection of the existing forest vegetation around the site, and establishment and maintenance of vegetated buffers. In addition, there will be no additional clearing of trees or vegetation in undisturbed areas within the designated Eagle Foraging Areas. Land that is currently cleared within the Eagle Foraging Area can be redeveloped. According to a letter from USFWS dated 18 June, 2003, the USFWS agree with the approach being taken to protect the bald eagle.

Construction is expected to begin in the proposed New South Post Village, Lewis Heights, and Rossell Village within the first few years after leasing. The Army will survey undisturbed wooded areas of those parcels in the summer of 2003 for small whorled pogonia. The remainder of the RCI parcels will be surveyed later, prior to their disturbance. Until these surveys have been completed, currently undisturbed wooded areas that might provide potential habitat for the small whorled pogonia will not be disturbed. A qualified biologist will be contracted to conduct these surveys. According to a letter from USFWS dated 18 June, 2003, the USFWS agree with the approach being taken to protect the small whorled pogonia.

Fort Belvoir is currently conducting a hydrological study and survey for the Northern Virginia well amphipod in the Tompkins Bay and T-17 areas, which are not in but are near

the project footprint. These surveys will potentially determine if the species is present in the southern area. The hydrological studies will determine the direction of groundwater flow in order to better assess impacts to the amphipod from development. Results from the surveys are expected to be available in June 2003. Construction in the southern peninsula of Fort Belvoir will not begin until the surveys are completed and consultations with USFWS are complete. According to a letter from USFWS dated 18 June, 2003, the USFWS agree with the approach being taken to survey for the amphipod.

Rock crushing facilities will be located at the southern construction support site, which is located approximately 1.5 miles from the location of the closest active bald eagle nest and 1,250 feet from the boundary with the bald eagle foraging area. Rock crushing activities will not be conducted on a regular basis. Materials will be stockpiled and run through the crusher only after large demolition periods (see Section 4.4 for additional information). Therefore, the noise generated from this facility is not expected to affect sensitive species.

In order to protect rare communities (such as those associated with groundwater seeps) adjacent to any housing villages, FBRC will coordinate with ENRD in order to preserve appropriate buffers around these communities. Storm water management practices will protect these communities from adverse changes in water quality, flow, and groundwater recharge.

Wetlands

Wetland impacts associated with construction are expected to be minor due to the maintenance of forested buffers associated with streams that contain the majority of the wetland systems. Long-term adverse effects are not expected because all impacts will be mitigated with compensation in the form of creation, restoration, or enhancement. In accordance with the Army's policy on natural resource protection, construction activities will seek to avoid impacts to wetlands to the extent practicable. Impacts are expected to be minimal because wetlands identified in previous wetlands reconnaissance have been avoided to the maximum extent practicable during site planning.

Prior to construction in Waters of the U.S., a jurisdictional wetland delineation of all housing villages and potential construction sites will be conducted and approved by USACE. Avoidance of wetlands will be the first priority; however, if avoidance of wetlands is not practicable, a Joint Permit Application will be submitted to the Virginia Marine Resources Commission, which will in turn be forwarded to USACE, VDEQ, and the Fairfax County Wetlands Board for review and comment. In order to compensate for the losses to wetlands, mitigation will be provided (in the form of creation, restoration, or enhancement) in order to meet the Army's policy of no net loss of wetlands on Army-controlled lands. All field work and permitting activities will be complete prior to construction. Mitigation of impacted wetlands will include an evaluation of the functionality of the lost wetlands and mitigation will include the replacement of these wetland functions on Fort Belvoir.

The following is a qualitative estimate of wetland impacts by village. (See also Table 4-14.) The estimates are based upon conceptual design layouts of each village that are subject to change. A jurisdictional delineation will be conducted at each parcel to assess the acres of existing wetlands and potential impacts to those wetlands as part of the federal and state permitting process.

Woodlawn Village. Based upon the conceptual village layout, there will be no impacts to wetlands at Woodlawn Village. All construction will occur within the boundary of the existing Perimeter Road, with the exception of some recreational areas (ball fields) which will be located in areas that are already cleared. In addition, housing layouts have been designed to be located further from existing wetland areas than existing houses, providing additional buffer to the wetland. As there is currently no development planned in the area east of the outer side of Plantation Drive, this area is expected to be removed from the land lease during the Metes and Bounds Survey.

Rossell Loop Village. Based upon the conceptual village layout, there will be no impacts to wetlands at Rossell Loop Village.

Belvoir Village. Based upon conceptual village layouts, there will be no impacts to wetlands in Belvoir Village. One-hundred-foot RPA buffers will be retained around the perennial streams and wetlands adjacent to Belvoir Village with the exception of existing developed areas, as detailed in Section 4.6 Water Resources. These buffers are expected to protect the wetlands associated with the streams.

Colyer Village. Based upon conceptual village layouts, there are potential impacts to portions of the 0.03 acres of wetlands located in this village.

Dogue Creek Village. Because Dogue Creek Village has been recently renovated, future plans will not be developed until the out years and conceptual drawings for Dogue Creek Village have not been developed. Therefore, it is outside the scope of this project and wetland impacts will not be assessed in this document. However, prior to any demolition or construction in Dogue Creek Village, a jurisdictional delineation will be conducted to assess the acres of existing wetlands and potential impacts to those wetlands as part of the Federal and State permitting process.

George Washington Village. Based upon conceptual village layouts, there are potential impacts to the wetlands located near the intersection of Soldier Road and Surveyor Road and to the wetlands located in the southeast corner of the village. In each wetland area the corner of one lot crosses the wetland boundary. Grading, routine maintenance (i.e. mowing), and construction activities will likely impact these areas. During the metes and bounds survey, areas of existing wetlands that are not within the development footprint are expected to removed from the land lease.

Jadwin Village. The frame houses in the northern edge of the village will be demolished and new townhouses will be constructed southward, further away from the existing ravine and therefore away from the wetlands associated with the streams in the ravine. Although there is potential to impact wetlands during this process, the location of the new houses will afford more of a buffer for the wetlands.

New South Post Village. The site will maintain a 100-foot forested buffer from the onsite stream channel that includes 0.31 acres wetlands. Therefore, no wetland impacts are expected for this site.

Because there are no known wetlands within Fairfax Village, Gerber Village, Lewis Heights Village, River Village, Park Village, or either construction support site, no wetland impacts are expected in these villages.

TABLE 4-16
Summary of Wetlands Impacts by Parcel/Village

Parcel/Village	Wetland Type	Acres (Existing)	Acres (Impact)
Belvoir Village	PFO1A PFO1B	0.10 0.001	0 0
Colyer Village	PFO1A	0.03	0.03
Dogue Creek Village	PFO1A	0.10	0.10
Fairfax Village	--	--	--
Gerber Village	--	--	--
George Washington Village	PFO1A PFO1B	0.08 0.36	0.08 0.36
Jadwin Loop Village	PFO1A	0.05	0
Lewis Heights Village	--	--	--
Park Village	--	--	--
River Village	--	--	--
Rossell Loop Village	PFO1A	0.01	0
Woodlawn Village	PFO1B PFO1C PEMA	0.47 14.41 1.88	0 0 0
New South Post Village	PFO1A	0.31	0
Construction Site 1	--	--	--
Construction Site 2	--	--	--

Note: Impacts estimated. Based upon conceptual drawings.

Coastal Zone Management. No adverse effects would be expected to occur within the Coastal Zone.

All storm water runoff will be collected and discharged to storm water systems designed using BMPs and that meet Fairfax County requirements for the Chesapeake Bay RMA (see Section 4.6 for a discussion of storm water management). The proposed action will not disturb Chesapeake Bay RPAs.

The standard operating practices for construction, erosion, and sediment controls, and inspection and maintenance procedures will be summarized in a SWPPP to reduce any surface water impacts. The proposed erosion and sediment control practices will reduce the sediment load in the runoff, however minor short-term effects are anticipated from this activity.

Based upon conceptual site drawings, there is potential for impacts to wetlands to occur, however, these impacts are extremely small, and all impacts will be mitigated.

Emission calculations based on Northern Virginia's nonattainment status of severe indicate that air emissions from proposed action would not exceed *de minimis* levels, and therefore no significant impacts to air quality are expected, though there will be increased emissions during the 8-year construction period.

4.7.2.2 No Action Alternative

Vegetation, Wildlife, Sensitive Species, Wetlands, and Coastal Zone Management. No effects to vegetation, wildlife, wetlands, sensitive species, or coastal zone management would be expected. Ongoing maintenance and repair activities will be conducted in a manner sensitive to these resources.

4.8 Cultural Resources

4.8.1 Affected Environment

4.8.1.1 Prehistoric and Historic Background

Fort Belvoir contains numerous significant cultural resources, including the Belvoir Manor ruins and Fairfax gravesite, that are listed on the National Register of Historic Places (National Register or NRHP); Thermo-Con House, Camp A.A. Humphreys Pump Station and Filter Building, and US Army Package Power Reactor, that are individually eligible for listing on the NRHP and are listed on the Virginia Landmarks Register; structures and landscapes that contribute to the NRHP-eligible and Virginia Register-listed Fort Belvoir Historic District; and hundreds of archeological resources that are eligible or potentially eligible for listing on the NRHP.

In 2001, the installation completed the Integrated Cultural Resources Management Plan (ICRMP) (US Army Garrison Fort Belvoir, February 2001). The ICRMP can be consulted for a detailed description of the prehistoric and historic background of the RCI project area. Additional information about specific resources is maintained in the Fort Belvoir Environmental and Natural Resources Division's geographical information system (GIS) planning layers. Unless otherwise indicated, all information in this section regarding cultural resources within the Area of Potential Effect for the RCI project was obtained from the ICRMP, the GIS, and personal communications from DPW&L-ENRD personnel.

4.8.1.2 Status of Cultural Resource Inventories and Section 106 Consultations

Federal agency actions must comply with the National Historic Preservation Act (NHPA) of 1966, as amended. The intent of the NHPA is to integrate consideration of historic preservation issues into the early stages of project planning by a federal agency. Accordingly, under Section 106 of the NHPA, the head of any federal agency having direct or indirect jurisdiction over a proposed federal or federally financed undertaking is required, before the expenditure of any federal funds on that undertaking, to account for its effects on any district, site, building, structure, or object that is included or eligible for inclusion in the National Register.

Section 110, as amended, of the NHPA directs federal agencies to establish a program to locate, inventory, and nominate to the Secretary of the Interior all properties under their ownership or control that appear to qualify for inclusion in the NRHP.

The cultural resources of Fort Belvoir have been surveyed using the National Register Criteria for Evaluation (36 CFR 60.4). Studies have identified more than 300 archeological sites at Fort Belvoir, many of which have been assessed as potentially eligible for listing on the NRHP but require further evaluation to determine their eligibility. In addition, a disturbance study and archeological reconnaissance of all previously unsurveyed and undisturbed areas has been completed. In 1994, the Virginia Department of Historic Resources confirmed that Fort Belvoir has satisfactorily completed the identification of archeological resources on the installation.

The Fort Belvoir Historic District contains 181 contributing and 17 noncontributing resources, including several of the family housing villages (see below). Recent surveys have recommended adding other buildings in the housing villages to an expanded historic district. Additional buildings and structures will continue to be evaluated under the Section 110 process as those resources approach the 50-year age of potential eligibility.

Together, the 2001 ICRMP and the GIS layers, which were prepared in conjunction with the ICRMP and are continuously updated, identify all of the post's known cultural resources. The ICRMP provides guidelines for the management of these resources. As recommended by the ICRMP, the Army is planning to conduct a historic cultural landscape survey of Fort Belvoir in the near future.

4.8.1.3 Architectural Resources

The Area of Potential Effect (APE) for architectural and cultural landscape resources for the proposed RCI action is defined as Belvoir, Gerber, Jadwin, Park, and Rossell Villages. Table 4-17 summarizes the status of the architectural resources within the APE, which date from the 1920s through 1950. The APE does not include the modern units in Woodlawn Village and the Capehart-Wherry neighborhoods that were built in the 1950s and 1960s. The Advisory Council's nationwide "Program Comment on Capehart and Wherry Era (1949-1962) Army Family Housing, Associated Structures, and Landscape Features" (Program Comment) has provided an Army-wide Section 106 review for all undertakings affecting Capehart and Wherry buildings and landscape features.

The 211 buildings (256 housing units and 11 garages) proposed for transfer in Belvoir Village, Gerber Village, Jadwin, Park, and Rossell Villages have been determined to be eligible or potentially eligible for listing on the National Register, as contributing buildings to the Fort Belvoir Historic District (see Table 4-17 and Figure 4-8).

TABLE 4-17
Historic Housing Involved in RCI

Village	Number and Type of Buildings	Number and Type of Housing Units	Description
Belvoir Village	59 Residential	59 single-family	brick Colonial Revival, 1934-35
	2 Residential	2 single-family	brick Colonial Revival, 1950
Gerber Village	60 Residential	60 single-family	brick Colonial Revival, 1930-34
	4 Residential	4 single-family	brick Colonial Revival, 1933
	6 Residential	12 duplexes	brick Colonial Revival, 1939

TABLE 4-17
Historic Housing Involved in RCI

Village	Number and Type of Buildings	Number and Type of Housing Units	Description
	6 Garages	-- --	brick Colonial Revival,1940
Jadwin Village/Jadwin Loop	5 Residential	5 single-family	frame Craftsman "T" shape, 1920-21
	9 Residential	9 single-family	frame Craftsman " L" shape, 1920-21
	5 Residential	25 townhomes	brick Colonial Revival, 5-unit, 1940
	5 Garages	-- --	brick, 1939
Jadwin Village/21st Street	6 Residential	6 single-family	frame Craftsman "T" shape, 1920-21
Park Village	9 Residential	9 single-family	frame Craftsman "T" shape, 1920-21
	5 Residential	5 single-family	frame Craftsman " L" shape, 1920-21
Rossell Village	30 Residential	60 duplexes	brick Colonial Revival, 1947-48
	211 Buildings	**256 Housing Units**	

In addition, there are 4 historic transformers located in Gerber Village that are not proposed to be transferred and a tennis court in Belvoir Village located on the land that will be leased. The historic administration building and Thermo-Con House in Gerber Village are not included in the lease parcel or transfer of buildings.

Historic District Housing

Belvoir Village and Gerber Village were constructed as part of the extensive rebuilding and beautification of Fort Humphreys (renamed Fort Belvoir in 1935) that occurred in the inter-war period of the 1930s and 1940s. As components of the formal plan for the residential and administrative core of the post, these villages are an important part of the Fort Belvoir Historic District and are significant under NHPA Criteria A and C for their Colonial Revival architecture and community planning. Characteristic features of the buildings include symmetrical facades, brick exteriors, and limestone detailing. The plan of these officers' neighborhoods, along curvilinear streets with central greenswards and grand trees, resembles 1930s garden-style suburban design. The park-like setting of Belvoir Village takes advantage of the natural topography and vistas of the Potomac. The Commanding Officer's Quarters (Building 1) in Belvoir Village is situated on a promontory overlooking the Potomac River (ICRMP and Goodwin, n.d.). The Officers Club and Visiting Officers Quarters at Belvoir Village and the NCO Club and Thermo-Con House at Gerber Village are not included among the buildings proposed for transfer to FBRC.

The "temporary" Craftsman-style, wood-frame houses in Park Village and Jadwin Village (sometimes referred to as "T-400s" housing) were designed in the 1920s by Captain W.H. Peaslee and Captain A.A. Hockman of the Quartermaster Corps, around the time that the Engineer School was moved from the Washington Barracks and before Camp A. A. Humphreys became a permanent post as Fort Humphreys. There are currently a total of 14 L-shaped and 14 T-shaped Craftsman houses remaining on Fort Belvoir, in Park and Jadwin Villages. Others in Park and Jadwin Village were previously demolished.

The six T-shaped houses in Jadwin Village along 21st Street were determined to be contributing elements to the Fort Belvoir Historic District in 1984. In February 2003, the Virginia SHPO concurred with Section 110 documentation (John Milner & Associates, 2002) that recommended the remaining 1920s Craftsman-style houses as contributing elements to an expanded Historic District (DPW&L-ENRD personal communication, May 2003).

The five brick buildings in Jadwin Village (25 townhouse units) were constructed toward the end of the 1930s expansion campaign at Fort Belvoir. The Rossell Loop buildings (60 duplex units) were constructed after WWII, originally as JNCO apartments, and were later converted to two-story duplexes. A 2000 Historic Building Survey recommended these 35 brick buildings in Rossell and Jadwin Villages as contributing elements to an expanded Historic District and the Virginia SHPO has concurred (DPW&L-ENRD personal communication, May 2003).

Capehart-Wherry Housing

The majority of existing Army family housing units nationwide were built during the Capehart (1955-1962) and Wherry (1949-1955) eras. These post-WWII programs (like RCI) engaged the private sector in constructing military housing neighborhoods, similar to what was being built in civilian neighborhoods at the time, to address a military family housing shortage that was affecting the retention of personnel (AEC, 2002).

On May 31, 2002, the Advisory Council approved the Army's request for a "Program Comment on Capehart and Wherry Era (1949-1962) Army Family Housing, Associated Structures, and Landscape Features." The Army sought this programmatic approach to Section 106 compliance because of the large number of Capehart-Wherry buildings that have or will soon reach the 50-year eligibility threshold for the NRHP and their potential to be affected by RCI. The Program Comment has provided Army-wide Section 106 review, instead of individual project-specific reviews, for all undertakings affecting Capehart and Wherry buildings and landscape features, including maintenance and repair, rehabilitation, renovation, demolition and transfer, sale or lease out of Federal control.

As a result, Section 106 consultation for these undertakings at individual installations is not required. The Army Environmental Center (AEC) is carrying out the nationwide treatment measures required by the Capehart-Wherry Program, including an expanded historic context study, neighborhood design guidelines for Capehart-Wherry housing that will be renovated or rehabilitated, identification of potential properties of particular importance, video documentation and preservation efforts to maintain selected properties as military family housing.

On Fort Belvoir, Lewis Heights Village is a Wherry neighborhood with 428 units in brick apartment buildings. Colyer Village contains a mixture of 68 Capehart and Wherry-era rowhouses and 24 Wherry-era apartment-style units. Fairfax, George Washington, Dogue Creek, and River Villages are Capehart neighborhoods that contain a total of 942 brick duplexes and townhouses.

Other Buildings

Table 4-18 shows the status of the existing buildings that would be demolished to make space for the new homes and Recreation Center at the proposed New South Post Village.

Three of these four buildings are more than 50 years old and a 1992 architectural survey recommended that they are not eligible for listing on the NRHP. However, no formal determination of eligibility was ever submitted to the Virginia SHPO for these resources. Another survey is required to determine their NRHP-eligibility (DPW&L-ENRD, personal communication, May 21, 2003).

TABLE 4-18
Buildings on Proposed New South Post Village Parcel

Building Number	Description	Year Built	Year Surveyed	Status	Comments
1001	Concrete/masonry, Army Community Service Center	1945	1992	Undetermined	Survey required
1021	Brick storehouse	1940	1992	Undetermined	Survey required
1022	Brick transformer building, storage	1935	1992	Undetermined	Survey required
1029	Telecomm building (and satellites)	1983	-	-	Less than 50 years old; no survey required

In addition, five administrative and maintenance buildings will be leased to FBRC for use as offices for property management and construction personnel, maintenance and temporary construction support facilities (see section 2.2.1.3). Fort Belvoir will grant a separate (revocable) lease to FBRC for the use of these buildings, instead of transferring them or including them in the 50-year ground lease.

These buildings are: 766 (warehouse built 1994), 1108 (warehouse built 1955), 1436 (applied instruction building built 1970), 1126 (warehouse built 1955) and 1144 (warehouse built 1917). Four of these buildings are less than 50 years old. Building 1144 is considered to be a contributing resource to the Fort Belvoir Historic District. No physical alterations are planned for this NRHP-eligible building.

4.8.1.4 Archeological Resources

The APE for archeological resources for the RCI project is defined as all of the parcels proposed for development (housing villages and recreation center) and the additional sites proposed for temporary use as construction staging areas.

A review of known archeological and archeologically sensitive areas by Fort Belvoir has determined that archeological resources are present in and near the proposed housing areas and temporary construction support areas. Due to the sensitive nature of the information, details about the specific locations of these sites are not provided in this document. Fort Belvoir will provide site-specific information to appropriate individuals or agencies on a need-to-know basis. Table 4-19 lists archeological sites that are within or adjacent to the RCI parcels.

Nineteen archeological sites are present on the subject properties and another three sites are about 50 feet or less away from the approximate parcel boundaries (Table 4-19). Phase I archeological surveys have suggested that 11 of these 19 sites are potentially eligible for listing on the NRHP. A Phase II study evaluated two of the 19 sites and recommended them to be

eligible for listing. Phase I surveys suggested that the remaining seven sites would not be eligible for listing and recommended no further study of those sites.

TABLE 4-19
Archeological Sites In or Near the RCI Footprint

Location Relative to RCI	Site ID	Chronology	Type/Function	NRHP Status
Belvoir Village	44FX1675	Prehistoric	Potential campsite	Not Eligible
Belvoir Village	44FX1676	Prehistoric	Unidentified	Not Eligible
Belvoir Village	44FX1927	Prehistoric	Unidentified	Potentially Eligible
Belvoir Village	44FX1930	Prehistoric	Unidentified	Potentially Eligible
Colyer Village	44FX1921	Prehistoric	Unidentified	Potentially Eligible
Dogue Creek Village	44FX1340	Prehistoric/ Historic	Unidentified/ 18th century domestic	Eligible
Dogue Creek Village	44FX1925	Prehistoric	potential campsite	Potentially Eligible
Dogue Creek Village	44FX10	Prehistoric	Unidentified	Potentially Eligible
Dogue Creek Village	44FX1926	Prehistoric	Potential campsite	Not Eligible
Fairfax Village	44FX1928	Prehistoric	Potential campsite	Potentially Eligible
Fairfax Village	44FX1929	Prehistoric	Unidentified	Potentially Eligible
George Washington Village	44FX9	Prehistoric	Unidentified	Potentially Eligible
Jadwin Village	44FX1922	Prehistoric	Potential campsite	Not Eligible
Jadwin Village	44FX1923	Prehistoric	Potential campsite	Not Eligible
Woodlawn Village	44FX1498	Prehistoric	Potential campsite	Potentially Eligible
Woodlawn Village	44FX1946	Prehistoric/ Historic	Unidentified	Potentially Eligible
Woodlawn Village	44FX1947	Historic	Domestic	Potentially Eligible
Construction staging	44FX624	Historic	Early 20th century	Not Eligible
Construction staging	44FX1503	Prehistoric		Not Eligible
Fairfax Village *(adjacent)*	44FX4	Historic	18th century plantation Complex	NRHP-listed[1]
Fairfax Village *(within 50 ft)*	44FX1505	Historic	20th century Military training trenches	Eligible[2]
Dogue Creek *(within 50 ft)*	44FX1344	Prehistoric		Not Eligible[2]

Notes:

1. Site 44FX4 abuts Fairfax Village and near Belvoir Village. It will be excluded from the RCI ground lease by the metes and bounds survey.

2. Sites 44FX1505 and 44FX1344 appear to be within 50 feet of an approximate parcel boundary and will also be excluded by the metes and bounds survey.

The parcel proposed for new construction of New South Post Village housing and Recreation Center has been surveyed and contains no known archeological sites.

Another three archeological sites that are located approximately less than 50 feet away from the proposed RCI parcels also are listed in Table 4-19, because RCI parcel boundaries are approximate until the metes and bounds survey is completed and because the boundaries of

the sites depicted in Fort Belvoir's GIS database must be considered inexact until site boundaries are confirmed in a field survey by global positioning system (GPS). One of these adjacent sites (44FX4), which was listed on the NRHP in 1973, abuts the Belvoir and Fairfax Villages parcels and contains the ruins of Belvoir Manor and the Fairfax family cemetery. The boundaries of site 44FX4 will be confirmed by field survey before the RCI ground lease is finalized and the metes and bounds survey will ensure that these site is completely excluded from the leased parcel. Sites 44FX1344 and 44FX1505, which appear to be about 50 feet from Dogue Creek Village and Fairfax Village, respectively, will also be excluded from those leased parcels by the metes and bounds survey.

Cemeteries

There are no cemeteries located within the parcels proposed for leasing to FBRC, but three cemeteries are adjacent or nearby. The Fairfax family burial site, which is a part of the NRHP-listed Belvoir manor archeological site (44FX4) is immediately adjacent to the Fairfax Village parcel. As discussed above, the metes and bounds survey will exclude this site from the parcel to be leased to FBRC. Private cemeteries of the Alexandria Friends Meeting–Religious Society of Friends and the former Woodlawn United Methodist Church are near the Lewis Heights parcel, roughly 400 feet to the southwest and 200 feet to the northwest, respectively.

4.8.1.5 Offsite Historic Properties

In addition to on-post resources, there are a number of important historic resources in the surrounding area, including Mount Vernon, George Washington's home and Gunston Hall, George Mason's home.

In 1971, Fairfax County established the Woodlawn Historic Overlay District, currently one of thirteen such districts in the county. The core of the Woodlawn Historic Overlay District encompasses several historic properties near Fort Belvoir:

- Woodlawn Plantation - an 18th-century mansion owned and operated by the National Trust for Historic Preservation that was the home of Eleanor Custis (granddaughter of Martha Washington) and her husband, Lawrence Lewis (George Washington's nephew)
- Pope/Leighey House - a "Usonian" house designed by Frank Lloyd Wright and moved from the path of highway project to Woodlawn Plantation in 1965
- Alexandria Friends Meeting House (also referred to as Woodlawn Friends Meeting House)
- Woodlawn Baptist Church
- Woodlawn Stables
- George Washington's Grist Mill

The Alexandria Friends Meeting House and cemetery is surrounded by the installation and the rest of these historic properties are within ¼-mile of the installation boundary. Figure 4-8 shows the location of the Woodlawn Historic Overlay District in relation to the RCI project area.

Historic Overlay Districts are established by amendment to the county's zoning ordinance and may consist of a single property or group of related properties. The county regulates new construction and changes to existing structures within Historic Overlay Districts to ensure compatibility with the historic resources on which the districts are based. This includes changes to the exterior appearance of any building, structure, or site located in the district, if it is visible from a public right-of-way or from a contributing or historic property within the district (Fairfax County, 2002; Fairfax County, 2003). Although local zoning and site plan review processes do not apply to Federal property, Fairfax County's interests in construction activities within the Woodlawn Historic Overlay District have been taken into account through the Section 106 consultation process.

Lewis Heights Village, which is adjacent to Woodlawn Plantation and is located on land that was originally part of Woodlawn Plantation, is entirely within the Woodlawn Historic Overlay District. Lewis Heights is visible from various points of view on Woodlawn Plantation, especially from the access road and second floor of the mansion. George Washington Village, which is near Woodlawn Stables, is partially included in the Historic Overlay District. River Village, which is visible from the top floor of George Washington's Grist Mill (not accessible to the public) and from Mount Vernon Memorial Highway, is partially included in the Historic Overlay District.

4.8.1.6 Section 106 Consultation

Fort Belvoir initiated Section 106 consultation for the RCI project with a letter to the Virginia SHPO dated February 6, 2003 (Appendix D). Since that time, the SHPO and staff members have met several times with Fort Belvoir and its RCI partner to discuss details of the proposed action. In a letter dated April 18, 2003, Fort Belvoir invited the Advisory Council on Historic Preservation to participate in the Section 106 consultation process. Three organizations (National Trust for Historic Preservation–Woodlawn Plantation, Alexandria Friends Meeting–Religious Society of Friends, and Fairfax County) have requested and been granted consulting party status under Section 106 regulations.

No transfer of historic buildings, leasing of land containing historic resources, construction in the vicinity of historic resources, or rehabilitation of historic buildings will proceed until the Section 106 consultation process has been completed.

A Programmatic Agreement (PA) has been drafted by the Army and is being developed in consultation with the Virginia SHPO and other consulting parties. The PA considers the proposed treatment of known and potential archeological resources, historic structures and cultural landscapes and addresses mitigation for any potential adverse impacts of the proposed RCI action to historic properties within the APE.

After it has been concluded, a PA will become a part of the RCI ground lease and its provisions will remain as a requirement on the RCI partnership, until all of the housing reverts to the Army at the end of the 50-year (or 75-year, if extended) lease period.

The Advisory Council's Program Comment has already provided an Army-wide Section 106 review for all undertakings affecting Capehart-Wherry historic resources. Therefore, no further Section 106 consultation is necessary for RCI actions affecting Fort Belvoir's Capehart and Wherry-era housing in Lewis Heights, Colyer, Fairfax, George Washington, Dogue Creek and River Villages (see section 4.8.2.1).

4.8.1.7 Public and Stakeholder Involvement

The public and stakeholder participation process required by Section 106 was initiated at the public scoping meeting for this EA in January 2003. Fort Belvoir then invited interested parties, including local government, historic property owners, historic preservation organizations, religious organizations and individuals who had expressed interest in the historic resources, to attend public meetings on March 12 and May 13, 2003. In addition, military families living in Fort Belvoir's historic housing were surveyed to help determine priorities for rehabilitating their housing and were invited to discuss their needs at meetings. Comments received from the scoping meeting, follow-up public meetings, coordination with historic housing residents, and focus meetings with consulting parties were considered in drafting the Programmatic Agreement for the RCI action. The Army will provide appropriate public notice before the PA is executed.

4.8.1.8 Native American Resources

With the exception of the archeological resources described in section 4.2.1.1, no known resources of Native American interest are located within the project area.

4.8.2 Consequences

4.8.2.1 Proposed Action

By definition, transfer of historic buildings to FBRC is considered an adverse effect under the NHPA. Other planned activities that are part of the proposed action will also result in adverse effects on historic properties, as summarized in Table 4-20 and discussed in this section.

From a NEPA perspective, adverse effects to historic properties under the NHPA are considered significant impacts if those adverse effects cannot be resolved through the Section 106 consultation process. Fort Belvoir anticipates that adverse effects of the RCI project will be resolved, by incorporating input from stakeholders and designing mitigation measures, in accordance with a PA that is being developed in consultation with the Virginia SHPO and other consulting parties. The undertaking is not expected to result in significant impacts, because adverse effects on historic properties will be addressed by implementation of the mitigation measures that are determined appropriate and agreed to by the Section 106 consulting parties. The Section 106 consultation process will be completed before any actions affecting historic properties, beginning with the transfer of the buildings to FBRC, are undertaken.

4.8.2.2 Architectural Resources

The strategy for Fort Belvoir's neighborhoods that contribute to the Fort Belvoir Historic District is to retain and rehabilitate all housing from the 1930s Colonial Revival Plan for the development of Fort Belvoir; to retain and rehabilitate examples of the 1920s temporary frame housing; and to remove the remaining 1920s housing and the 1940s housing in Rossell Village to allow redevelopment of housing villages within the limited land areas currently available. In all, 73.5 percent (155 of 211) of the historic buildings will be rehabilitated and 26.5 percent (56 of 211) of the historic buildings, those which have been determined to be inappropriate for rehabilitation based on their condition and siting, will be demolished.

TABLE 4-20
Summary of Potential Effects on Historic Properties

Village	Resource Description	NRHP Status	Potential Project Impact	Project Action for Resource	Anticipated NHPA Effect
Belvoir Village	59 Brick single-family houses, Colonial Revival, 1934-35	Eligible	Alteration	Retain and rehabilitate in accordance with PA	Adverse Effect *
	2 brick single-family houses, 1950	Eligible	Alteration	Retain and rehabilitate in accordance with PA	Adverse Effect *
	site 44FX1675	Not Eligible	Road maintenance and utilities. Site is under existing road.	Proceed in accordance with PA	No Adverse Effect
	site 44FX1676	Not Eligible	Road maintenance and utilities. Site is under existing road and near front of one house to be rehabilitated.	Proceed in accordance with PA	No Adverse Effect
	site 44FX1927	Potentially Eligible	Resource eastern edge abuts parcel boundary in area not planned for disturbance	Will avoid	No Effect
	site 44FX1930	Potentially Eligible	Resource western edge abuts parcel boundary in area not planned for disturbance	Will avoid	No Effect
Colyer Village	92 Capehart housing units		Demolish and replace	Mitigation is addressed in Program Comment	No Adverse Effect
	site 44FX1921	Potentially Eligible	Construction of six new homes	GPS boundaries and Phase II evaluation. Mitigate if determined eligible.	Adverse Effect unless determined not eligible
Dogue Creek Village	270 Rebuilt Capehart housing units		Maintain during IDP; demolish and replace in out years	Mitigation is addressed in Program Comment	No Adverse Effect
	site 44FX1340	Eligible	No ground disturbance planned	Will avoid	No Effect
	site 44FX1925	Potentially Eligible	No ground disturbance planned	Will avoid	No Effect

TABLE 4-20
Summary of Potential Effects on Historic Properties

Village	Resource Description	NRHP Status	Potential Project Impact	Project Action for Resource	Anticipated NHPA Effect
Dogue Creek Village (cont.)	site 44FX10	Potentially Eligible	Site is under existing park; possible surface improvements to park under license from installation.	Metes and bounds survey will exclude site from lease. Phase II evaluation if ground disturbance is planned. Will avoid if eligible.	No Adverse Effect
	site 44FX1926	Not Eligible	None	Will avoid	No Effect
Dogue Creek *(within 50-ft)*	44FX1344	Not Eligible	Within 50 feet of parcel boundary. GPS boundaries.	Will exclude from ground lease and avoid	No Effect
Gerber Village	60 brick single-family houses, Colonial Revival, 1930-34	Eligible	Alteration	Retain and rehabilitate in accordance with PA	Adverse Effect *
	4 brick single-family houses, Colonial Revival, 1934	Eligible	Alteration	Retain and rehabilitate in accordance with PA	Adverse Effect *
	6 brick duplex buildings, Colonial Revival, 1939	Eligible	Alteration	Retain and rehabilitate in accordance with PA	Adverse Effect *
	6 brick garages,1940	Eligible	Alteration	Retain and rehabilitate in accordance with PA	Adverse Effect *
	(no archeological sites)				
Fairfax Village	148 Capehart housing units		Demolish and replace	Mitigation is addressed in Program Comment	No Adverse Effect
	site 44FX1928	Potentially Eligible	Construction - site's southern edge overlaps part of two new home sites. If not needed for lot setbacks, the wooded area between Fairfax and Belvoir Villages, including most of this site, is expected to be removed from the ground lease by the metes and bounds survey.	GPS boundaries and Phase II evaluation. Avoid or mitigate if determined eligible.	Adverse Effect unless avoided or determined not eligible

TABLE 4-20
Summary of Potential Effects on Historic Properties

Village	Resource Description	NRHP Status	Potential Project Impact	Project Action for Resource	Anticipated NHPA Effect
Fairfax Village (cont.)	site 44FX1929	Potentially Eligible	Construction - site's northwestern edge abuts one new home site and eastern edge abuts 2 existing houses to be rehabilitated (Belvoir Village). The area including most of this site is expected to be removed from parcel by metes and bounds (see above).	GPS boundaries and Phase II evaluation. Avoid or mitigate if determined eligible.	Adverse Effect unless avoided or determined not eligible
Fairfax Village *(within 50-ft)*	site 44FX1505	Eligible	Site's western edge about 50-100 feet from proposed new home site	Will exclude from ground lease and avoid during construction	No Effect
Fairfax Village *(within 50-ft)*	site 44FX4	NRHP-listed	Rehabilitation of existing house (Belvoir Village) about 50 feet away. Two new houses proposed within 50-100 feet of the site.	Will GPS boundaries and exclude from ground lease. Final site design on adjacent parcel will avoid impacts to this site.	No Effect
George Washington Village	244 Capehart housing units		Demolish and replace	Mitigation is addressed in Program Comment	No Adverse Effect
	site 44FX9	Potentially Eligible	Construction. Under existing Mount Vernon Road and proposed new intersection with Statesman Road.	GPS boundaries and Phase II evaluation. Mitigate if determined eligible.	Adverse Effect unless determined not eligible
Jadwin Village (Jadwin Loop)	5 Single-family, frame Craftsman T-shape, 1920-21	Eligible	Demolish and replace	Mitigation in accordance with PA	Adverse Effect
	9 Single-family, frame Craftsman L-shape, 1920-21	Eligible	Demolish and replace	Mitigation in accordance with PA	Adverse Effect
	5 5-unit brick (25 townhouses), 1940	Eligible	Alteration	Retain and rehabilitate in accordance with PA	Adverse Effect *

TABLE 4-20
Summary of Potential Effects on Historic Properties

Village	Resource Description	NRHP Status	Potential Project Impact	Project Action for Resource	Anticipated NHPA Effect
	5 Brick garages, 1939	Eligible	Alteration	Retain and rehabilitate in accordance with PA	Adverse Effect *
Jadwin Village (21st Street)	6 Single-family, frame Craftsman T-shape, 1921	Eligible	Alteration	Retain and rehabilitate in accordance with PA	Adverse Effect *
	site 44FX1922	Not Eligible	Construction of one new townhouse building and realignment of Jadwin Loop.	Proceed in accordance with PA	No Adverse Effect
	site 44FX1923	Not Eligible	Construction or road maintenance and utilities. Site's western edge abuts existing townhouse building and is under existing alley behind it.	Proceed in accordance with PA	No Adverse Effect
Park Village	9 Single-family, frame Craftsman T-shape, 1920-21	Eligible	Demolish and replace	Mitigation in accordance with PA	Adverse Effect
	3 Single-family, frame Craftsman L-shape, 1920	Eligible	Demolish and replace	Mitigation in accordance with PA	Adverse Effect
	2 Single-family, frame Craftsman L-shape, 1920	Eligible	Alteration	Retain and rehabilitate in accordance with PA	Adverse Effect*
	(no archeological sites)				
Rossell Village	30 Brick buildings (60 duplex units), 1947-48	Eligible	Demolish and replace	Mitigation in accordance with PA	Adverse Effect
	(no archeological sites)				
Woodlawn Village	(no historic housing)				
	site 44FX1498	Potentially Eligible	Construction. Site is inside the existing ring road on 8 replacement home sites.	GPS boundaries and Phase II evaluation. Mitigate if determined eligible.	Adverse Effect unless determined not eligible

TABLE 4-20
Summary of Potential Effects on Historic Properties

Village	Resource Description	NRHP Status	Potential Project Impact	Project Action for Resource	Anticipated NHPA Effect
Woodlawn Village (cont.)	site 44FX1946	Potentially Eligible	Road maintenance and utilities. Site's eastern edge is under existing road.	GPS boundaries and Phase II evaluation. Avoid or mitigate.	Adverse Effect unless avoided or determined not eligible
	site 44FX1947	Potentially Eligible	Road maintenance and utilities. Site's southwestern edge is under existing roads (Pole Rd and Plantation Dr). Metes and bounds survey is expected to remove most of this site.	GPS boundaries and Phase II if necessary. Avoid if practicable.	Adverse Effect unless avoided or determined not eligible
New South Post Village	3 buildings more than 50 years in age	Undetermined	Demolish	Architectural Survey. Mitigate if determined eligible.	No Adverse Effect
	(no archeological sites)				
Construction Support	site 44FX624	Not Eligible	Concrete plant and stone crusher	Proceed in accordance with PA	No Adverse Effect
	site 44FX1503	Not Eligible	Concrete plant and stone crusher	Proceed in accordance with PA	No Adverse Effect
Property Maintenance	1 warehouse built in 1917	Eligible	Storage of appliances and nonperishable supplies	No physical alteration. To be leased, not transferred.	No Adverse Effect

* Rehabilitation will be conducted in accordance with the terms of the Programmatic Agreement being developed with Virginia SHPO and the Secretary of the Interior's Treatment Standards. Mitigation measures for adverse effects will also be performed in accordance with the Programmatic Agreement.

These actions will result in multiple adverse effects to historic properties that will require mitigation.

Alterations and Infill Housing

Rehabilitation and additions are proposed for Fort Belvoir's historic houses to provide modern, functional, and convenient homes. To avoid or minimize adverse effects, interior and exterior rehabilitation will be conducted in accordance with measures agreed to by the Section 106 consulting parties and the Secretary of the Interior's Treatment Standards.

Infill housing will be designed to be compatible in scale, style and materials, but will not be a copy of the historic housing. Details will be distinct and elevations will vary somewhat in form.

Proposed details about alterations to historic structures provided in this EA are based on preliminary design and are subject to the ongoing Section 106 consultation process. The final scope of work also is dependent on negotiation of the final CDMP between the Army and the development entity, as well as the terms of the PA being developed by the Army with the Virginia SHPO and other consulting parties.

In Belvoir Village, interior rehabilitation may include actions, as needed, such as enlarging and modernizing kitchens, baths and closets; refinishing wood surfaces and repairing plaster walls and ceilings; repairs to alleviate basement flooding problems; and repairing and upgrading electrical, plumbing, telecommunications and mechanical systems. Structural alterations being considered may include expanding the living space into the existing garages and adding detached two-car garages at the side or rear. Exterior rehabilitation work may include actions such as maintenance of painted surfaces, roofs, masonry, and windows, with possible in-kind replacement of some deteriorated windows, and improving existing lawns and landscaping in harmony with the historic landscape of Belvoir Village.

Up to five new infill houses will be constructed on available home sites along Belvoir Road at the entry to the village, maintaining the original spacing, siting, and character of Belvoir Village. The infill houses will be compatible with the historic houses in the Village, but readily identifiable as different. In Belvoir Village, infill houses will still be in the Colonial Revival style, but will have hip roofs instead of gabled, front porches will be distinct from the historic houses, and there will be recessed attached garages (Krause, personal communication, June 2003).

Additions that are proposed to enlarge the Gerber Village houses would be constructed to the rear of the houses, preserving the existing appearance of the house fronts. To provide covered parking and storage space, new detached, two-car garages are proposed (across the alley) for units in Gerber Village and existing garages would be expanded to two-car garages. In the duplex houses, interiors may be remodeled to improve circulation problems and enlarge bedrooms. Basement work will be done to eliminate flooding, mildew and insect problems windows and doors will be repaired. In all houses, interior rehabilitation may include actions such as refinishing wood surfaces and trim; replacing heating and air conditioning systems (HVAC); upgrading electrical, lighting, telephone, and cable TV systems and adding Internet service.

Other exterior rehabilitation work may include maintenance on painted surfaces, roofs, masonry, and windows, with possible in-kind replacement of some deteriorated windows. Additions will relate to the existing neighborhood by adding elements of similar scale, mass, proportion, and materials. Landscaping will be maintained and upgraded on an ongoing basis consistent with the historic landscape of the Village.

Up to five new infill housing units will be constructed on available home sites, maintaining the original spacing, siting, and character of Gerber Village. New infill housing in Gerber Village will be Cape Cod in style, but with flanking frame wings and a symmetrical entrance, unlike the offset entry and side porch of the original houses.

In Jadwin Village, interior rehabilitation in the brick townhouses may include actions such as upgrading plumbing; renovating kitchens; refinishing wood, trim, windows and doors; upgrading electrical and telecommunications wiring; and replacing HVAC systems. Exterior rehabilitation is proposed to include adding new or expanding existing detached multi-car garages, to provide more secure storage space and two garage spaces per unit, and improving common play areas for children.

Most of the 1920s frame Craftsman-style houses in Jadwin and Park Villages are proposed for demolition due to the siting, layout, and condition of the buildings (see the following subsection for a discussion of demolition). Examples of both the T-shaped and L-shaped houses will be preserved and rehabilitated.

Interior rehabilitation of the frame Craftsman-style houses on 21st Street may include actions such as renovating existing bathrooms and adding a bathroom; upgrading kitchens; updating electrical and other systems; and refinishing wood trim and floors. Exterior rehabilitation actions may include providing garages and secure storage; replacing gutters and downspouts; and improving general maintenance. The aluminum siding on these houses will be replaced, to be more in keeping with the original appearance, and some other period details will be restored. Enlarging these houses has the potential for adverse effects on their historic architectural integrity.

The frame Craftsman-style T-shaped houses on the north side of Jadwin Loop will be demolished and replaced with six new brick buildings, consistent with the 1930s development plan for Jadwin Village. The new brick townhouses will be comparable in scale to the historic brick 5-unit townhouse buildings, but with different roof configuration and fenestration.

Two of the L-shaped, 1920s Craftsman-style houses in Park Village will be retained and rehabilitated in the same manner as the T-shaped houses on 21st Street, as examples of a previously-abundant housing type on Fort Belvoir. The other frame T- and L-shaped houses in Park Village will be demolished and replaced. New replacement housing will be constructed in a Craftsman style, compatible with the remaining one story T-400 houses, so as to not overwhelm them in scale. Front porches and carpenter details will recall the early 1920's character of the remaining historic T-400 houses. Incorporating a small adjacent and currently vacant lot into the redeveloped village will allow the street to be expanded into a loop with a central green, similar to other villages in Fort Belvoir.

Demolition

Demolition of the Craftsman houses in Jadwin and Park Villages and the brick buildings in Rossell Village will result in adverse effects on historic properties. This action is proposed for the following reasons:

Jadwin Loop: Unit analysis requires significant rehabilitation and small additions, as well as the construction of freestanding garages on the T-400 frame houses, to make them appropriate as family housing that would be comparable to the new homes. Electrical systems do not meet current standards; insulation in walls and crawlspaces is inadequate; and bathrooms, closet, and storage space is inadequate. In addition, the topography of most of the neighborhood, with houses perched on steep hillsides, has caused minor structural problems and would greatly increase the cost of rehabilitation. The topography, condition and size of the houses would also make relocation very difficult. For this reason, only the six "T" shape frame houses along 21st Street are to be rehabilitated for use as family housing.

Snow Loop/Park Village: There are three remainingT-400 houses in Snow Loop, all in very poor condition. This area is no longer appropriate for family housing, and given the condition of the remaining units, demolition is the only reasonable option.

In Park Village, the houses are sited such that it is difficult to achieve the required density for the neighborhood with the existing orientation and spacing of the houses. This, in combination with the extra cost, makes it infeasible to retain and rehabilitate additional units. However, two of the "L" shaped units will be retained, so that examples of each World War I era housing type remain in use as family housing on Fort Belvoir.

Rossell Loop: The existing duplex housing units at Rossell Loop are notably inadequate, relative to the new housing being planned for Ft. Belvoir, in terms of size, type and configuration of rooms. Kitchens are too small for more than modest improvement; electrical systems do not meet current standards; closet and storage space is inadequate; and there is no room to add garages or carports. The layout makes modest expansion infeasible, so that wholesale interior renovation would be required. The cost of this level of renovation and expansion makes saving these buildings cost prohibitive. In addition, the new housing layout allows for more housing units, with the ability to meet the "smart growth" goals of the RCI plan (Krause, personal communication, June 2003).

Mitigation strategies being considered to resolve the adverse effect of demolishing these historic buildings include:

- Retaining and rehabilitating two of the L-shaped houses in Park Village to preserve an example of this building type
- Performing Historic American Buildings Survey (HABS) documentation on one of each type of historic building, including its setting and surrounding landscape features, prior to removal. This documentation will provide an historic context and large format photographs, along with copies of existing plans, maps and other records for transmission to the Library of Congress
- Preparing an Internet-ready, multi-media presentation on the history of 20th century Army family housing at Fort Belvoir, in coordination with the Fort Belvoir Cultural

Resources Manager, that will be exhibited at the new Welcome Center and made available to the Section 106 consulting parties and the public.

In addition, FBRC will explore the feasibility of donating or selling structures to non-government parties, historic architectural salvage, and relocation and adaptive reuse of some structures on Fort Belvoir.

Capehart-Wherry Housing

In planning the RCI actions that will affect Capehart-Wherry housing, associated structures, and landscape features, the Fort Belvoir RCI partnership has reviewed and considered the Neighborhood Design Guidelines for Army Wherry and Capehart Era Family Housing, currently in Preliminary Draft form. The Guidelines address many areas of housing design in the Capehart Wherry construction eras, from site planning methods to buildings, patios, roofs, windows and ancillary structures such as carports and storage sheds.

The Army has determined that the existing Capehart-Wherry housing units at Fort Belvoir should be demolished because they do not meet the Army's housing needs and requirements at Fort Belvoir, for the reasons detailed below. This will result in an adverse (but not significant) effect on historic resources. Although Fort Belvoir is not one of the installations selected for the AEC's nationwide Capehart-Wherry recordation program under the Advisory Council's Program Comment, that nationwide program will provide mitigation for the demolition of Capehart-Wherry housing on Fort Belvoir.

The design principles originally applied to the neighborhood organization of housing areas from the Capehart-Wherry Era are inappropriate for the redevelopment of the housing areas at Fort Belvoir and the reintegration of the existing housing communities with each other and the Main Post at-large. The Fort Belvoir RCI design team found the Design Guidelines to be directing development toward continuing patterns based upon a 1950's paradigm of design that is associated with the boom of tract housing, automobile-oriented neighborhoods, and the economically-built and easily reproduced styles of that time.

The guiding principles of Fort Belvoir's RCI require the design team to build neighborhoods that incorporate the "smart growth" design principles of pedestrian-oriented design elements. These "smart growth" principles are synonymous with sustainable design practices and include small front yard setbacks, short blocks within an efficient street framework, interconnected sidewalks that are unencumbered by driveways, and continuous circulation patterns without dead-ends.

The Fort Belvoir RCI design concept for these neighborhoods does contain a number of elements that are consistent with the Design Guidelines in spirit, if not in actuality: the communities are planned; there are uniform building setbacks; and open spaces and common areas are provided. However, these elements are provided and integrated into the redeveloped communities in ways other than the Guidelines suggest (Hesler, personal communication, June 2003).

Other Buildings

None of the structures remaining on the parcel where the proposed New South Post Village would be built are currently considered by the Army to be eligible for listing on the NRHP. However, documentation for the three buildings (1001, 1021 and 1022) that are more than

50 years old was never formally submitted to the Virginia SHPO. Before they are demolished, another survey will be conducted and submitted to the SHPO to determine their NRHP-eligibility. If necessary, the Army will consult further with the SHPO to resolve the adverse effect of their demolition.

No physical alterations are planned for Building 1144 (NRHP-eligible warehouse built 1917), which will be leased for continued use as a storage building.

The foundation of the former Commanding Officer's house (demolished in 1966) is located behind the brick townhouses at the eastern end of Jadwin Loop. This structural remnant has not previously been evaluated or considered as an historic property (DPW&L-ENRD, personal communication, August 2002 and May 2003). The exact location has not been documented, but the approximate location is not within the area of planned disturbance for Jadwin Village. The metes and bounds survey is expected to exclude a portion of the Jadwin Village parcel from the ground lease (undisturbed land outside the existing park area) and it appears that this area would include the old foundation.

4.8.2.3 Archeological Resources

Table 4-19 (above) lists archeological sites that are within or adjacent to the subject parcels and identifies the potential effect of project actions on those sites.

In accordance with the terms of the PA currently being developed, prior to any new construction on previously undeveloped land, Fort Belvoir will determine the need for an survey. If a survey is recommended, the Fort Belvoir Cultural Resources Manager will undertake a survey of the APE sufficient to determine the NRHP-eligibility of historic properties. If NRHP-eligible archeological sites will be affected by the undertaking, the Army will consult with the Virginia SHPO to determine how to avoid or resolve an adverse effect on the affected sites.

Nine sites will not be affected by the proposed action. Four of these sites (44FX4–the Belvoir Manor ruins, 44FX10 in Dogue Creek Village, and 44FX1344 and 44FX1505, which appear to be about 50 feet from the approximate boundaries of Dogue Creek Village and Fairfax Village, respectively) will be excluded from the ground lease by the metes and bounds survey. The other five (44FX1927, 44FX1930, 44FX1340, 44FX1925, 44FX1926) are not in the area of proposed ground disturbance and will be avoided.

Seven sites that are potentially eligible for listing on the NRHP are in the proposed area of ground disturbance (44FX1921, 44FX1928, 44FX1929, 44FX9, 44FX1498, 44FX1946 and 44FX1947). At the conceptual design stage, it appears that three of these sites cannot be easily avoided (44FX1921 in Colyer Village, 44FX9 in George Washington Village and 44FX1498 in Woodlawn Village). Efforts will be made in final site planning to avoid these sites; however, if they have been determined to be NRHP-eligible and it is not practicable to avoid them, the affected sites would be mitigated in consultation with the Virginia SHPO. The other four sites (44FX1928 and 44FX1929, located mostly on wooded land between Fairfax and Belvoir Villages, plus 44FX1946 and 44FX1947in Woodlawn Village) could be affected by road paving or housing construction, but it may be feasible to avoid them in the final site planning. Most of site 44FX1947 in Woodlawn Village is expected to be excluded from the ground lease by the metes and bounds survey, but a portion of it appears to lie under existing roads.

Six sites that have been recommended by Phase I surveys as not eligible for listing on the NRHP with no further need for evaluation (44FX1675, 44FX1676, 44FX1922, 44FX1923, 44FX624, 44FX1503) could be disturbed by paving roads, installing utility lines, construction of nearby housing, or operations on the temporary construction staging sites (if site grading or other ground disturbance is required to set up the concrete plant or stone crusher).

Before the ground lease is finalized, the boundaries of site 44FX4 will be reevaluated and verified by a field survey to ensure that the site will be excluded from the ground lease. After the boundaries of the site have been confirmed, the full potential impact of construction in the adjacent area of Fairfax Village will be reassessed before site design is finalized. Direct and indirect impacts of new construction to this significant NRHP-listed site will be avoided in final site planning.

Because all of the proposed construction areas have been surveyed or previously assessed as disturbed, it is unlikely that any unknown archeological sites would be discovered during new construction on the New South Post Village and Recreation Center parcels, demolition and redevelopment of existing housing, or installation of new stormwater management facilities or other utilities within existing villages.

However, if an unexpected discovery of archeological materials does occur, construction activities at that work site will immediately stop and the Fort Belvoir Cultural Resources Manager will be notified. FBRC will make every reasonable effort to ensure that no unauthorized personnel have access to the site and that no further damage is done to the discovery, until Fort Belvoir has complied with 36 CFR 800.13(b) and any other legal requirements.

Fort Belvoir will ensure that archaeological artifacts recovered from archaeological investigations or unexpected discoveries will be stored in a curatorial repository that meets federal standards stipulated in 36 CFR 79, "The Curation of Federally-Owned and Administered Archaeological Collections."

Cemeteries

No impacts to cemeteries are anticipated. As discussed above, the metes and bounds survey will exclude the Fairfax family burial site, which is a part of the NRHP-listed Belvoir manor archeological site (44FX4), from the parcel to be leased. During and after the redevelopment of Fairfax Village, public access to this cemetery and site will be maintained. The same number of parking spaces provided by the existing visitors parking lot will be replaced alongside the realigned road near the trail head (see Figure 2-3).

The proposed action will not affect the private cemeteries near the Lewis Heights parcel or change their accessibility by members of the Alexandria Friends Meeting–Religious Society of Friends and the United Methodist Church.

4.8.2.4 Viewshed Issues

Fort Belvoir Historic District

Adverse impacts to the Fort Belvoir Historic District viewshed will occur when existing historic houses are removed and others are enlarged or garages are added. The effects of altering the exteriors will be minimized by adding elements of similar scale, mass, proportion and materials, by minimizing alterations at the front of buildings, and by

maintaining landscape consistent with historic landscapes. Visual effects of removing historic buildings will be reduced somewhat by replacing them with compatible new homes, but the historic viewshed will be altered.

In addition, street furniture, street lighting and neighborhood external lighting plan have the potential to adversely affect the Historic District. Final design plans will be developed in consultation with the Fort Belvoir Cultural Resources Manager and the Virginia SHPO, as appropriate, to avoid or resolve any adverse effects.

Cultural Landscape

The historic green in the center of Belvoir Village will be maintained as-is and the tennis court, which is a contributing element to the Historic District, will be maintained. The two greens around which most of the Gerber Village houses are arranged will be retained in their existing configuration, but new garages will infringe on them by about 25 feet all around the perimeter. Building additions and garages will affect the view of the greens from the street.

The green in the center of Jadwin Village will be retained in its current location, but will be reduced in size by the rebuilding of Jadwin Loop about 100 feet inside its current northern edge. This will provide more space on the north side of Jadwin Loop so that the new homes can be built further away from the ravine than the existing houses are.

The 2001 ICRMP recommended the preparation of a Landscape Preservation Plan for the Fort Belvoir Historic District that would "document the historical evolution of the landscape design of the Historic District, identify the character-defining features associated with the designed and natural landscape and recommend measures to maintain and safeguard historic landscape features." Fort Belvoir intends to complete a historic landscape survey in the near future, to identify and assess the significance of cultural landscape features in the Historic District.

Offsite Viewshed

The redevelopment of Lewis Heights will affect views from within the Woodlawn Historic Overlay District. Potentially adverse effects have been mitigated by context-sensitive design and maintaining vegetative screening to reduce visibility historic properties within the Overlay District.

The preliminary design for Lewis Heights would remove existing houses that are currently most prominent in the view from Woodlawn Plantation and increase the green space from that viewpoint, resulting in a beneficial effect on the viewshed. The demolition of River Village will change the view from a public roadway within the Overlay District, but should have a neutral effect by removing visible buildings and maintaining existing trees. The redevelopment of George Washington Village is not expected to affect offsite viewshed.

As consulting parties in the Section 106 process, Woodlawn Plantation (the National Trust for Historic Preservation), Alexandria Friends Meeting-Religious Society of Friends and Fairfax County will be afforded an opportunity to comment on the architectural design and layout of those neighborhoods that are visible from historic properties.

4.8.2.5 No Action Alternative

Under the no action alternative to the RCI project, the Army would continue to perform ongoing maintenance of all historic housing units and could perform rehabilitation or renovation of some units. Future actions to replace buildings in Rossell, Jadwin, or Park Villages, which were under discussion before the RCI project, are possible but no definite plans have been made. Unless Fort Belvoir consults with the SHPO to arrive at a PA that would address effects of maintenance and other routine management activities, all of these actions would require individual Section 106 consultation. Fort Belvoir could proceed with plans to upgrade living conditions in Lewis Heights and the other Capehart-Wherry neighborhoods, as MCA funding becomes available, without the need for Section 106 consultation.

Existing infringement by Lewis Heights upon Woodlawn Plantation's viewshed would continue unchanged, resulting in a continued adverse effect. At present, the Lewis Heights buildings and playground are visible from various points of view including the lawn, garden and access road on the plantation and from the second story of the mansion house. Although the Army could address these effects by redeveloping Lewis Heights in the future without RCI, funding to do so is not likely to be available in the foreseeable future. The Capehart units in River Village would continue to be visible from Mount Vernon Memorial Highway in the Woodlawn Historic Overlay District.

4.9 Socioeconomic Resources

4.9.1 Affected Environment

This section describes the contribution of Fort Belvoir to the economy and the sociological environment in the region. The socioeconomic indicators used for this study include regional economic activity, population, housing, and schools. These indicators characterize the region of influence (ROI). An ROI is a geographic area selected as the basis on which demographic and economic impacts of project alternatives are analyzed. In addition, on-post recreation, community facilities, public safety and related services are discussed.

The ROI for the proposed action is the Metropolitan Washington regional planning area, as defined by the Metropolitan Washington Council of Governments (MWCOG). This area is comprised of **central jurisdictions** (Arlington County and City of Alexandria in Virginia and the District of Columbia); **inner suburbs** (Montgomery and Prince George's Counties in Maryland and Fairfax County and the Cities of Fairfax and Falls Church in Virginia); and **outer suburbs** (Calvert, Charles, and Frederick Counties in Maryland and Loudoun, Prince William, Stafford Counties, and the Cities of Manassas and Manassas Park in Virginia). [4]

Fort Belvoir is located at the southern edge of Fairfax County, about 4 miles from the Prince William County border, placing it in the inner suburbs.

[4] This 16-jurisdiction area was the Metropolitan Statistical Area (MSA) defined in 1983 by Office of Management and Budgets (OMB) for federal statistical purposes. After the 1990 Census, OMB modified the definition of metropolitan areas and expanded the Washington MSA to the 25-jurisdiction Washington DC-MD-VA-WVA Primary Metropolitan Statistical Area (PMSA), which is currently used in statistics produced by federal agencies. However, MWCOG still produces its annual estimates and forecasts for the 16-jurisdiction MSA as defined in 1983. Where federal statistics for the ROI (MWCOG planning region) are not available, data for the PMSA is presented instead.

The baseline for socioeconomic data is 2001, the date of Fort Belvoir's decision to proceed with planning for an Army RCI project. Where 2001 data were not available, the most recent data available are presented.

4.9.1.1 Economic Development

Despite the economic downturn and lingering effects of 9-11-2001 on the tourism industry, job growth in the Washington area remains stronger and unemployment remains lower, especially in the suburbs, compared to nationwide trends. From 2000 to 2001, employment in the Washington was still growing but at a much slower rate (28,000 jobs added) than from 1999 to 2000 (114,000 jobs added). Between 1997 and 2001, over 57 percent of total job growth was in the inner suburbs, followed by the outer suburbs with 27 percent and the central jurisdictions with 16 percent.

In 2001, at-place employment in the ROI totaled nearly 2.6 million jobs, over half of them in the inner suburbs. The services sector accounted for the largest share of jobs (40 percent) in the region, followed by government (22 percent) and retail trade (15 percent) (MWCOG, 2002).

MWCOG Round 6.2 Cooperative Forecasts predict that the region's principal employment centers will remain in the inner suburbs with 32 percent of jobs in 2025, and central jurisdictions with 50 percent of jobs, while the outer suburbs are expected to provide 18 percent of all jobs in 2025 (MWCOG, 2002).

In 2001, the average annual unemployment rate in the entire Washington, DC-MD-VA-WV PMSA was 3.1 percent, down from 3.7 percent in 1997. In February 2003, the unemployment rate for the PMSA was 3.7 percent, placing the area at 32nd (lowest) for unemployment among 331 metropolitan areas nationwide. By comparison, unemployment in March 2003 was 6.4 percent in the District of Columbia, 4.5 percent for the state of Maryland and 4.2 percent for the state of Virginia (BLS, 2003).

In 2000, Fairfax County has the highest per capita income in the region at $51,227, while the per capita income for the ROI was $40,970 (MWCOG, 2002). Median income in Fairfax County was also the highest in the region at $81,050 (2000 Census).

The median household income of Fort Belvoir residents living on North Post (Census tract 4219) and South Post (Census tract 4162) was $33,266 and $46,675, respectively.

Commercial construction declined during 2001 compared to prior years, with developers breaking ground on 32.2 million square feet of space, compared to 48.6 million square feet in 2000. The most new construction was in Fairfax County, with 7.6 million square feet of commercial space (MWCOG, 2002).

Retail sales totaled $56.5 billion in 2001, a slight increase over 2000, but when adjusted for inflation were slightly less than retail sales in 2000 of $57 billion. Sales in the region increased by 10.1 percent from 1997 to 2001, compared to 14.4 percent increase nationwide (MWCOG, 2002).

4.9.1.2 Demographics

In 2001, the total population of the ROI was estimated at over 4.6 million people, up from 4.5 million at the 2000 Census. The majority (59 percent) of these people lived in the inner suburbs, while 22 percent live in the outer suburbs and 19 percent in the central jurisdictions. Fairfax County is the largest single jurisdiction, with a population of 0.98 million (MWCOG, 2002).

From 1997 to 2001, population in the ROI grew by a total of 362,100 (8.5 percent). The inner suburbs claimed the largest share of this growth, with a net gain of 164,800 people, followed by the outer suburbs with 135,200 more people and the central jurisdictions with 62,100 more people. Loudoun County was the single jurisdiction with the greatest proportional increase at 38.5 percent (MWCOG, 2002).

Although the outer suburbs are showing the highest rate of growth (15.1 percent from 1997 to 2001), the inner suburbs are expected to remain the ROI's most populous area. According to MWCOG forecasts, the population of the ROI is expected to be around 5.1 million by 2010, with 58 percent of those people living in the inner suburbs, and will reach 5.9 million by 2025, with 54 percent in the inner suburbs (MWCOG, 2002).

At the 2000 Census, the total resident population of Fort Belvoir (Census tracts 4162 and 4219) was7,260 persons, of which 44 percent were children under 18 years of age and 33 percent were school-age (5 to 18 years). Of the total population, 292 people (4 percent) were living in group quarters (i.e., barracks) and the rest were living in households. There were 1,817 families and 57 non-family households living on Fort Belvoir at the 2000 Census.

The demographic profile of military residential communities tends to differ from that of the general population, due in part to the ages of active-duty service members. The average household size on Fort Belvoir was 3.71 persons, while the average household in Fairfax County was 2.73 persons. The average family size on Fort Belvoir was 3.82 persons, compared to the average family size of 3.2 persons in Fairfax County. On Fort Belvoir, 86 percent of households had children under 18 years, compared to 39 percent in Fairfax County. There were no households on Fort Belvoir with members over 65 years, compared to 21 percent in Fairfax County.

4.9.1.3 Housing

Fort Belvoir currently provides 2,070 family housing units for military service members and their families. Table 4-21 is a summary of the numbers of housing units and bedrooms currently available for officers and enlisted personnel. The existing family housing on Fort Belvoir is described in Section 2.2.1.2 and proposed changes to housing are described in Section 2.2.2.

TABLE 4-21
Fort Belvoir Housing Inventory

Family Quarters	Percent	Officer	Enlisted	Total
1 Bedroom	2%	0	48	48
2 Bedroom	28%	6	569	575

TABLE 4-21
Fort Belvoir Housing Inventory

Family Quarters	Percent	Officer	Enlisted	Total
3 Bedroom	47%	182	793	975
4 Bedroom	22%	109	343	452
5 Bedroom	1%	19	0	19
6 Bedroom	0%	1	0	1
Totals	**100%**	**305**	**1,765**	**2,070**

In addition, Fort Belvoir provides billeting for 808 permanent party enlisted personnel, as well as transient lodging consisting of 491 visiting officer quarters, 23 visiting enlisted, and 21 distinguished visitors quarters (Fort Belvoir website, April 2003).

The Fort Belvoir, Fort Myer, Fort McNair and Pentagon 2001 Family Housing Market Analysis (Neihaus, 2002) evaluated the condition and availability of private-sector housing in the housing market area, which was defined by using the standard Army definition of 20 miles and/or 30 minutes to the principal work location in peak traffic. Travel was measured to the south from Fort Belvoir, to the west and north from Fort Myer, and to the east and southeast from Fort McNair. The family housing market area thus defined includes portions of Stafford County, Prince William County, Fairfax County, and cities of Fairfax and Falls Church, Arlington County, Montgomery County, Prince George's County and the District of Columbia.

The family housing market area currently has a total of about 1.3 million housing units, of which 59.3 percent were single-family houses in 2001 (up from about 56.8 percent in 1990) and 39.7 percent are multi-family housing units. About 58.7 percent of occupied housing units in the housing market area are owner-occupied and 41.3 percent are renter-occupied (Neihaus, 2002). Similarly, there were 1.7 million housing units in the ROI at the 2000 Census, 63 percent of which were owner-occupied. The overall vacancy rate for both the housing market area and the ROI was 4.6 percent. Vacancy rate for rental units dropped from 7.5 percent in 1990 to 3.7 percent in 2001 (Neihaus, 2002).

The majority of rental housing (76 percent) in the housing market area has two or fewer bedroom housing units, with only 16.6 percent three-bedroom and 7.3 percent four-bedroom units. Housing quality characteristics of housing units in the housing market area showed that 0.6 percent of units were not connected to reliable water supply and 0.4 percent had neither public sewer service or septic/cesspool, 0.4 percent lacked complete kitchen facilities, and 0.5 percent lacked complete plumbing facilities (Neihaus, 2002).

In the housing market area, 2001 median monthly rents for two-bedroom units were $1,400 per month (in a range of $450 to $4,300), or $1,529 per month including utilities. For three- and four-bedroom rental units, the median rent with utilities was $1,872 and $2,228, respectively. Rental costs varied greatly by location. By comparison, Maximum Acceptable Housing Cost for military service members (BAH plus Out-of-Pocket amount that varies by

grade) in 2001 ranged from $1,068 for JNCOs and JENL (E1-E5) to $2,112 for O6 and higher (Neihaus, 2002).

In the ROI, permits were issued for 32,775 new housing units in 2001, down from 35,030 permits in 2000. Nearly half of the housing permits issued in 2001 were in the outer suburbs, but Fairfax County was the highest single jurisdiction for housing permits, issuing 6,121 permits in 2001 (MWCOG, 2002).

New homes sold in the ROI decreased sharply to 18,958 sold in 2001, down from 22,882 sold in 2000. Housing inflation in the PMSA increased by 3.8 percent between 2000 and 2001, compared to an increase of 4.0 percent nationally (MWCOG, 2002).

4.9.1.4 Quality of Life

Law Enforcement Services

Law enforcement support is provided to the Fort Belvoir community by Military Police of the Provost Marshal Office. The Military Police headquarters are on South Post at Pohick Road and 12th Street. Residents are asked to report any crimes, incidents, accidents or suspicious individuals or activity to the Provost Marshall Office, located in Building 1131. In the case of an emergency, residents should call 911, which will be routed back to Fort Belvoir for response.

The Fairfax County Police Department provides public safety services for the area surrounding Fort Belvoir (Fort Belvoir Post Guide, 2001).

Fire Protection Services

Fort Belvoir has three fire stations on post: No. 65 on South Post; No. 63 on North Post; and No. 66 at Davison Airfield. These stations are staffed by five fire companies (three engine companies, one truck company and one airport crash company), with a total staff of 66 firefighters. During any 24 hour period, at least 21 firefighter personnel are on duty. Emergency medical service (EMS) personnel are trained at least to the level of emergency medical technician (EMT). The installation fire department has three engines and one ladder truck (Fort Belvoir, 2001).

The off-post fire stations (Fairfax County Fire and Rescue Department) closest to Fort Belvoir are the Woodlawn, Lorton, Gunston, and Kingstowne fire stations.

Medical Services

Fort Belvoir's DeWitt Army Community Hospital provides health care services to active and retired military personnel and their families that are residing in Northern Virginia. The DeWitt Health Care System is recognized as the primary care foundation for the Walter Reed Health Care System. The DeWitt Health Care System operates three Family Health Care Clinics located on military facilities, at Fort Belvoir, Fort Myer and Fort A.P. Hill, as well as two off-post Family Health Care Clinics in Fairfax and Woodbridge. These Family Health Care facilities offer primary care appointments on an appointment basis only and accept no walk-ins. The Family Health Center for Fort Belvoir is located in DeWitt Hospital.

DeWitt Army Community Hospital currently has 69 beds (including bassinets) for patient use. The average daily occupancy rate for the hospital is 21 beds, with 405 inpatient visits and 132,439 clinic visits in 2002. Along with the main pharmacy, DeWitt Hospital also

operates a Pharmacy Refill Annex at the Main PX on post. Dental services are available on post for soldiers on active duty. The Logan Dental Clinic had 11,339 visits in 2002. (Fort Belvoir, 2001; Fort Belvoir website, April 2003).

Schools

Fort Belvoir Elementary School has been in operation from September 1998 and replaced three former schools (Cheney, Markham, and Barden) that closed in 1998. Fort Belvoir Elementary is part of the Fairfax County Public School System (FCPS) and is the county's largest elementary school, serving more than 1,300 students from kindergarten through sixth grade. In 2002, total enrollment was 1,338 including 1,208 on-post students. The 136,000-square-foot facility contains four instructional wings with 57 classrooms and numerous resource activity spaces. The media center has with three instructional reading areas, provides a large children's library collection, online catalog and circulation stations, a TV studio, and a fleet of computers for staff and students' use. The school is equipped with Internet access and houses the latest technologies.

Middle and high school students attend off-post Fairfax County schools. Fort Belvoir Elementary feeds into the Mount Vernon High School pyramid and students attend Walt Whitman Middle School. In 2002, 631 military family member school children attended grades 7-12 at off-post schools. Total enrollment in 2002 was 945 students for Walt Whitman Middle School and 1,710 students for Mount Vernon High School. Both of these schools are close to Fort Belvoir and provide school bus service. Students living on Fort Belvoir also have access to other Fairfax County schools through countywide programs and authorized transfers, as well as private and religious schools in the area (Fort Belvoir, 2001; Fort Belvoir website, April 2003; Fort Belvoir Post Guide, 2001; FCPS website, October 2002).

As of the 2000 Census, 87 percent of school-aged children (1,937 of the 2,228 children ages 5-18 years) living on the Fort Belvoir (Census tracts 4162 and 4219) attended public schools. From Fairfax County enrollment data, about 74 percent of students from Fort Belvoir in all schools were in grades Kindergarten through 6th grade (elementary school).

In 2001, FCPS projected stable enrollment of about 1,300 to 1,340 students through the 2005-2006 school year, which is consistent with recorded enrollments from 1999 to 2002. Like many other schools in Fairfax County and the region, Fort Belvoir Elementary has experienced an effective reduction in capacity, due to reduced class sizes and the space needed by special programs. As a result, although the design capacity of the school was 1,500 students, Fort Belvoir Elementary is functionally over-capacity and mobile classrooms are used to provide the necessary extra space (Brady, personal communication, May 21, 2001; Potter, personal communication, June 2003).

Child and Youth Services are available for military families that require child care and preschool educational services. Day care is provided for children of military members and DoD civilian employees, with fee for service depending on family income. The North Post Child Development Center offers 216 full-day care spaces (including kindergarten) and 60 part-day preschool spaces and the South Post Child Development Center offers 190 full-day care spaces and 26 hourly care spaces. The Child Development Centers are also available for developmental assistance. The Family Child Care Office offers professional home day care and after-school care for children ranging from 4 weeks to 12 years of age. School-age child care is also available at Fort Belvoir Elementary School. The McNamara Headquarters

Complex includes another Child Development Center, located near Gate 3, for children whose parents work at the complex (Fort Belvoir, 2001; Fort Belvoir website, April 2003).

Family Support and Emergency Relief

The Fort Belvoir Soldier and Family Support Center assists in improving the quality of life for military families. The center provides a variety of support services programs, including:

- Relocation Assistance services for families departing and newly arriving on post
- The Exceptional Family Member Program provides assistance to families with a special-needs child or spouse.
- The Consumer Affairs/Financial Assistance Program offers financial counseling and consumer education classes
- Information Referral and Follow-up provides resource listings for various agencies in the military and civilian community
- The Family Advocacy Program aims to strengthen family relationships and reduce stress through educational programs and support services.
- The Employment Assistance Program offers employment counseling and other services for job-seekers, as well as medical assistant and secretarial certification programs
- Job assistance, including resume writing, networking, interviewing, and marketing, is offered under the Army Career and Alumni Program, to help transitioning service members and their families
- Army Emergency Relief provides interest-free loans and grants to active duty soldiers and retirees for emergency needs (Fort Belvoir, 2001; Fort Belvoir Post Guide, 2001).

Shops and Services

Fort Belvoir's major shopping area located is the Post Exchange Mall on North Post. This mall encompasses 136,000 square feet and offers a wide variety of Army and Air Force Exchange services. The Fort Belvoir Commissary is open 7-days-a-week and offers a wide variety of produce, fresh meats and seafood, grocery, in-store bakery, and delicatessen items. The North and South Post Shoppettes and the Class Six Store offer residents a variety of convenience foods as well as grocery items including wine, spirits, and beer. The Commissary averaged more than 86,300 customers per month and the Post Exchange averaged 68,400 customers per month in 2002.

The Army and Air Force Exchange Service (AAFES) clothing alteration and shoe repair facility provides military clothing alterations and sewing of insignia for authorized military members. Fort Belvoir also provides a Military Clothing Sales Store. The South Post service station provides gasoline, new tire sales, and batteries. The Dry Cleaner Shop offers a range of laundry and dry cleaning services along with complete in-house alteration service on uniforms and civilian clothing and shoe repair. Two barbershops, one located inside the Post Exchange Mall and the other located at the South Post, and a beauty shop are available for resident use.

A SunTrust Bank branch is available for on-post banking services. The Fort Belvoir Credit Union (FBFCU), a not-for-profit financial cooperative that has been serving the financial needs of the Fort Belvoir community for more than 50 years, offers services such as savings and mortgages to its patrons.

Religious services at Fort Belvoir are provided by Chaplains and their assistants. Daily Mass and Sunday worship are available for Protestants and Catholics. The Chaplain Family Life Center provides a range of pastoral and family counseling programs. Protestant and Jewish religious education programs for youth and adults are available. In 2002, an estimated 152,240 people (yearly average) attended more than 1,700 religious services on Fort Belvoir.

The Joint Personal Property Shipping Office, Washington Area, at Fort Belvoir provides a household goods transit service that ships and receives household goods and baggage for members of the five branches of the armed services and DoD employees and handles entitlements and travel requests.

The Barden Education Center, located next to the proposed New South Post Village parcel, is part of the Army Continuing Education System and provides a wide variety of further advancement courses and a number of colleges and universities offer classes at Fort Belvoir. Fort Belvoir's Van Noy Library provides residents with access to reference materials and Internet-capable computer terminals as well as a Children's Library.

The Veterinary Clinic provides services for pets of active-duty, retired military members, and reservists on active duty (Fort Belvoir, 2001; Fort Belvoir website, April 2003).

The Self-Help Center houses tools, paint, garden supplies, household items and repair materials for use in improving offices and government quarters (Fort Belvoir, 2001; Fort Belvoir website, April 2003; Fort Belvoir Post Guide, 2001).

Recreation

Extensive recreational facilities are available at Fort Belvoir to military personnel, families, and retirees. Recreational facilities occupy 1,006 acres of the installation in areas convenient to the population they serve (Fort Belvoir, 2001). There are two community centers: Kawamura Community Center, which focuses on arts and crafts, and Sosa Community Center, which provides wide-screen TV, musical instruments and lessons, a game room with video games and pool tables, and space for meetings and clubs.

The Fort Belvoir Officer's Club, located in Belvoir Village on a promontory overlooking the Potomac River, offers lunch, dinner, and Sunday brunch. The Officer's Club provides spaces for small seminars, luncheons, or large dinner parties and includes a swimming pool complex. The Community Club, near George Washington Village, offers a restaurant open for lunch on weekdays, provides catering for events on weekends, hosts weekly Bingo parties and offers a Cyber Lounge and Sports Bar with Direct Digital Satellite connection, as well as live point-to-point video conferencing for meetings.

Fort Belvoir's two golf courses on South Post (9 holes) and North Post (36 holes) are foremost recreational resources for the military and retiree community in the area. Three picnic park areas can be reserved for events. The Dogue Creek Marina at River Village provides boat slips and rents watercraft and boats. The ABWR and JMAWR offer trails for hiking and observing wildlife; trails are open to the public and the refuges are made

available for educational programs operated by off-post organizations. The Accotink Bay Refuge Environmental Education Center supports refuge-based educational programs with classroom space and interpretive programs. The installation has indoor and outdoor archery ranges (the latter currently closed for renovation) and makes over 8,000 acres of land available for seasonal bow-hunting (with a state license). Fishing (with a state license) is allowed in the refuges.

Fort Belvoir has many walking and running areas, as well as tennis courts and athletic fields, including several softball fields, six soccer fields and two football fields. The installation has historically made these facilities available to its neighbors, both through ongoing licenses and special events. When local schools in the Washington Metropolitan area were canceling outdoor events during the 2002 sniper incident, Fort Belvoir provided a secure environment for local high school football games. On-post Boy and Girl Scout troops and events are allowed to use Fort Belvoir facilities.

Benyaurd Indoor Pool near Gerber Village offers group instruction and private lessons in aqua sports for residents. There are two fitness centers on post and the Specker Field House offers skating. The Fort Belvoir Outdoor Recreation Program at Sosa Community Center rents camping and skiing equipment, bikes and rollerblades. A Skate Park is located between Buildings 1001 and 1003 and safety equipment is available for loan at the Youth Services Building and Sosa Community Center. The installation also offers an automotive shop and a Bowling Center.

The information, ticketing, and registration (ITR) service at Sosa Community Center provides residents with travel information, destinations, airline and train tickets, package tours, and tickets to local entertainment and sporting events (Fort Belvoir, 2001; Fort Belvoir website, April 2003; Fort Belvoir Post Guide, 2001).

Retirement Services

The Retirement Services Office provides counseling services to those that are considering retirement, as well as services and scheduled activities for those that are retired.

Homeless Programs

Fairfax County operates a homeless shelter in an historic building that was formerly the Camp A. A. Humphreys water filtration plant, located on Route 1 outside Tulley Gate. The vacant building was renovated and leased to the county in 1986 (ICRMP, 2001).

4.9.1.5 Environmental Justice and Protection of Children

Environmental Justice

On February 11, 1994, President Clinton signed EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The purpose of this order is to require each federal agency to identify and address any disproportionately high and adverse environmental or economic effects that its programs and policies might have on minority or low-income populations. Environmental Justice: Guidance Under the National Environmental Policy Act (CEQ, 1997) defines minorities as members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black or African American; or Hispanic. (Persons of Hispanic or Latino origin may be members of any racial group. Nationwide, in 2000 about 14.2 percent of Whites, 3.0 percent

of Blacks, 1.9 percent of Asians and Pacific Islanders, and 11.0 percent of American Indians and Alaska Natives were of Hispanic origin.) A minority population should be identified where either the minority population of the affected area exceeds 50 percent or is meaningfully greater than the minority population percentage in the general population.

Low-income populations are identified using the Census Bureau's statistical poverty threshold, which varies by household size and number of children. For example, the 2000 poverty threshold for a family of 4 with two children was $17,463. The nationwide poverty rate was 12.4 percent at the 2000 Census and 11.7 percent in 2001 (US Census website, accessed April 2003). The Census Bureau defines a "poverty area" as a Census tract where 20 percent or more of the residents have incomes below the poverty threshold and an "extreme poverty area" as one with 40 percent or more below the poverty level (U.S. Department of Commerce, Bureau of the Census, 1995).

To provide the baseline against which any environmental justice impacts can be identified and analyzed, Table 4-22 presents demographic information on race, ethnicity, and poverty status in the Census block groups surrounding Fort Belvoir to the east and north, closest to the housing development villages, as well as Accotink Village, which is located across Route 1 from Tulley Gate and is entirely surrounded by Fort Belvoir's North Post except for where it fronts Route 1. Block groups are subsets of Census tracts and represent the level at which disproportionate impacts would be most noticeable. Statistics for Fairfax County and the ROI are presented to provide context.

As Table 4-22 shows, Fort Belvoir's residential population and two of the adjacent areas, the area surrounding Woodlawn Village and Accotink Village, have a higher percentage of minority population than Fairfax County and are similar to the ROI in that regard. Accotink Village has a 58 percent minority population in 2000, which exceeds the ROI's 51 percent. None of the adjacent areas met the definition of a poverty area, but the 15.5-percent poverty rate in Accotink Village was more than three times the countywide poverty rate and more than twice the ROI's poverty rate. The poverty rate on Fort Belvoir was greater than in the civilian areas adjacent to Woodlawn and River Villages, and greater than Fairfax County as a whole, but lower than the poverty rate of the ROI.

TABLE 4-22
Census 2000 Race, Ethnicity and Poverty Status for the Adjacent Area, Fairfax County and ROI

		Census Block Groups in Areas Adjacent to Housing				
	Fort Belvoir[1]	Accotink Village[2]	Adjacent to River Village[3]	Adjacent to Woodlawn Village[4]	Fairfax County	ROI
Total population	7,260	390	3,461	8,014	969,749	4,544,944
Hispanic or Latino[5]	10%	8%	3%	11%	0%	9%
Not Hispanic or Latino:						
White	51%	42%	89%	53%	70%	58%
Black or African American	31%	36%	3%	26%	9%	27%
American Indian and Alaska Native	0%	1%	0%	0%	0%	0%

TABLE 4-22
Census 2000 Race, Ethnicity and Poverty Status for the Adjacent Area, Fairfax County and ROI

		Census Block Groups in Areas Adjacent to Housing				
	Fort Belvoir[1]	Accotink Village[2]	Adjacent to River Village[3]	Adjacent to Woodlawn Village[4]	Fairfax County	ROI
Asian	2%	9%	3%	6%	13%	7%
Native Hawaiian and Other Pacific Islander	1%	0%	0%	0%	0%	0%
Some other race	1%	0%	0%	0%	5%	4%
Two or more races	3%	4%	1%	3%	4%	3%
Total minority population	49%	58%	11%	47%	30%	51%
Poverty rate	6.2%	15.5%	1.3%	4.5%	4.5%	7.0%

1. Tract 4219, Block Group (BG) 1 and Tract 4162, BG 1
2. Tract 4220, BG 2
3. Tract 4161, BG 1 and BG 2
4. Tract 4218, BG 1 and 2, Tract 4217, BG 1, and Tract 4212, BG 1
5. Persons of Hispanic or Latino origin can be of any "race"
Source: U.S. Census American FactFinder website < http://factfinder.census.gov>

4.9.1.6 Protection of Children

On April 21, 1997, the President issued Executive Order 13045, "Protection of Children from Environmental Health Risks and Safety Risks," which seeks to protect children from disproportionately incurring environmental health or safety risks that might arise as a result of government policies, programs, activities, and standards. Children are present at Fort Belvoir both as residents of family housing and as visitors (daily in Child Development Centers, as users of recreational facilities, in Scout groups and school field trips, etc.). The Army routinely takes precautions for their safety by a number of means including, but not limited to, the use of fencing, limitations on access to certain areas, and provision of adult supervision.

As discussed in Section 4.12, previous investigations found hazardous materials (ACM and LBP) to be present in many of the housing units on Fort Belvoir. These materials were widely used in the building products industry and for housing maintenance for many years. The presence of these materials in the housing units does not constitute a health hazard under normal circumstances, however, and the materials are removed or encapsulated as units are renovated. Fort Belvoir also conducts resident outreach to increase awareness of how parents can reduce potential LBP exposure in the home. Mold is also present in some houses on Fort Belvoir and reports of mold problems are addressed on a case-by-case basis.

4.9.2 Consequences

4.9.2.1 Proposed Action

Economic development

Short-term minor beneficial effects would be expected. In the short term, the expenditures and employment associated with construction of new housing would increase the sales

volume, employment, and income in the ROI, as estimated by the Economic Impact Forecast System (EIFS) model results. Table 4-23 displays the rate of direct and induced economic growth during Year 2 of the IDP, which is when the greatest construction expenditures are anticipated. The EIFS model, its inputs, outputs, and significance measures (Rational Threshold Values or RTVs) are discussed in more detail in Appendix G. These economic benefits would be temporary, lasting only for the duration of construction. These changes in specific economic parameters would fall well within historical fluctuations, as represented by the RTVs shown in Table 4-23, and would be considered very minor.

In Year 1, the privatization of family housing operations would result in the loss of 4 housing inspector government jobs in the Fort Belvoir Housing Office and 55 contractor jobs in housing maintenance. These functions would be replaced by 60 to 70 FBRC property management and maintenance personnel, resulting in a net increase of 11 to 21 permanent jobs. In addition, throughout the 8-year IDP, FBRC would employ 5 to 10 property development staff. These changes will not result in any appreciable changes in regional economic indicators (Appendix G).

TABLE 4-23
EIFS Construction Model Output for the Proposed Action at Fort Belvoir

Indicator	Projected Change	Percentage Change	RTV Range
Direct Sales Volume	$37,965,580		*N/A*
Total Sales Volume	$94,913,940	0.06%	–4.44% to 11.74%
Direct Employment	167		*N/A*
Total Employment	416	0.02%	–2.76% to 3.55%
Direct Income	$8,341,194		*N/A*
Total Income	$20,852,980	0.02%	–11.51% to 3.71%
Local Population	0	0%	–1.38% to 0.79%

Demographics

Minor effects would be expected. The total number of housing units will not change, but the occupancy rate is expected to improve. Therefore, at the end of the initial development period when all the new and rehabilitated housing is available, the total population living in family housing at Fort Belvoir could increase somewhat.

In recent years (1999 to 2003), the occupancy rate of Fort Belvoir's family housing has ranging from a low of 77 percent (in 1999) to a high of 89 percent (2000 and 2001). At the 2000 Census, household population at Fort Belvoir was 6,968 persons. At 95 percent occupancy, that would equate to about 7,335 persons, an increase of 367 people (5.3 percent) above the 2000 Census. Alternatively, applying the average Fort Belvoir household size of 3.71 persons to a 95 percent occupancy rate on 2,070 units would equate to about 7,290 persons, an increase of 322 people (4.6 percent) over the 2000 Census.

Because there could be a minor increase in on-post population, an increase in demand for additional law enforcement, fire protection services, medical and other services could result from implementation of the proposed action, as discussed below.

Housing

Because the total number of housing units will not increase, there would be no effect on housing supply or demand in the family housing market area. Property taxes are not applicable to RCI housing at Fort Belvoir.

Quality of Life

Long-term minor beneficial effects on quality of life would be expected. The availability of affordable, quality family housing is a key function of quality of life for soldiers and their families. The proposed action would improve the condition and aesthetic appeal of existing housing through replacement and rehabilitation. The supply of 3- 4- and 5-bedroom units on Fort Belvoir would be increased. No adverse effects on the variety of services Fort Belvoir provides to residents, workers, retirees and other visitors are expected.

Because there could be a minor increase in on-post population, a minor increase in demand for law enforcement, fire protection services, medical and other services could result, as discussed below.

Law Enforcement and Fire Protection

Based on resource planning factors for residential development from the Urban Land Institute (Burchell et. al, 1994), a residential population increase of 367 persons could require an additional 0.55 full-time equivalent (FTE) police officers, 0.45 FTE firefighters and 0.04 FTE EMS personnel.

Under the FY 2003 Defense authorization, fire and police are included as services the Army may provide (in accordance with 10 USC 2872a (b)), but FBRC will be required to reimburse the Army for such services (in accordance with 10 USC 2872a (c)).

Medical Services

A minor increase in demand for on-post medical services could result. Based on residential planning factors, a residential population increase of 367 persons could result in an additional 10 EMS calls per year.

The extension of 12th Street will remove some parking spaces used by DeWitt Hospital patrons and an overflow parking lot for the Dental Clinic will be removed to construct New South Village. Temporary replacement parking will be provided, until the Hospital and Dental Clinic are relocated to North Post.

Schools

Fort Belvoir has consulted with Facility and Planning Analysis staff of Fairfax County Public Schools regarding potential effects on county schools from the proposed RCI action. Student generation rates derived from housing units, which is how the County assesses impacts of new construction, are 45-50 percent higher on Fort Belvoir than for in the County as a whole. Even so, based on the number and types of units proposed to be rebuilt/ rehabilitated at Fort Belvoir, County school planning analysis did not project a significant increase in student population from the proposed action (Potter, personal communication, June 2003).

As a rough check on the normal housing unit-based projections, by applying ratios derived from the 2000 Census and assuming that the occupancy rate of Fort Belvoir's family housing will increase to 95 percent, the number of school-age children living in family housing at build-out could be about 2,244 children. Of these, about 1,480 could be elementary school age, or 10 children above the 2000 Census. Assuming 100 percent occupancy (which is not realistic), about 1,558 elementary-school-age children could live on-post, or 218 children above the 2000 Census. However, not all of these would attend public schools; at the 2000 Census, only 87 percent of school-age children living on Fort Belvoir did so.

Fort Belvoir will continue to work closely with Fairfax County Public Schools to address any issues that may arise as a result of RCI at Fort Belvoir.

Family Support and Retirement Services

Services would continue to be provided to residents and retirees by the Fort Belvoir Soldier and Family Support Center and the Retirement Services Office.

Shops and Services

The proposed "live/work" housing units in New South Post Village will provide additional space for leased shops and services in South Post's "Main Street" area, which will benefit residents, workers and visitors on Fort Belvoir. FBRC will work with AAFES, which has first right of refusal for leasing or licensing such operations on the installation, to fill these facilities.

The existing parking lot currently used by the congregation of Belvoir Chapel (Building 1018) will be removed to construct the new Recreation Center, but will be replaced behind that new building.

Recreation

In addition to improving the quality of military family housing, the proposed action will provide five new neighborhood community centers, as well as a new Recreation Center that will be of long-term benefit to the many people who live and work on Fort Belvoir. Existing parks and trails and other outdoor recreation (ballfields, tennis courts, fitness courses, tot lots, etc) in the housing villages will be improved and new facilities will be built in the villages. The existing picnic area on the New South Post Village parcel, which is frequently used by the congregation of Belvoir Chapel (Building 1018), will be enlarged and improved.

A baseball field currently located on the proposed Recreation Center parcel and the Skate Park between Buildings 1001 and 1003 will be displaced by construction of the New South Post Village, but both facilities will be replaced nearby. The Skate Park can easily be moved to the force protection buffer between the new Recreation Center and the parking lot behind it (where Figure 2-14 shows a basketball court).A replacement baseball field is planned on the field just south of the Recreation Center parcel (Figure 2-14).

An adverse effect upon an off-post private recreational organization has been identified. Fort Belvoir currently allows the Woodlawn Little League nonexclusive use of the installation's McNaughton baseball fields located in Woodlawn Village, under a no-cost license issued by USACE. The license is revocable-at-will by the Army and would need to be terminated prior to the closing date of the land transfer to FBRC. The Woodlawn Little League has been invited to combine with the Fort Belvoir Little League and share in the use of other baseball fields on Fort Belvoir and the Fairfax County Recreation Department has

indicated that sufficient baseball fields and parkland exist in the Mount Vernon area to accommodate Woodlawn Little League needs. However, the Army is actively considering transferring this land (approximately 10 acres) to Fairfax County, perhaps in exchange for other County land.

Homeless Programs

The proposed action will have no effect on the Fairfax County homeless shelter near Tulley Gate.

Environmental Justice

Construction impacts are temporary in nature, but they can range from annoying to detrimental for those living near a construction site. Because most of the construction activity would be carried out in the core of the installation, few adverse impacts to low-income and minority communities are expected.

Construction in Woodlawn Village would have minor adverse effects on minority populations in the nearby off-post neighborhoods. Construction traffic along Pole Road will likely be an annoyance. Other direct effects of construction activities (such as fugitive dust and noise) may affect the neighborhood to the south, across Pole Road where the nearest residences are 100-150 feet from the edge of Woodlawn Village. As discussed in sections 4.3, 4.4 and 4.10, the noise, dust, and traffic generated by construction would be minimized through construction plans. Fugitive dust emissions will be minimized throughout the construction period by use of conventional dust suppression and mitigation techniques such as soil erosion and sedimentation control, restrictions on where vehicles can travel onsite, speed controls for construction vehicles and equipment, and watering of exposed soil and demolition debris to control dust. Noise from construction equipment will be controlled by use of appropriate sound-mitigation techniques. Construction traffic during peak hours will be reduced by promoting carpooling and by using centralized construction staging areas.

Construction is not expected to affect the neighborhood to the west of Woodlawn Village, because the nearest residences lie more than 1,000 feet away, on the other side of the vegetated wetland area that separates Woodlawn Village from its western neighbors.

The low-income and minority population within Accotink Village may experience minor adverse effects due to increased construction traffic along Route 1 and entering Tulley Gate, but other direct or indirect effects are not expected, because Accotink Village is not near any of the existing or proposed housing villages. Construction traffic is unlikely to use the narrow Backlick Road (State Route 613), which bisects Accotink Village, instead of Fairfax County Parkway to reach Tulley Gate.

As shown in Table 4-22 above, the off-post neighborhoods near River Village are not considered to be minority communities.

Modernizing housing on Fort Belvoir will result in long-term beneficial effects on the quality of life for low-income and minority residents of military family housing.

Protection of Children

Both short-term minor adverse and long-term minor beneficial effects on the protection of children would be expected.

In the short term, because construction sites can be enticing to children, construction activity could be an increased safety risk. Families living in villages that will be entirely demolished and rebuilt will be relocated before demolition and construction begins, but rehabilitation in Gerber and Belvoir Villages and demolition and reconstruction within Jadwin Village may take place at some units while families continue to live in other housing units. In addition, construction at New South Post Village would take place near an existing Child Development Center and the existing Colyer Village neighborhood.

Barriers and "no trespassing" signs will be placed around construction sites to deter children from playing in these areas. All construction vehicles, equipment and materials will be stored in fenced areas and secured when not in use. During construction, safety measures stated in 29 CFR 1926, Safety and Health Regulations for Construction, and other applicable regulations and guidance will be followed to protect the health and safety of residents on Fort Belvoir, as well as construction workers.

The parking lot that will be removed to build the Recreation Center is also used by patrons of the Child Development Center (Building 1028). It will be replaced behind the new Recreation Center. No effects on the safety of children is expected, because parents and children who use that existing parking lot already have to cross 12th Street to reach it. There is a traffic signal and crosswalk at the corner of 12th Street and Belvoir Road. The loop road that provides direct access to Building 1028 for parents dropping off and picking up children will not be affected.

After reconstruction and rehabilitation is complete, long-term beneficial effects on the health of children would be expected because of reduced potential for exposure to hazardous materials. In 1991, the Secretary of the Department of Health and Human Services called lead the "number one environmental threat to the health of children in the United States" (USEPA, 2003). Hazardous materials (ACM and LBP) identified in Fort Belvoir housing units are currently managed in place, to control exposure and minimize health risks; residents are provided with information about LBP. Potential risks to children living on Fort Belvoir would be further reduced by removal or encapsulation during demolition or rehabilitation activities.

New construction does not use building products containing these hazardous materials. These actions would eliminate children's exposure to these hazardous materials in the new homes and further reduce possible exposure in the historic homes.

The construction of new housing, replacement of heating and air conditioning systems, and correction of existing water infiltration problems in historic housing should reduce residents' exposure to mold and mildew.

4.9.2.2 No Action Alternative

Long-term minor adverse effects would be expected. Continuation of current family housing programs would perpetuate deficiencies in quality of life for some soldiers and their dependents. Availability of family housing that is both affordable and of high quality is a key function of quality of life and is often given high priority by soldiers and their families. Fort Belvoir would continue to perform regular maintenance on existing housing. Future renovation projects, similar to the Dogue Creek project, could occur at some point,

but it would be on a constrained budget and therefore over a longer period of time, compared to the 8-year period under the proposed action.

Health risks to children from LBP and ACM would continue to be controlled by management in place and abatement during renovations and health risks due to mold would continue to be addressed on an as-needed basis.

The no action alternative would not affect installation population or ROI demographics.

4.10 Transportation

4.10.1 Affected Environment

4.10.1.1 Roadways and Traffic

The study area focuses on both on-post and key off-post intersections in the vicinity of Fort Belvoir. Many of the off-post intersections are currently congested during peak travel times, while recent studies and field observation indicate that key on-post intersections have substantial reserve capacity. Analysis of both on and off-post locations is intended to assure that traffic impacts of the proposed housing improvements are adequately measured.

Key roadways that serve the Fort Belvoir area are Interstate 95, U.S. Route 1 (Richmond Highway), and the Fairfax County Parkway. Other roadways that serve localized Fort Belvoir traffic include Telegraph Road, Kingman Road, Woodlawn Road, Beulah Street, and Mt. Vernon Memorial Highway. Major on-post roadways include Pohick Road, Belvoir Road, Gunston Road, and Mt. Vernon Road. (See Figure 2-1.)

Interstate 95 is a north-south freeway approximately 2 miles northwest of Fort Belvoir. The majority of traffic accessing Fort Belvoir from I-95 does so via the Fairfax County Parkway interchange; however, I-95 traffic also accesses the Fort via the Lorton Road and U.S. Route 1 interchanges.

U.S. Route 1 is a major arterial roadway that runs in an east-west orientation near Fort Belvoir. The posted speed limit is 45 miles per hour (mph). Near the post, Route 1 is primarily a four-lane undivided roadway with exclusive turn lanes at major intersections. Access to Fort Belvoir and the majority of the housing villages occur via the Pence, Tulley, and Walker Gates.

Fairfax County Parkway is a four-lane divided major arterial that has both interchanges and at-grade signalized intersections. The Parkway provides ingress/egress to Fort Belvoir via both Route 1 and John J. Kingman Road.

Existing Traffic Volumes

Manual turning movement traffic counts at major intersections serving Fort Belvoir were obtained by others in December 2002 as part of master plan activities being undertaken at Fort Belvoir. These counts were supplemented with counts obtained from the DeWitt Army Community Hospital Replacement Environmental Assessment (July 2002) to provide full coverage of both on and off-post intersections likely to be affected by the proposed housing changes. The DeWitt EA counts were obtained in March and April 2002 during morning and evening peak periods. Since these counts were taken, Beulah Street at Telegraph Road

has been re-opened to traffic. This has resulted in traffic increases and changes in traffic patterns on Kingman Road and on the northern part of the Gunston Road corridor. Volumes used in this study were compared to volumes used in the Gunston Road Corridor Study (Transcore, April 2003).Differences between the traffic volume data were not substantial, thus, the master plan and DeWitt EA counts were used for this study.

For this EA, count data at the following intersections (see Figure 4-9) were used:

- Telegraph Road and Beulah Street (signalized)
- Fairfax County Parkway and Kingman Road (signalized)
- Kingman Road and Beulah Street (signalized)
- Kingman Road and Gunston Road (signalized)
- Gunston Road and Gorgas Road (unsignalized)
- Gunston Road and Pohick Road/12th Street (signalized)
- Gunston Road and Abbott Road (unsignalized)
- Gunston Road and Goethals Road (unsignalized)
- Gunston Road and 18th Street (unsignalized)
- Woodlawn Road and Gorgas Road (signalized)
- Pohick Road and Theote Road (signalized)
- Route 1 and Fairfax County Parkway (signalized)
- Route 1 and Backlick Road/Pohick Road (signalized)
- Route 1 and Belvoir Road (signalized)
- Route 1 and Woodlawn Road (signalized)
- Belvoir Road and 12th Street (signalized)
- Belvoir Road and 18th Street (unsignalized)
- Mount Vernon Memorial Highway and Mount Vernon Road (unsignalized)
- Mount Vernon Road and Hurley Road (unsignalized)

A summary of existing peak hour turn movement counts is provided in Appendix H.

Existing Traffic Conditions

The intersections identified above represent a mix of both signalized and unsignalized locations. Signalized and unsignalized intersection analysis procedures were consistent with other recent EAs completed at Fort Belvoir, and are described below.

Planning level procedures outlined in the in the 2000 Highway Capacity Manual were used to assess the operational status of signalized intersections in the study area. The planning level procedures take into account traffic volume, intersection lane arrangements, signal phasing, and signal cycle length. The operational status of each intersection was assessed based on critical intersection volume to capacity (v/c) ratio thresholds shown in Table 4-24.

TABLE 4-24
Signalized Intersection Operational Status Based on Intersection Volume to Capacity Ratios

Critical v/c Ratio (X_{cm})	Relationship to Capacity
X_{cm} < 0.85	Under capacity
> 0.85 –0.95	Near capacity

TABLE 4-24
Signalized Intersection Operational Status Based on Intersection Volume to Capacity Ratios

Critical v/c Ratio (X_{cm})	Relationship to Capacity
> 0.95 – 1.00	At capacity
X_{cm} > 1.00	Over capacity

For unsignalized intersections, 2000 Highway Capacity Manual procedures were used to calculate levels of service. For all-way stop control intersections, a level of service for the entire intersection is provided. At two-way stop control intersection, a level of service for the stop controlled approaches is provided. For consistency with the planning level approach used at signalized intersections, the capacity status of unsignalized intersections is reported according to the thresholds shown in Table 4-25.

TABLE 4-25
Unsignalized Intersection Operational Status Based on Level of Service

Overall Intersection LOS / Critical Movement LOS	Relationship to Capacity
LOS A to LOS C	Under capacity
LOS D to LOS E	Near capacity
LOS F	Over capacity

The volume/capacity (V/C) ratio and operational status of each of the study area intersections for both the existing morning and evening peak period is summarized in Tables 4-26 and 4-27, respectively.

TABLE 4-26
Signalized Intersection Operational Status Under Existing Conditions

	AM Peak		PM Peak	
Signalized Intersection	V/C Ratio	Capacity Status	V/C Ratio	Capacity Status
Telegraph Road and Beulah Street	0.66	Under Capacity	0.76	Under Capacity
Fairfax County Parkway and Kingman Road	0.70	Under Capacity	**1.12**	**Over Capacity**
Kingman Road and Beulah Street	0.33	Under Capacity	0.35	Under Capacity
Kingman Road and Gunston Road	0.37	Under Capacity	0.64	Under Capacity
Gunston Road and Pohick Road/12th Street	0.41	Under Capacity	0.44	Under Capacity
Woodlawn Road and Gorgas Road	0.32	Under Capacity	0.42	Under Capacity
Pohick Road and Theote Road	0.42	Under Capacity	0.77	Under Capacity
Route 1 and Fairfax County Parkway	**1.11**	**Over Capacity**	**1.03**	**Over Capacity**
Route 1 and Backlick/Pohick Road	0.79	Under Capacity	**1.06**	**Over Capacity**
Route 1 and Belvoir Road	0.79	Under Capacity	0.79	Under Capacity

TABLE 4-26
Signalized Intersection Operational Status Under Existing Conditions

	AM Peak		PM Peak	
Route 1 and Woodlawn Road	0.69	Under Capacity	0.78	Under Capacity
Belvoir Road and 12th Street	0.41	Under Capacity	0.30	Under Capacity

TABLE 4-27
Unsignalized Intersection Operational Status Under Existing Conditions

Intersection	AM Peak	PM Peak
	Capacity Status	**Capacity Status**
Gunston Road and Gorgas Road	Under Capacity	Under Capacity
Gunston Road and Abbott Road	Under Capacity	Under Capacity
Gunston Road and Goethals Road	Under Capacity	Under Capacity
Gunston Road and 18th Street	Under Capacity	Under Capacity
Belvoir Road and 18th Street	Under Capacity	Under Capacity
Mt. Vernon Mem. Hwy and Mt. Vernon Road	**Over Capacity (Eastbound Approach)**	**Over Capacity (Eastbound Approach)**
Mt. Vernon Road and Hurley Road	Under Capacity	Under Capacity

As indicated in Tables 4-26 and 4-27, the signalized intersections at Fairfax County Parkway/Kingman Road, Fairfax County Parkway/Route 1 and Route 1/Pohick Road all exceed their theoretical capacity during one or more peak periods. Other signalized intersections in the study area are operating well below their theoretical capacity. These results correspond with traffic operations observed in the field.

The unsignalized intersection at Mt. Vernon Memorial Highway and Mt. Vernon Road also operates over capacity, as left turning vehicles from Mt. Vernon Road experience long delays. Other unsignalized intersections operate with reserve capacity available.

4.10.1.2Public Transportation

Public Transportation Near Fort Belvoir

Several modes of public transportation are available in and around the Fort Belvoir area. Commuter rail (provided by Virginia Railway Express [VRE]) and Metrorail service can be accessed via stations a short distance from the post. VRE service is accessed at the Woodbridge station, which is approximately 8 miles from the post. Metro service serving the post is best accessed via Huntington Station on the yellow line or the Franconia/

Springfield station on the blue line. These stations are both approximately 5 miles from the post.

Bus service to/from these rail stations is provided by both Metrobus and the Fairfax Connector bus services. Bus service is also provided to/from Fort Belvoir to many locations along Route 1.

Key bus routes that currently serve the post include:

- **Fairfax Connector Route 202 (Beulah Street Line)**. This route provides service from just off the north post (north of Telegraph Road) to the Franconia/Springfield Metro station and beyond. Weekday service is provided from approximately 5:00 a.m. to 9:00 a.m. and from 3:00 p.m. to 9:00 p.m. Busses are scheduled on approximately 30 minute headways.
- **Fairfax Connector Route 107 (Richmond Highway Line)**. This route provides service primarily along Route 1. The route goes from the Defense Logistics Agency (DLA) building on Fort Belvoir to the Huntington Metro station. Weekday service is provided from approximately 5:00 a.m. to 8:30 a.m. and from 4:00 p.m. to 6:30 p.m. Buses are scheduled on approximately 30 minute headways. Route 105 also provides service along this general route, with stops near Route 1 and Mt. Vernon Memorial Highway.
- **Metrobus Route 9A (Richmond Highway Line).** This route provides service between the Lorton VRE station and the Pentagon Metro station with several stops on Fort Belvoir. A stop is also provided at the Huntington Metro station. Weekday service is provided on approximately 30 minute headways.
- **Metrobus Route 11Y (Mt. Vernon Express Line).** This route provides service from near the Walker Gate to Farragut Square in Washington, D.C. The route travels along the Mt. Vernon Memorial Highway and along the George Washington Parkway. Weekday service is provided on approximately 30 minute headways from approximately 6:30 a.m. to 8:00 a.m. and from 4:30 p.m. to 6:30 p.m.

Planned Roadway Improvements Near Fort Belvoir

There are planned major improvements that will impact intersections included in this analysis. The improvements can be expected to improve traffic operations in the vicinity of Fort Belvoir. Many of these improvements are currently being studied by the Virginia Department of Transportation (VDOT) and are documented in the ***Route 1 Improvements Environmental Assessment***. Due to the unknown timing of the improvements, they are not included in the future year (year 2011) analysis.

Planned roadway improvements in the Fort Belvoir area that are called for in the MWCOG Constrained Long-Range Plan (cited in U.S. Army Garrison Fort Belvoir, July 2002) include:

- Widening of U.S. Route 1 from VA 235 to Telegraph Road from 4 to 6 lanes
- Widening of U.S. Route 1 from Telegraph Road to Lorton Road from 4 to 7 lanes
- Widening of U.S. Route 1 from Lorton Road to Stafford County Line from 4 to 6 lanes
- Widening of Telegraph Road from Beulah Street to Franconia Road from 2 to 4 lanes

Again, due to the unknown timing of these improvements, they are not included in the future year 2011 analysis.

4.10.2 Consequences

4.10.2.1 Proposed Action

The proposed RCI redevelopment will not add additional housing units to Fort Belvoir although the housing types and housing location will change relative to existing conditions. The change in housing density, type, and location could result in additional trips to/from Fort Belvoir.

For purposes of traffic analysis, a net increase of 39 housing units was investigated (for a total of 2,109 units).This does not indicate a commitment or desire to build more than the existing 2,070 units, but is a "worst-case" scenario that reflects the unknown of how many units will be provided within each respective village. The 2,109 units reflects the sum of the highest number of potential units in each village, although the total units at the end of the redevelopment will not exceed the current level of 2,070 units.

Trip Generation as a Result of RCI Development

The number of trips generated by the redevelopment of the Fort Belvoir housing stock is a function of both the type and intensity of development. Estimates of the trip characteristics associated with the proposed housing units on Fort Belvoir were obtained from the Institute of Transportation Engineers (ITE) publication *Trip Generation* (6th edition). This document consists of a compilation and synthesis of trip generation studies from around the country and is the primary source of information on trip generation used by the transportation engineering profession.

No additional housing units are proposed for Fort Belvoir, although the type and location of housing on post is proposed to change. These planned changes do result in a forecast increase in the number of trips to/from Fort Belvoir. Again, the trip generation is based on a "up to" total of 2,109 units, although no more than 2,070 units will ultimately be on the post at the end of redevelopment. The net change in trip generation characteristics for each village on Fort Belvoir is summarized below in Table 4-28.

TABLE 4-28
Projected Change in Trip Generation Characteristics of Fort Belvoir Villages

	Number of Resulting Automobile Trips	
Village	**AM Peak Hour Net Increase/Decrease in Trips**	**PM Peak Hour Net Increase/Decrease in Trips**
Belvoir	5	10
Colyer	30	35
Dogue	0	0
Fairfax	35	45
George Washington	50	70
Gerber	5	0
Jadwin	5	0
Lewis Heights	10	40

TABLE 4-28
Projected Change in Trip Generation Characteristics of Fort Belvoir Villages

Village	Number of Resulting Automobile Trips	
	AM Peak Hour Net Increase/Decrease in Trips	PM Peak Hour Net Increase/Decrease in Trips
Park	10	15
River	-90	-110
Rossell	40	45
Woodlawn	110	160
New South Post	215	270
Total	425	580

Note that the trips generated by the proposed development, which are summarized above, are those expected during the peak period of the adjacent roadway network. Given the commuting patterns of those working for the military, it is likely that many housing residents' trips would take place outside of the existing periods of heaviest congestion on the roadway network (i.e., may start work earlier and arrive home earlier). For this analysis, a worst case condition was assumed where all trips would occur during the adjacent roadway peak.

Trip Directional Distribution

Directional distribution of resident trips to/from Fort Belvoir was based on discussions with current Fort Belvoir residents and observed travel patterns at Fort Belvoir gates. Current travel patterns on Fort Belvoir indicate that approximately 90 percent of residents living on Fort Belvoir travel off-post to/from a place of employment. Although FBRC will take into account personnel stationed at Fort Belvoir in the priority of assignment for family housing, these travel patterns are expected to be largely unchanged for housing units constructed as part of the proposed action.

Most of the off-post automobile trips to/from the south, west and north will use either Route 1 or the Fairfax County Parkway. Trips to/from the east and north are expected to use Route 1 and the Mt. Vernon Memorial Highway. The anticipated trip directional distribution is shown below in Table 4-29.

TABLE 4-29
Trip Directional Distribution for the Proposed RCI Development

Direction	Expected Trip Distribution
North/East via Route 1	25%
North/East via Mt. Vernon Mem. Hwy.	10%
South/West via Route 1	10%
North via Fairfax County Parkway	45%

Internal to Fort Belvoir	10%

Modal Split

For analysis purposes, it is assumed that new trips associated with the RCI development will be automobile based. This assumption is intended to represent the "worst-case" trip generation scenario. Because of the public transportation options available to Fort Belvoir residents, it can reasonably be expected that some of the new housing residents will take advantage of these services.

Traffic Assignment

Vehicle trips were assigned to key roadways to/from Fort Belvoir using multiple paths. Paths and proportions of trips assigned to each path were selected based on the directness of route, perceived existing traffic congestion, and perceived local route preferences.

Vehicles that will be added to the roadway network during peak periods are summarized in Table 4-30. A summary of forecast year 2011 proposed action traffic volumes are shown in Appendix H.

TABLE 4-30
Trips Added to the Roadway Network as a Result of the RCI Development

	Fairfax Co. Parkway		Route 1		Other Streets	
Peak Period	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
AM Peak	70	125	50	95	30	55
PM Peak	160	100	120	80	70	50

Forecast Year 2011 Build Traffic Conditions

The operational status of both the signalized and unsignalized intersections in the study area was examined for the forecast year 2011 build condition.

Planning-level procedures outlined in the 2000 Highway Capacity Manual were used to assess the operational status of signalized intersections in the study area under forecast year 2011 build traffic. The operational status of each intersection was identified as under capacity, near capacity, at capacity, or over capacity on the basis of the calculated critical intersection v/c ratio. At unsignalized intersections, the calculated level of service for the entire intersection or critical movement at an intersection was reported as under, near, or over capacity.

The operational status of each of the study area intersections for signalized and unsignalized intersections, both the morning and evening peak period, is summarized in Tables 4-31 and 4-32, respectively.

TABLE 4-31
Signalized Intersection Operational Status Under Forecast 2011 Build Conditions

	AM Peak	PM Peak
Signalized Intersection		

TABLE 4-31
Signalized Intersection Operational Status Under Forecast 2011 Build Conditions

Signalized Intersection	AM Peak		PM Peak	
	V/C Ratio	Capacity Status	V/C Ratio	Capacity Status
Telegraph Road and Beulah Street	0.85	Under Capacity	0.98	At Capacity
Fairfax County Parkway and Kingman Road	0.97	At Capacity	**1.49**	**Over Capacity**
Kingman Road and Beulah Street	0.44	Under Capacity	0.49	Under Capacity
Kingman Road and Gunston Road	0.58	Under Capacity	0.93	Near Capacity
Gunston Road and Pohick Road/12th Street	0.62	Under Capacity	0.60	Under Capacity
Woodlawn Road and Gorgas Road	0.46	Under Capacity	0.58	Under Capacity
Pohick Road and Theote Road	0.56	Under Capacity	**1.02**	**Over Capacity**
Route 1 and Fairfax County Parkway	**1.45**	**Over Capacity**	**1.42**	**Over Capacity**
Route 1 and Backlick/Pohick Road	**1.04**	**Over Capacity**	**1.38**	**Over Capacity**
Route 1 and Belvoir Road	**1.12**	**Over Capacity**	**1.04**	**Over Capacity**
Route 1 and Woodlawn Road	0.92	Near Capacity	**1.02**	**Over Capacity**
Belvoir Road and 12th Street	0.54	Under Capacity	0.51	Under Capacity

TABLE 4-32
Unsignalized Intersection Operational Status Under Forecast 2011 Build Conditions

Intersection	AM Peak	PM Peak
	Capacity Status	Capacity Status
Gunston Road and Gorgas Road	Under Capacity	Near Capacity (Northbound Approach)
Gunston Road and Abbott Road	**Over Capacity (Southbound Approach)**	**Over Capacity (Northbound Approach)**
Gunston Road and Goethals Road	Near Capacity (SB Approach)	**Over Capacity (Northbound Approach)**
Gunston Road and 18th Street	Under Capacity	Under Capacity
Belvoir Road and 18th Street	Under Capacity	Under Capacity
Mt. Vernon Mem. Hwy and Mt. Vernon Road	**Over Capacity (Eastbound Approach)**	**Over Capacity (Eastbound Approach)**
Mt. Vernon Road and Hurley Road	Under Capacity	Under Capacity

As indicated in Table 4-31, the four signalized intersections along Route 1 all are expected to exceed their theoretical capacity during one or more peak periods in 2011. The intersections at Telegraph Road/Beulah Street, Fairfax County Parkway/Kingman Road, and Pohick Road/Theote Road are also expected to exceed their theoretical capacity during one or more

peak periods in 2011. These are the same intersections that are expected to be near or exceed their theoretical capacity in the 2011 no-build scenario.

A similar situation exists in regard to the unsignalized intersections (Table 4-32). The intersections at Mt. Vernon Memorial Highway/Mt. Vernon Road, Gunston/Goethals, and Gunston/Abbott are all expected to operate poorly in the 2011 build scenario, just as they operate poorly in the 2011 no-build scenario.

Traffic During Construction

If approved, construction is anticipated to take place between 2004 and 2011. The developer has established a detailed schedule of construction over the 7-year period. During the peak of construction, which is expected to be less than 1 year, approximately 400 construction-related cars a day and three to seven construction/supply trucks a day are estimated to access Fort Belvoir.

Utilizing an anticipated vehicle occupancy rate of 1.8 passengers/vehicle, which represents a higher rate of carpooling typically observed among construction crews, construction activities are expected to add up to 220 cars to the roadway network each day. Unlike trips generated by the housing units, these construction trips are anticipated to occur outside of peak hours of the adjacent roadway network, when the roadways are less congested. The developer is committed to promoting carpooling of work crews and/or establishing an off-post staging area and bussing workers to the construction site.

Surface Transportation Impacts and Mitigation

As a result of the proposed action to renovate and replace units in existing housing areas, there will be increases in traffic on roadways on and surrounding Fort Belvoir. The overall impact of this added traffic is not considered significant. Many study area intersections are expected to be at or exceed their theoretical capacity with or without the proposed action. Additional trips generated by the RCI development do not cause intersections within the study area to exceed their theoretical capacity (see Table 4-33). Even though impacts are not substantial, the developer is committed to working with the garrison and tenants to address incremental contributions of traffic from this project to existing and future traffic problems. In addition, the developer will advocate mass transit opportunities by constructing on-post bus shelters and providing links to transit agency websites that provide bus, Metro and carpooling information.

TABLE 4-33
V/C Ratios and Project Effect

	AM Peak			PM Peak		
Signalized Intersection	V/C Ratio Build	V/C Ratio No Build	Project Effect	V/C Ratio Build	V/C Ratio No Build	Project Effect
Telegraph Road and Beulah Street	0.85	0.85	0.00	0.98	0.98	0.00
Fairfax County Parkway and Kingman Road	0.97	0.89	0.08	**1.49**	**1.44**	**0.05**
Kingman Road and Beulah Street	0.44	0.44	0.00	0.49	0.49	0.00
Kingman Road and Gunston Road	0.58	0.47	0.11	0.93	0.83	0.10

TABLE 4-33
V/C Ratios and Project Effect

Signalized Intersection	AM Peak			PM Peak		
	V/C Ratio Build	V/C Ratio No Build	Project Effect	V/C Ratio Build	V/C Ratio No Build	Project Effect
Gunston Road and Pohick Road/12th Street	0.62	0.53	0.09	0.60	0.57	0.03
Woodlawn Road and Gorgas Road	0.46	0.42	0.04	0.58	0.55	0.03
Pohick Road and Theote Road	0.56	0.55	0.01	**1.02**	**1.00**	0.02
Route 1 and Fairfax County Parkway	**1.45**	**1.42**	**0.03**	**1.42**	**1.33**	**0.09**
Route 1 and Backlick/Pohick Road	**1.04**	**1.02**	**0.02**	**1.38**	**1.35**	**0.03**
Route 1 and Belvoir Road	**1.12**	**1.02**	**0.10**	**1.04**	**1.02**	**0.02**
Route 1 and Woodlawn Road	0.92	0.89	0.03	**1.02**	**1.00**	0.02
Belvoir Road and 12th Street	0.54	0.53	0.01	0.51	0.40	0.11

Planned projects for roadways surrounding Fort Belvoir have the potential to reduce congestion on the roadways serving the area. Plans to add capacity on Route 1 through the study area will reduce congestion along this important thoroughfare. Anticipated congestion at on-post unsignalized intersections can be eliminated with installation of traffic signals and potential changes to on-post roadway access changes (specifically, opening the ramp from Gunston Road to northbound Route 1 during the p.m. peak per the AMC supplemental EA). Appropriate warrant studies should be completed before signal installation. Continued emphasis by the Fort to advocate and utilize mass transit opportunities can also lead to improvements in traffic operations on roadways serving the Fort Belvoir area. New trips generated in this study were assumed to be automobile trips. Even a nominal use of transit has the potential to reduce anticipated congestion. Transit mode shares of ten percent or higher are found in some areas of the Route 1 corridor in Fairfax County. This contrasts with a maximum of two percent that utilizes public transit at Fort Belvoir, based on surveys conducted over the past several years (U.S. Army Garrison Fort Belvoir, May 2002). Plans being developed as part of a Fort Belvoir mass transit study should provide a blueprint for generating additional transit use on post.

4.10.2.2No Action Alternative

Under the no action alternative there would be no change to the housing developments on Fort Belvoir. No action traffic operations were evaluated at study area intersections for the year 2011 study horizon. Although there are planned major improvements in the vicinity of Fort Belvoir, the timing of these improvements is uncertain; thus, the improvements were assumed not to be in place by the 2011 horizon year.

Forecast Year 2011 No-Build Traffic Volumes

Forecast year 2011 background traffic was obtained by growing existing traffic volumes by approximately 3.5 percent per year through the 2011 horizon year. This annual growth rate is consistent with growth rates used in recent Fort Belvoir Environmental Assessments (U.S. Army Garrison Fort Belvoir, July 2002) and is intended to capture growth from other planned improvements being studied on Fort Belvoir. A summary of forecast year 2011 no-action traffic volumes are shown in Appendix H.

Forecast Year 2011 No-Build Traffic Conditions

The operational status of both the signalized and unsignalized intersections in the study area was examined for the forecast year 2011 no-build condition.

Planning level procedures outlined in the 2000 Highway Capacity Manual were used to assess the operational status of signalized intersections in the study area under forecast year 2011 traffic. The operational status of each intersection was identified as under capacity, near capacity, at capacity, or over capacity on the basis of the calculated critical intersection v/c ratio. At unsignalized intersections, the calculated level of service for the entire intersection or critical movement at an intersection was reported as under, near, or over capacity.

The operational status of each of the study area intersections for signalized and unsignalized intersections, in both the morning and evening peak period, is summarized in Tables 4-34 and 4-35, respectively.

TABLE 4-34
Signalized Intersection Operational Status Under Forecast 2011 No-Build Conditions

	AM Peak		PM Peak	
Signalized Intersection	**V/C Ratio**	**Capacity Status**	**V/C Ratio**	**Capacity Status**
Telegraph Road and Beulah Street	0.85	Under Capacity	0.98	At Capacity
Fairfax County Parkway and Kingman Road	0.89	Near Capacity	**1.44**	**Over Capacity**
Kingman Road and Beulah Street	0.44	Under Capacity	0.49	Under Capacity
Kingman Road and Gunston Road	0.47	Under Capacity	0.83	Under Capacity
Gunston Road and Pohick Road/12th Street	0.53	Under Capacity	0.57	Under Capacity
Woodlawn Road and Gorgas Road	0.42	Under Capacity	0.55	Under Capacity
Pohick Road and Theote Road	0.55	Under Capacity	**1.00**	**At Capacity**
Route 1 and Fairfax County Parkway	**1.42**	**Over Capacity**	**1.33**	**Over Capacity**
Route 1 and Backlick/Pohick Road	**1.02**	**Over Capacity**	**1.35**	**Over Capacity**
Route 1 and Belvoir Road	**1.02**	**Over Capacity**	**1.02**	**Over Capacity**
Route 1 and Woodlawn Road	0.89	Near Capacity	**1.00**	**At Capacity**
Belvoir Road and 12th Street	0.53	Under Capacity	0.40	Under Capacity

TABLE 4-35
Unsignalized Intersection Operational Status Under Forecast 2011 No-Build Conditions

	AM Peak	PM Peak
Intersection	**Capacity Status**	**Capacity Status**
Gunston Road and Gorgas Road	Under Capacity	Under Capacity
Gunston Road and Abbott Road	Near Capacity (Southbound Approach)	Near Capacity (Northbound Approach)
Gunston Road and Goethals Road	Under Capacity	**Over Capacity (Northbound Approach)**
Gunston Road and 18th Street	Under Capacity	Under Capacity
Belvoir Road and 18th Street	Under Capacity	Under Capacity
Mt. Vernon Mem. Hwy and Mt. Vernon Road	**Over Capacity (Eastbound Approach)**	**Over Capacity (Eastbound Approach)**
Mt. Vernon Road and Hurley Road	Under Capacity	Under Capacity

As indicated in Tables 4-34 and 4-35, the four signalized intersections along Route 1 are expected to exceed their theoretical capacity during one or more peak periods in 2011. The intersections at Telegraph Road/Beulah Street, Fairfax County Parkway/Kingman Road, and Pohick Road/Theote Road are also expected to exceed their theoretical capacity during one or more peak periods in 2011. Other signalized intersections in the study area are still expected to operate at acceptable levels, but their reserve capacity will be reduced relative to existing conditions.

As under existing conditions, the unsignalized intersection at Mt. Vernon Memorial Highway and Mt. Vernon Road will continue to operate poorly in 2011. The intersections of Gunston/Goethals and Gunston/Abbott are also expected to be near or exceed their available capacity.

4.11 Utilities

4.11.1 Affected Environment

4.11.1.1 Potable Water Supply

The Fairfax County Water Authority (FCWA) is the potable water provider for Fort Belvoir. The distribution system is owned, operated, and maintained by the installation. The installation receives the potable water from three entry locations: FCWA meter vaults/ pump stations on Pole Road, Telegraph Road, and Beulah Road. The Beulah Road location is used primarily for emergency situations, but also supplies water to the North Post golf course and the Defense Communications Electronics Evaluation and Testing Activity (CEETA) facility (US Army Corps of Engineers, June 2002b). The Telegraph Road entry location supplies the South Post and all of the housing villages except Woodlawn and Lewis Heights. The Pole Road entry location provides water to the North Post area and the

Woodlawn housing village. Lewis Heights housing village receives a mix of potable water from the Telegraph Road and Pole Road entry locations.

Approximately 2.2 million gallons of water per day flow through the three entry points (US Army Corp of Engineers, June 2002c). For fiscal year 2002, the housing villages used a total of 230,532 thousand gallons of potable water (Smith, personal communication, June, 2003).

The distribution system components currently include 78 miles of more than 6-inch (15 centimeter [cm]) water main pipes, two pumping stations, four active storage tanks, a chlorination unit, 68 sample stations, and approximately 641 hydrants (US Army Corps of Engineers, March 2000). The pipes consist primarily of a combination of cement, polyvinyl chloride (PVC) and ductile iron. Of the four storage tanks, three are elevated with a 1.3 million gallon (MG) total capacity and one is a ground level tank with a 1 MG capacity. The Telegraph Road entry location supplies two of the storage tanks, one of these two tanks is located in the historic Gerber Village (Tank #188, Capacity - 300,000 gal.) and another (Tank #591, Capacity - 500,000 gal.) is located in an environmentally protected portion of Fairfax Village near the southern limits of the post.

The chlorination system is located on Telegraph Road and is operated by Fort Belvoir. It is operated year round. There are no other water treatment facilities currently at the post. The distribution system may expand to add new lines in the North Post Development area (Bolton, June 25, 2002). Fort Belvoir's water system is anticipated to be privatized in the near future, though the privatization process is not guaranteed to occur. An EA for utility privatization was prepared in March 2000 and a utility privatization update is currently being conducted (Smith, August 30, 2002).

An analysis of the system prepared in 1996 showed that over 70 percent of the potable water system was built in the 1940s and another 7 percent was constructed in the 1950s (US Army Corps of Engineers, June 2002c). In 1998, the housing villages underwent a replacement of pipes with ductile iron pipes (Bolton, June 25, 2002).

Lead and copper sampling is performed every 3 years from 31 selected homes, with the last sampling having been conducted in 2001. The number and location of sample sites are based on Fort Belvoir's population and plumbing conditions. The next scheduled lead and copper sampling event is the year 2004 (US Army Garrision, 2001). There have been no lead detection violations at Fort Belvoir within the last 5 years (Bolton, June 2002).

The installation is considered a consecutive water works system by the state of Virginia, as it buys its water from the county for on-post distribution and also sells water to customers of the post who do not have direct water service connection to the county. These customers include the approximately 15 homes behind the Hess Gas Station on Route 1 outside Tully Gate, the Woodlawn Plantation House, Woodlawn Stables, and Woodlawn Church. The installation's status as a consecutive waterworks requires the installation to produce its own water quality reports. The water quality reports are compiled using monitoring and sampling data from Fairfax County Water Authority and Fort Belvoir's Environmental and Natural Resource Division.

The reports are sent to residents and water customers of the post (Bolton, June 25, 2002). There are no potable wells on the installation property. Any abandoned potable wells have been

closed and filled over the last 2 years. There are five groundwater wells used for irrigation purposes, four at the North Post golf course and one at DLA (Bolton, June 25, 2002).

4.11.1.2Sewer

Fort Belvoir owns and maintains the on-post sanitary sewer system, which is comprised of 382,100 linear feet of service laterals, collection pipes and mains, 1,697 manholes, and 34 lift stations, and two main pumping stations. Fifteen of the lift stations are scattered along the southeastern limits of the post, throughout Belvoir, Fairfax, Dogue Creek, and Gerber Villages (US Army Corps of Engineers, March 2000). The pumping stations were formerly treatment stations until the 1970s and are located at Building #97 (bottom of Jadwin Loop) and Building # 687 (bottom of Tompkins Basin). The post also owns and operates two ferrous sulfate sewage treatment facilities (US Army Corps of Engineers, March 2000).

The piping system is composed of clay, mixed concrete, cast iron, and asbestos, with clay being the primary pipe material. The pipe ranges in size from 24 inches to less than 4 inches with the most common size being 8 inches. Like the other utility systems, most of the wastewater collection system was built in the 1940s. Most of the sewer collection mains are over 20 years old and have been slipped lined to increase the integrity and flow characteristics (US Army Corps of Engineers, June 2002b).

The housing villages are all connected to the post wastewater collection system. For fiscal year 2002, the post collected 151,776 thousand gallons of wastewater from the housing villages (Smith, personal communication, June 2003).

The wastewater from the installation ultimately discharges to Fairfax County's Noman M. Cole, Jr. Pollution Control Plant (formerly the Lower Potomac Pollution Control Plant). There is also a 6,300 gal septic tank at the Golf Course Maintenance Facility on Telegraph Road. This tank does not have a septic field. The sewer system is anticipated to be privatized in the near future, though the privatization process is not guaranteed to occur.

4.11.1.3Storm Water

Fort Belvoir owns and operates the post's storm water system, which consists of mostly open channels that receive sheet flow and point source flow from within the post's 58 subwatersheds. The open channels ultimately discharge to the post's watercourses through approximately 118, 360 linear feet of paved drainage ditches and 315,800 feet of storm drains. A system of catch basins is used to trap sediments and grit. Street cleaning is performed every spring to remove sand and salt that accumulates during the winter months (US Army Garrison, September 2001). The storm sewers ultimately discharge to Pohick, Accotink, or Dogue Creeks, or to the Potomac River.

The installation has a Storm Water Pollution Prevention Plan (SPPP) and will be covered under a Phase II Storm Water permit as a regulated small municipal separate storm sewer system (MS4) in the near future. Fort Belvoir is covered under a general Virginia Pollutant Discharge Elimination System (VPDES) Phase I stormwater permit. The VPDES Phase I permit program governs any construction activity including clearing, grading, and excavation activities, except for operations that results in the disturbance of less than 5 acres of total land area that is not part of a larger common plan of development or sale (Gillett, personal communication, June 2003). The Phase II VPDES program, which also applies to

Fort Belvoir, expands permit coverage to stormwater discharges from construction activity that results in the disturbance of total land area of 1 acre or more. Fort Belvoir also holds a Phase I VPDES permit for stormwater discharges from industrial activity, which includes governance of discharge from four active groundwater pump and treat petroleum remediation systems at Fort Belvoir.

4.11.1.4Energy Sources

Electricity

Electrical power for the main post at Fort Belvoir is provided by Dominion Virginia Power (DVP) from a 34.5 kilovolt (KV) substation. Fort Belvoir owns the entire on-post electrical systems and its appurtenances. Power is transferred from the DVP substation to a Fort Belvoir-owned switching station and distributed to the post at 34.5 KVs through about 78 miles of overhead lines and 83 miles of underground lines. As of 2000, several overhead feeders were used to serve the various areas of the post. A total of ten substations are located throughout the installation to transform power to lower voltage. Fort Belvoir also uses one combination substation and switching station, and three switching stations. Meter information from DVP indicates that the incoming feeders are operating at about 50 percent of capacity. Connected load data indicates that the main 34.5 KV circuits are operating at 50 to 70 percent of capacity (US Army Garrison, September 2001).

The distribution system is composed primarily of overhead, pole-type (conventional open-wire) construction with pole-mounted transformer banks. There is also some underground primary construction using both direct burial and duct-type construction methods. Most of the commercial area is served from the overhead system; a portion of the residential use area is served from the underground system. The average electrical energy requirement for residential housing at Fort Belvoir during fiscal year 2002 was 24.2 million kilowatt-hours (kwhrs) (Mike Smith, personal communication, June 2003).

A large number of the overhead lines run through the southeastern portion of the post to supply Lewis Heights, River, Dogue Creek, George Washington, Colyer, Belvoir, Fairfax, and Gerber Villages. The majority of the overhead lines are located in environmentally protected areas, including a major line extending parallel to John J. Kingman Road and through the forest and wildlife corridor (US Army Corp of Engineers, March 2000).

Underground lines are distributed throughout sections of the post and a large portion are present in an area adjacent to the JMAWR enclosed by Plantation Drive and Pole Road at the northwestern portion of the post. Underground lines are also located in Gerber Village enclosed by Gunston and Belvoir Roads and in the neighboring areas (US Army Corp of Engineers, March 2000).

Fort Belvoir's electrical system is anticipated to be privatized in the near future, though the privatization process is not guaranteed to occur. The privatization agreement will determine the future of a seven-phase upgrade of the power system initiated in 1988 and aimed at removing most of the existing substations while adding new ones only where needed (US Army Garrison, Sept 2001).

Natural Gas

Fort Belvoir's natural gas system is owned and operated by Washington Gas. As of 2000, gas was distributed to the installation through 25 miles of main gas line and 11 miles of service lines mostly servicing the family housing areas. Fort Belvoir has been upgrading its natural gas supply system since 1993 and will continue to do so over the next few years. Improvements include the conversion of facilities from Number 2 and Number 6 fuel oil to natural gas, replacement of old piping, and placement of new lines and meters.

All of the existing housing villages use natural gas in some capacity except Rossell and Woodlawn Villages. The average natural gas requirement for residential housing at Fort Belvoir during fiscal year 2002 was 88 million ft3 (Mike Smith, personal communication, June 2003).

Steam

The existing De Witt Army Community Hospital, Davison Army Airfield, and the larger buildings on Fort Belvoir use steam to provide heat and hot water. Recently built facilities (such as the McNamara headquarters building) and smaller buildings (such as residential units) use individual boilers. Fort Belvoir has four high-pressure and six low-pressure steam plants. The Viron/Pepco Services Partnership maintains and operates the Building 1422 steam plant under the MDW Energy Savings Performance Contract. DynCorp maintains and operates other steam plants and all steam lines. As of 1997, steam was distributed to the Post through 13 mi (21 km) of steam and condensate lines. Most of the piping associated with each central boiler runs underground. Fort Belvoir owns and maintains the entire system (US Army Garrison, July 2002).

A steam line runs through the western portion of the proposed New South Post Village. This steam line will be left in place and an undisturbed buffer (45 feet wide) on either side around the steam line will be maintained.

4.11.1.5Communications

Telecommunication and information services on Fort Belvoir consist of a copper and fiber-optic data-distribution network. The network backbone is a Asynchronous Transfer Mode (ATM) and the telephone switch is Integrated Services Digital Network (ISDN)-capable. The installation owns the entire system, including copper and fiber-optic cables, utility poles, and computerized switchboard systems associated with inter-post and DoD applications. As of 1997, the main telephone switch handled 18,000 telephone lines. It could be upgraded to handle up to 45,000 lines (US Army Garrison, September 2001).

Fort Belvoir's housing areas are currently wired with analog telephone lines and cable television. There are currently no modern digital data or fiber-optic connections in the housing areas (US Army Garrision, January 2002). The telephone service at Fort Belvoir is provided by Verizon Telephone. The system is a mainframe interconnecting facility owned and operated by Verizon (US Army Corp of Engineers, March 2002). The cable television provider is the Comcast Company (Mike Smith, personal communication, August 2002).

Each home on Fort Belvoir is equipped with a minimum of two pair of analog telephone wires, allowing for two telephone connections. However, in some of the homes, only one

pair of telephone wires may be currently operational. Residents are responsible for ordering and paying for their own service directly from Verizon (US Army Garrison, January 2002).

Each home also has a cable television wire installed at least up to the outside of the home. In many homes in which previous residents have ordered cable television, the cable is installed inside the home, and residents are required to order and pay for cable television service directly from Comcast (US Army Garrison, January 2002).

4.11.1.6 Solid Waste

Fort Belvoir generates about 10,460 tons (9,490 metric tons) of solid waste per year (Werner, personal communication, July 2002). Household and office building trash is disposed of off-post by a contract hauler to the I-95 Energy/Resource Recovery Facility run by Covanta Fairfax, Inc. Items such as tires, fluorescent lighting, and scrap metal go to DRMO for recycling. Woody waste and leaves are composted at the Post's compost site. Other bulky waste such as appliances and furniture are disposed of at Hilltop Landfill in Fairfax County, as well as construction and demolition debris.

The installation has a mandatory post-wide recycling program that collects white paper, colored paper, newspaper, aluminum cans, tin/steel cans, scrap metal, cardboard, glass bottles, plastic containers, used oil, toner cartridges, and scrap metal at the Building 1089, Recycling Facility. Curbside recycling service currently picks up aluminum cans, plastic bottles, glass bottles, and newspaper. Residents may drop all other items off at Building 1089. Fort Belvoir also has a 10-year Integrated Solid Waste Management Plan, last updated in 1999. The goal of the plan is to reduce materials that must be disposed of by incineration or landfilling. In general, the planning goal is to use integrated solid waste management planning to reduce solid waste management costs and potential environmental impacts. Fort Belvoir has met the plan goals and through its recycling collection program and landscape maintenance practices now recycles more than 50 percent of its solid waste (US Army Garrison, September 2001; DPW&L-ENRD, personal communication, June 2003).

4.11.2 Consequences

4.11.2.1 Proposed Action

Under this program, FBRC will be responsible for all costs of utilities provided to common areas of the project and all vacant units during the entire project period. Further, FBRC will be responsible for all utilities in occupied housing units covered by the project until the units have been rehabilitated or replaced and utility meters (electric, gas, and/or oil) have been installed, and a 12-month consumption record has been established. When these three conditions are met in an entire housing area and appropriate notice is provided to the service member occupant, the service member will become responsible for the cost of utilities (electric, gas, and oil) for their residence (Clark-Pinnacle, March 2003).

After consumption records have been established, an average utility consumption cost will be determined for each housing unit type. The service member will then receive this amount from his housing allowance and be responsible for paying utilities. Should the utility costs exceed the service member's identified utility allowance, the service member will be responsible to pay that amount from basic pay. If the utility bill is less than the calculated

allowance, the service member retains those funds. The remainder of the service member's BAH will go to FBRC as rent (Clark-Pinnacle, March 2003).

FBRC may also install meters to track usage of water and wastewater at individual housing units or may install a master meter at the village entrance. However, in accordance with Army RCI utility policy, it is expected that these utilities will remain a project-level cost.

4.11.2.2Potable Water Supply

All the RCI lease areas will continue to be supplied with water that is purchased in bulk from FCWA. All the villages, other than Woodlawn, will continue to use the Post water distribution systems to transport water to the lease area limits. Woodlawn will continue to be fed from a 10' PVC main from the Commissary elevated tank system. New South Post connects to the post distribution system at two existing 12" mains. One is located in Gunston Road, the other in Belvoir Road. The water distribution system to be constructed within New South Post will interconnect between these two large mains. There is also the potential to connect to a second 12" main in Gunston, for additional looping redundancy, if during final design it is determined to be warranted (Arnold, personal communication, June 2003).

The RCI program, in conjunction with the Master Community Plan, anticipates the utilization of existing water distribution systems. New mains will be constructed per the utility providers' standards in locations where streets are added to service infill homes and connected to existing mains where the streets meet existing streets. New service laterals will be built from the new homes and tied into the existing mains. The new service laterals are anticipated to benefit the overall community by reducing water loss from existing connections, which have degraded (Clark-Pinnacle, March 2003).

The water supply system for the proposed action will conform to applicable Federal and State codes for "Public Water Drinking" systems. These specifications have been adopted to ensure regional options are considered, consummate with public health design criteria, in compliance with existing State statutes and in accordance with good public health engineering practices. Variance may be required in respect to the measure of demand for service, and shall be determined based on actual measured flows (Clark-Pinnacle, March 2003). Any modifications to the water distribution system must be made in accordance with the requirements of Fort Belvoir's waterworks permit and 12 VAC 5-590-10, et. seq.

Demand on potable water supply from home users is not expected to increase appreciably under the proposed action, as there will be no net increase in the number of new homes; therefore the current system capacity is adequate. Water flows from the neighborhood centers, Welcome Center, and Recreation Center have been included in the analysis of the village they are located in. Additionally, per capita usage will decrease with the installation of modern water-efficient control devices such as low flow showerheads, faucets, toilets, and by repacking old pipelines that may allow leakage (Arnold, personal communication, June 2003).

In most of the existing villages, the number of homes is anticipated to be reduced, in which case the existing water piping systems will be replaced with new piping systems within the village boundaries. The few existing villages that may have an increase in density would

only increase the unit count by a small amount. Based on the current maximum densities, the following villages could potentially see an increase unit count as follows:

- Rossell - up to 20 additional homes
- Belvoir - up to 8 additional homes
- Park - up to 16 additional homes
- Jadwin - up to 30 additional homes
- Gerber - up to 14 additional homes

These relatively small potential increases will be accommodated within the existing capacities in the adjoining water lines and within the new water lines to be installed within village areas. When an existing residential area is increased in size, the water distribution system for that area will be studied and, if needed, a new distribution main will be installed beginning at the RCI property line to the location of the new houses. If, as a result of the new development, existing utilities are required to be upgraded beyond the line of that particular residential village, it is proposed that this upgrade work be coordinated with DPW&L (Clark-Pinnacle, March 2003).

For the 1,800 units to be rebuilt or rehabilitated, there will be a significant reduction in water capacity demands. This reduction will be a result of the use of water-saving type fixtures for the toilets, showers, clothes washers, and dishwashers. The reduction is estimated to be 33 percent, as calculated by the water analysis. The pre-development condition assumes 288 gallons per day per household (gpd/household) based on the use of historical data referenced in the attachment. The post-development condition shows 193 gpd/household. The 193 gpd/household compares favorably with current planning numbers used by the Washington Suburban Sanitary Commission (WSSC) for new homes using modern water saving type fixtures. The WSSC figures are 225 gpd/household for single family homes and 178 gpd/household for town homes (Arnold, personal communication, June 2003).

In addition to the homes, the project will include a total of 5 neighborhood centers, one Welcome Center, and one Recreation Center (which includes two pools). The average daily flows for these facilities are 200 gpd for each neighborhood center, 750 gpd for the Welcome Center, and 5,250 gpd for the Recreation Center. These flows are considered with the neighborhoods they are located in (Arnold, personal communication, June 2003).

Water usage from construction activities is estimated to be 3,000 gpd for the concrete batch plant (if utilized); 1,000 gpd for dust control for sitework (only for 2 months if sitework occurring during summer months); and 300 gpd for wash racks (only during first 3 months of sitework in each village).

Under the proposed action, long-term minor beneficial effects would be expected for the potable water supply. Areas of new construction would receive new delivery lines within the development area, providing improved water delivery and reduced water exfiltration and loss. Additionally, existing areas will replace older fixtures with fixtures that use considerably less water.

If, as a result of the new development, existing utilities are required to be upgraded beyond the boundary of that particular residential village, FBRC will coordinate with the installation to bring about this upgrade work. This water utility is expected (but not

guaranteed) to be privatized in the near future, resulting in additional long-term beneficial effects as the system will be fully upgraded.

4.11.2.3 Sewer

Under the proposed action, FBRC anticipates the utilization of existing sanitary sewer mains. New mains will be constructed per the utility providers' standards only in locations where streets are added to service infill homes and connected to existing mains where the streets meet existing streets. New service laterals will be built from the new homes and tied into the existing mains. The new service laterals are anticipated to benefit the overall community by replacing degraded existing connections (Clark-Pinnacle, March 2003).

When an existing residential area is increased in size, the sanitary sewer system for that area will be studied and, if needed, a new main will be installed beginning at the RCI property line to the location of the new houses. If, as a result of the new development, existing utilities are required to be upgraded beyond the line of that particular residential village, it is proposed that this upgrade work be coordinated with DPW&L (Clark-Pinnacle, March 2003).

The sanitary sewer system for the proposed action shall conform to applicable codes for "Design Criteria for Sewerage Systems." These specifications are the guidelines to be used for the comprehensive consideration of domestic sewage collection, treatment, and disposal systems, establishing the minimum design criteria pursuant to existing state statutes pertaining to effluent quality meeting State water quality standards. These criteria are intended to promote the design of facilities in accordance with good public health and water quality engineering practices. Variance may be required in respect to the measure of demand for service, and shall be determined based on actual measured flows (Clark-Pinnacle, March 2003).

Pump Stations

The wastewater flows in South Post essentially flow to either pump station (PS)-97 or PS-687. There are also a number of local smaller pump stations that feed into one of the two major pump stations. These two pump stations are metered and then flow to FCWA facilities.

The pump station (PS-97) currently serves most of South Post, including all the South Post villages other than Gerber. As such, adverse impact of New South Post Village on PS-97 will be minimal considering the reduction in units in the other existing villages. New South Post Village could have up to 260 homes flow to this pump station. However, if 260 units are built in New South Post, then at least 65 fewer units will remain in the various other villages that currently drain to SPS-97. As such, the worst case increase to PS-97 is 195 homes, which amounts to less than 0.10 mgd average flow. This is a small fraction of the existing capacity. While there will be an initial increase in flow to PS-97, an analysis of the pre-development and post-development wastewater flows from the housing areas to PS-97 indicates a final reduction of about 18 percent. There is an existing 12" sewer that these new homes would connect to that drains to SPS-97.The pump station, force main and gravity line to the station are currently handling most of the flows from South Post.

Pump station 687 currently serves the balance of South Post wastewater flows that does not go to PS-97. The wastewater analysis shows that the proposed action is estimated to increase flow to this pump station from 21,888 gpd (0.02 mgd) to 52,678gpd (0.05 mgd). This is an

increase of 31,790 gpd (0.03 mgd). Based on the pump horse power and force main size (three pumps at 40 HP and a 12" diameter force main), the capacity of pump station 687 exceeds 1.0 mgd. The total flows from the RCI areas therefore represent only about 5 percent of the station pump capacity, and the expected increase is only 2 percent of capacity. This very minor increase is not expected to exceed the capacity of the pump station. During final design this will be analyzed in more detail, as well as the past wet weather overflow history, and in the event there is a capacity concern, the pump station will be modified accordingly.

A portion of New South Post will require a new pump station to serve about 64 households. The project will install the new pump station which is expected to in turn flow to PS-687, and has been considered in the analysis of that pump station discussed above.

Pump station 1031 serves a small area of South Post and is located near New South Post Village on Gunston Road. This pump station feeds into PS-687. It is estimated that 151 new housing units will flow to PS-1031, where none flow to it currently. The flow from the housing units is estimated at 29,137 gpd or 0.03 mgd. Based on the pump horse power and force main size (2 pumps at 7.5 HP and a 4" force main), the capacity of PS-1031 exceeds 150,000 gpd (0.15 MGD). This represent up to 20 percent of the total pump station capacity. An increased flow of this magnitude may exceed the current capacity of the pump station. During final design this will be analyzed in more detail, and if needed the pump station will be modified as required to provide the needed capacity.

On North Post, Lewis Heights Village flows to PS-1832. The flows from the RCI area to the pump station will be reduced by about 53 percent, as calculated by the wastewater analysis. Based on pump horse power and force main size (2 pumps at 5 HP and a 4" force main), the capacity exceeds 100,000 gpd. The expected flow after development is 57,888 gpd, so there is sufficient capacity.

Woodlawn Village drains directly to a FCWA sewer collection main, and is metered within Woodlawn before the connection. The flow reduction expected from Woodlawn is approximately 38 percent, as calculated by the wastewater analysis. There will be a decrease in capacity utilization for the FCWA systems that provide service to Woodlawn Village.

Within Fort Belvoir the major components of the wastewater system will see a decrease in capacity utilization as compared to the existing condition, resulting in a long-term beneficial impact. One major on-post wastewater pump station (PS-687) will experience a increase in capacity utilization of 2 percent or less. If needed, and it is not expected, the pump station will be modified during final design to insure capacity utilization does not exceed 100 percent. One small local area pump station (1031) will see an increase in capacity utilization of as much as 20 percent as a result of the New South Post Village. If this proves to exceed the existing capacity of PS-1031 as determined during final design, then the pump station will be modified accordingly to provide the required capacity. The overall impact of the proposed action is expected to be beneficial on the system capacities for wastewater, as areas of new construction would receive new wastewater collection lines within the development area. Additionally, an increase in wastewater is not expected as there will be no net increase in the number of new homes or residents; therefore the system would not be constrained. Effluent is expected to continue to discharge to Fairfax County's Noman M. Cole, Jr. Pollution Control Plant (formerly the Lower Potomac Pollution Control Plant). The

post's wastewater utility is expected (but not guaranteed) to be privatized in the near future, resulting in additional long term beneficial effects as the system will be fully upgraded.

4.11.2.4Storm Water

Both long-term beneficial and short-term minor adverse effects would be expected for surface water as a result of storm water management during the construction of new housing villages. Details regarding storm water consequences are found in Section 4.6.2 of the EA.

4.11.2.5Energy Sources

Electricity

Under the proposed action, long-term minor beneficial effects would be expected for the electric system. This utility is expected (though not guaranteed) to be privatized in the near future resulting in long term beneficial effects as the system will be fully upgraded.

An increase in electricity is not expected under the proposed action as there will be no net increase in the number of new homes or residents; therefore the system would not be constrained. In addition, beneficial effects would result from the construction and rehabilitation of the housing units with the installation of energy efficient materials and systems. New construction will use standard energy-efficient techniques for the walls, roofs, and windows, and rehabilitation will use energy-efficient components to replace the old systems where appropriate. Heating, ventilation, air conditioning, and household appliance systems will be installed that have been designed to meet ENERGY STAR® standards. Energy savings are estimated at 30 percent, as calculated by the energy analysis.

Electrical distribution system for existing villages will consist of a combination of overhead and underground primary service feeders dependant on the area involved and its corresponding type of construction (i.e., new or renovation). New South Post will be powered by the existing 34.5 kV circuit (Circuit 1) that runs overhead along 9th Street to a substation behind the current DeWitt Hospital. According to post personnel, there is sufficient capacity on Circuit 1 and in the substation to handle the new homes in New South Post Village (Sedeski, June 2003). The ability to replace overhead electrical utilities with underground services is being explored for inclusion within the RCI program, but may not be adopted (Clark-Pinnacle, March 2003).

Natural Gas

Though there will be no net increase in the number of new homes or residents, an increase in natural gas usage is expected under the proposed action, as the existing heating oil heating systems in Belvoir and Rossell will be replaced with natural gas heating systems. In fiscal year 2002, the housing units used 127,157 gallons of heating oil, which includes usage from Belvoir, Rossel, and Dogue Villages (Mike Smith, personal communication, June 2003). Since 2002, Dogue Village has been entirely converted to natural gas. The new ancillary buildings (Welcome Center, Recreation Center, and Village Centers will also be powered by natural gas, thereby also contributing to the increase in usage at 273,000 MBH, 864,000 MBH, and 122,000 MBH (each), respectively.

Under the proposed action, long-term minor beneficial effects would result from the construction and renovations of the housing units with the installation of energy efficient

materials and systems. New construction will use standard energy-efficient techniques for the walls, roofs, and windows, and rehabilitation will use energy-efficient components to replace the old systems where appropriate. Heating and ventilation systems will be installed that have been designed to meet ENERGY STAR® standards.

According to the Master Community Plan, the installation anticipates the utilization of gas mains. New mains will be constructed or relocated by the utility provider and shall conform to the code and design criteria established by them. When an existing residential area is increased in size or dramatically rearranged, the gas distribution system for that area will be studied and, if needed, a new gas distribution main will be installed to the location of the new houses by the utility provider. If, as a result of the new development, existing utilities are required to be upgraded beyond the line of that particular residential village, it is proposed that this upgrade work be undertaken by Washington Gas, the utility provider, as is typically done in similar private development projects (Clark-Pinnacle, March 2003).

4.11.2.6 Communications

Under the proposed action, long-term minor beneficial effects would be expected for the communication system. The communication distribution system will be installed underground for all new areas of construction. In areas of rehabilitation, the system will be a continuation of the existing overhead or underground system in place.

The cable television and telephone system will be incorporated into the design of the new developments. Industry standards will be used for the design and construction of these facilities. The CATV distribution system will be installed underground for all new areas of construction. In areas of rehabilitation, the system will be a continuation of the existing overhead or underground system in place (Clark-Pinnacle, March 2003).

4.11.2.7 Solid Waste

Short-term minor adverse effects would be expected from the debris associated with the construction, demolition, and rehabilitation of family housing units over the eight year construction period. The debris would be hauled to an off-post landfill. Some portion of the debris, such as concrete and asphalt pavement will be recycled to the extent practicable. As there will be no increase in the number of residential homes, the proposed action would not increase the quantity of solid waste produced on Fort Belvoir following the eight year construction period.

Under the proposed action, FBRC will participate in Fort Belvoir's recycling program in accordance with federal, state and local policies and regulations. Recycling services will be provided to the housing areas through an outside contractor. If possible, recycled goods from the housing areas will be continue to be received at the installation's recycling facility (Building 1089). If not, information on recyclable items, by weight and/or by volume removed, will be provided to DPW&L on a monthly or quarterly basis for incorporation into the installation's SWARS database (Clark-Pinnacle, June 2003).

4.11.2.8 No Action Alternative

Under the no action alternative, no immediate impacts to the utilities would occur and, consequently, no impacts to storm water systems, natural gas systems, communications, or solid waste would occur. However, for the electric, potable water, and wastewater utilities,

it is expected that long-term beneficial effects would still occur due to the anticipated privatization of these utilities.

4.12 Hazardous and Toxic Substances

4.12.1 Affected Environment

Specific environmental statutes and regulations govern hazardous material and hazardous waste management activities at Fort Belvoir. For the purpose of this analysis, the terms hazardous waste, hazardous materials, and toxic substances include those substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), RCRA, or the Toxic Substances Control Act (TSCA). In general, they include substances that, because of their quantity, concentration, or physical, chemical, or toxic characteristics, may present substantial danger to public health or welfare or the environment when released into the environment. Fort Belvoir has both a Hazardous Waste Management Plan, a Hazardous Waste Minimization Plan, and a Master Spill Plan.

To identify possible areas of storage, release, or where disposal of hazardous substances, or petroleum products or their derivatives has occurred, an Environmental Baseline Survey (EBS) was prepared for those areas at Fort Belvoir considered for RCI project development (CH2M HILL, 2003). The EBS also identifies other existing environmental or safety issues (e.g., asbestos-containing material [ACM] and lead-based paint [LBP]) that would limit or affect the use of property for RCI actions.

4.12.1.1 Uses and Storage of Hazardous Materials

Petroleum, oil and lubricants (POL) products may have a variety of uses, but within the housing areas on Fort Belvoir, they most often provide fuel for the generation of heat and hot water (DPW&L-ENRD, 2003). Newer housing units are heated by electric or natural gas fired boilers. No other hazardous materials, with the exception of small quantities of paint, fuel, and household cleaners purchased by the tenants were noted to be used or present at the housing units on Fort Belvoir. As observed in the random site audits conducted during the EBS (CH2M HILL, 2003), some housing units store and use small quantities (less than 5 gal./pounds) of insecticides, fuel, propane, and cleaning materials. Generally, these items were stored appropriately and in good condition.

Currently, Dyncorp is responsible for the maintenance of the facilities within the RCI foot print. The hazardous materials associated with these maintenance activities, such as paint or solvents, are stored by Dyncorp within their designated storage facility that is not located within the RCI footprint.

Fort Belvoir has approximately 124 known USTs currently in use, of which 27 are regulated, and 186 known ASTs currently in use, of which 8 are regulated. These numbers represent tallies across the installation and are not specific to any area of project consideration area (i.e., not specific to RCI properties) (DPW&L-ENRD, 2003). These regulated and non-regulated tanks contain various substances such as heating oil, diesel fuel, motor gasoline, JP-8, lubricants, used oils, fuel-contaminated water (which is addressed under the RCRA program, not the Virginia DEQ PST program). As part of the Fort Belvoir PMP program, tank tightness testing is performed and removal, replacement, and upgrading of the tanks

are conducted as necessary. All tank replacements are with double-walled, state-of-the-art USTs or ASTs, dependent upon specific project requirements (DPW&L-ENRD, September 2001). As this is an ongoing program, the number of petroleum storage tanks present on post may be less by the time the RCI program would be implemented.

There are no RCRA regulated storage tanks within the RCI foot print. All USTs and ASTs currently in use within the RCI footprint are non-regulated (Compliance Branch Chief, DPW&L-ERND, personal communication, July 2002). The USTs and ASTs present within the RCI foot print are used to store heating oil for the facilities with the exception of one active AST containing diesel for an emergency generator located in Dogue Creek Village and one active AST containing waste oil recovered from an active POL remediation system in Dogue Creek Village. Although the ENRD PMP GIS does not have documented locations of any petroleum storage beyond the information provided for the New South Post Village area, it was common to use heating oil in former barracks for heat and hot water and former motor pool areas have typically been known for spills and petroleum releases (Compliance Branch Chief, DPW&L-ERND, personal communication, 2003).

Lack of a documented petroleum storage tank at a particular location does not preclude the possibility that there may still be a UST that has been closed in-place, or remnants of an historic UST or AST (POL contaminated soil) from some previously unknown UST or AST within the RCI footprint (Compliance Branch Chief, DPW&L-ERND, personal communication, July 2002). No known USTs exist within Fairfax, Jadwin Loop, Gerber, Colyer, or Woodlawn Villages. Currently there are active USTs at each housing unit in Rossell Loop and one active, 4,000 gallon UST in the New South Village Parcel. Known USTs have been removed in Dogue Creek, George Washington, Lewis Heights, River, Park Villages and the New South Parcel and the sites closed, with the exception of a site near Building 900 (PC# 97-3115), in accordance with Virginia State Law. Site closure consisted of removing the USTs and mitigating exposure to human receptors. Removal of all impacted media at these sites may not necessarily have been required in order to have achieved mitigation of exposure for closure.

No known ASTs exist within Fairfax, Jadwin Loop, Gerber, Colyer, Park, River or Woodlawn Villages. Active ASTs for each housing unit are located within Belvoir Village. There is an active AST for the remedial system in Dogue Creek Village. An active AST associated with a backup generator is located in George Washington Village. This location in George Washington Village also had a removed AST.

Pesticides (herbicides, insecticides, and fungicides) are applied, and will continue to be applied, postwide at Fort Belvoir by contractors licensed by the Commonwealth of Virginia to apply these products, including pesticide application on the properties covered in this EA. Pesticides applied by these contractors are stored in the Pest Control Shop, Building 1496.

4.12.1.2Hazardous Waste Disposal

Normal operations at Fort Belvoir generate wastes defined as hazardous by RCRA and state statutes. The management of hazardous waste at Fort Belvoir is conducted in compliance with the Resource Conservation and Recovery Act (RCRA). Fort Belvoir has both a Hazardous Waste Management Plan, a Hazardous Waste Minimization Plan, and a Master

Spill Plan. Fort Belvoir has one RCRA Part B permit from VDEQ for storage of hazardous wastes at two facilities. Neither of these two facilities are located within the RCI foot print.

A variety of hazardous wastes are generated from the normal maintenance and operations of Army programs at Fort Belvoir. The handling of the hazardous waste is tracked by Fort Belvoir's DPW&L office, in accordance with the Hazardous Waste Management Plan. Currently the private contractor responsible for the maintenance of the facilities within the RCI foot print is required to turn all hazardous waste generated from his operations over to the Army for manifesting and disposal at licensed facilities.

In addition, Fort Belvoir implements a post-wide petroleum management program (PMP) to maintain compliance related to petroleum storage, handling, transfer, and remediation with both federal and Commonwealth of Virginia Petroleum Storage Tank (PST) programs (DPW&L-ENRD, 2003).

4.12.1.3 Site Contamination and Cleanup

Within the RCI property sites, one site within Dogue Creek Village, north of unit #900 (PC# 97-3115), is undergoing active remediation of soil contaminated by heating oil leakage from multiple heating oil tanks from various buildings within Dogue Creek Village. The site is currently undergoing pump and treat cleanup for petroleum contaminated soil and groundwater. In addition, a storm drain and a tributary Creek that discharges to Accotink Bay on the New South Parcel were impacted by a release from adjacent properties. As the release occurred on adjacent property it is discussed below.

Five sites near the housing villages are also undergoing active remediation of soil contaminated by heating oil leakage. These active petroleum remediation sites are located adjacent to Gerber Village and Jadwin Loop. The remedial sites are identified as follows: PC# 99-3400 (Building 202), PC# 99-3262 (Building 210), PC# 99-3261 (Building 211), PC# 99-3401 (Building 256) all east of Gerber Village and PC# 99-3170 (Building 247) northwest of Jadwin Loop. Soil vapor extraction/low-pressure bio-venting systems were installed and are currently operating at each site, except at building 247 (discussed below). The liquid petroleum hydrocarbons (LPHs) detected at each of these sites appear to be either isolated in the areas of the former/closed-in-place USTs (Building 202), or within 10 to 20 feet of the former USTs (Buildings 210 and 256).

The Site Characterization Report (SCR) prepared for the site near Building 247, indicates that the highest level of soil contamination is within 40-75 feet of the former tank basins and LPHs have been detected in the water table in a well approximately 100 feet south along Gaillard Road. A Corrective Action Plan (CAP) is currently being completed under the VDEQ Petroleum Program mandates. The anticipated CAP for the site is expected to delineate the extent of contamination (DPW&L-ENRD, 2003).

Per the VDEQ PST Technical Manual, remedial endponts at all corrective action sites are established on a risk-to-receptor basis, because the main objective of a corrective action is to reduce risks to impacted or potentially impacted receptors. If a receptor is not present, the contamination is left in place. The majority of the corrective action sites on Fort Belvoir were closed due to no receptors being present that would be impacted by contamination. There is likelihood that some residual contamination was left in the ground at the closed corrective action sites based upon relative risk factors and lack of receptors.

There are approximately 25 closed corrective action sites within the RCI footprint (2 in Lewis Heights, 1 in George Washington Village, 21 within Dogue Creek, and one within the New South Post Parcel [former Building 1027]). There are approximately 7 closed corrective action sites within proximity to the RCI footprint.

South of the New South Parcel, there are two corrective action sites. The sites are both located south of Twelfth Street along the southwest portion of the RCI foot print. The South Post AAFES commercial gas station, Building 1197 (PC# 93-0295), was closed in 1996. The site was associated with releases from the former dispensing tanks. Closure was achieved following tank removal, site characterization, and compliance monitoring. The site was closed with contamination left in place.

The second site south of the New South Parcel, PC# 02-3144, is currently undergoing site characterization and is associated with a release of heating oil from Building 1197. Heating oil was detected in a creek on the New South Parcel where it receives flow from a storm drain that drains run-off from the Building 1197 area. Site characterization investigations revealed the fuel oil return line for the new boiler installed in the fall of 2001 was not connected to the UST, but found to be discharging to the ground (Site Characterization Report, Building 1197).

The Fort Belvoir RCRA Solid Waste Management Study identified 238 Solid Waste Management Units (SWMUs) on the Installation (CH2M HILL, 1992). None of these SWMUs are located on the 12 existing housing villages or the New South Parcel. Three SWMUs, however, are located within the southern temporary construction support location. Two of these SWMUs (B-01, B-02) are closed, requiring No Further Action (NFA). The status of the third SWMU (L-47), located on the eastern boundary of the southern temporary construction site, is "site inspection/decommission" (refer to Figure 4-10). This status means existing documentation recommends the SWMU be properly decommissioned, inspected for potential contaminant migration pathways, and follow-up actions performed, as appropriate (DPW&L-ENRD, 2003).

Table 4-36 lists the SWMUs located adjacent to or near the existing housing villages, the proposed New South Post Village parcel, and temporary construction sites. The table contains the proximity to RCI properties, brief description of the SWMU and current status as of 1992. Based on personal interviews with DPW&L-ENRD, the status of these SWMUs has not changed significantly since 1992 and they are not expected to have an impact on the RCI foot print.

TABLE 4-36
Nearby Solid Waste Management Units

Proximity to Housing Villages[1]	SWMU ID	SWMU Description	SWMU Status
Approx. 450 ft southwest of Gerber Village	A-04	Former Coal Storage Area	Open
Approx. 200 ft east of George Washington Village	A-8	George Washington Village Landfill	Closed
Approx. 670 ft north of Dogue Creek Village	A-9	Markham School Landfill	Closed
Approx. 100 ft east of George Washington Village	A-16	George Washington Village Landfill Interceptor Trench	Closed
Approx. 400 ft north of Dogue Creek Village	A-17	Markham Landfill Interceptor Trench	Closed

TABLE 4-36
Nearby Solid Waste Management Units

Approximately 94 ft southeast of stone crushing temporary construction site	A-28	Non-authorized Debris Landfill	Open
Within stone crushing temporary construction site (northwest corner)	B-01	Building 625 Hazardous Waste Storage Area	Closed
Within stone crushing temporary construction site (northeast corner)	B-02	Building 627 Hazardous Waste Storage Area	Closed
Approximately 25 ft south of stone crushing temporary construction site	B-03	Building 632 Hazardous Waste Storage Area	Closed
Approximately 175 ft south of stone crushing temporary construction site	B-04	Building 633 Hazardous Waste Storage Area	Closed
Approximately 100 ft south of stone crushing temporary construction site	B-05	Building 633 Hazardous Waste Storage Area	Closed
Approx. 300 ft west of Fairfax Village	B-14, B-15	Building 363A,C – Hazardous Waste Storage Area	Closed
Approx. 360 ft west of Gerber Village	C-11	Building 715 Wash Rack	Open
Approx. 500 ft west of Fairfax Village	D-4, D-5	Building 324 Oil/Water Separators (3)	Open
Approx. 400 ft west of Gerber Village	D-11	Building 715 Oil/Water Separator	Closed
Approx. 310 ft west of Gerber Village	E-13	Building 715 Waste POL Storage Area	Open
Approx. 350 ft southwest of River Village	F-3	Fort Belvoir Marina Aboveground Waste POL Tank	Closed
Approx. 375 ft west of Gerber Village	G-11	Building 714 Underground Waste POL Tank (closed)	Closed
Approx. 250 ft west of Gerber Village	I-04	Building 707 Battery Acid Neutralization Unit (closed)	Closed
Approx. 800 ft east of Jadwin Village	L-11, L-8	Sewage Treatment Plant 2, Drum Storage Area	Open
Within stone crushing temporary construction site (southeast corner)	L-47	600 Area Transformer Storage Pad	Open
Approx. 200 ft southwest of River Village	N-17	Fort Belvoir Marina Battery Storage Area	Open

1. The approximate locations of the SWMUs listed in this table does not include and is not attempting to delineate the extent of contamination or area boundaries. Information concerning extent of contamination from each individual SWMU was not available in the cited references.

Source: U.S. Army Fort Belvoir, Solid Waste Management Unit Study, CH2M HILL, 1992; DPW&L-ENRD, personal communication, 2002.
POL = Petroleum, Oil, and Lubricants

4.12.1.4 Special Hazards

Polychlorinated Biphenyls (PCBs)

PCBs are industrial compounds used in electrical equipment, primarily capacitors and transformers, because they are electrically nonconductive and stable at high temperatures. Because of their chemical stability, PCBs persist in the environment, bioaccumulate in organisms, and become concentrated in the food chain.

Fort Belvoir considers the installation to be PCB compliant (< 50 ppm PCB content in oil cooled electrical equipment) (DPW&L-ENRD, personal communication, August 2002). Fort Belvoir's policy is to sample all transformers for PCB content when they are taken offline for repair or replacement. Due to the size, complexity, and age of the electrical system at Fort Belvoir, the possibility exists that there is non-compliant electrical equipment within the RCI footprint.

Asbestos

Remediation for ACM is regulated by the USEPA and OSHA. Asbestos fiber emissions into the ambient air are regulated in accordance with Section 112 of the CAA, which established the NESHAP. These standards address the demolition or rehabilitation of buildings with ACM.

Two categories are used to describe ACM. Friable ACM is defined as any material containing more than 1 percent asbestos (as determined by polarized light microscopy) that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. Nonfriable ACM is material that contains more than 1 percent asbestos and does not meet the criteria for friable ACM.

An in-depth ACM inventory or survey of a housing unit is performed by a licensed asbestos inspector when the residential unit is vacant or under renovation. Vacant quarters are surveyed based on what needs to be renovated (i.e., bathroom, kitchen, utility room, bedroom, etc.).

An asbestos survey was conducted in 1999 of the housing village units by Fort Belvoir. In addition, Fort Belvoir maintains an inventory database of existing asbestos conditions of all housing units on Post. Table 4-37 summarizes the identified asbestos containing construction materials within each housing village and the New South Parcel. Additional detail about asbestos-containing construction materials within each housing unit is provided in the EBS being prepared for the transfer of buildings and leasing of land proposed under RCI (CH2M HILL, 2003).

TABLE 4-37
Asbestos Survey Results

Village	Location of Asbestos Containing Material
Woodlawn Village	Floor tiles in hallways, bedrooms, and within the vinyl flooring in kitchens, laundry rooms, and bathrooms.
Dogue Creek Village[1]	In flue insulation, transit duct under the housing unit slabs, and within the floor tiles in the living rooms and upstairs bedrooms and hallways.
George Washington Village	In the vinyl flooring in the kitchens, utility rooms, and bathrooms and also in the permanent walls and ceilings.
Colyer Village	Within the permanent walls and ceilings and in the vinyl flooring in the bathrooms.
Fairfax Village	Floor tiles in the living rooms and bedrooms and within the vinyl flooring in the kitchens, utility rooms, and bathrooms. Also in the transit duct under the first floor slab of the units.

TABLE 4-37
Asbestos Survey Results

Village	Location of Asbestos Containing Material
Gerber Village	Within the permanent walls and ceilings and within the floor tiles of the bathrooms, kitchens and utility rooms.
Belvoir Village	In the pipe insulation in the basement and crawl space and within the permanent walls and ceilings
River Village	In flex connectors of crawl spaces
New South Post Village Parcel	Building 1001 – within the permanent walls and ceilings.

Source: U.S. Army Corp of Engineers, Asbestos Housing Survey, 2001, DPW&L-ENRD, personal communication, January 2003.

1. Abated during renovation in 2002 (DPW&L-ENRD, personal communication, 2003)

Lead-Based Paint (LBP)

In September 1997, a LBP risk assessment was conducted throughout eleven homogeneous areas of post housing (Dewberry & Davis, 1997). The LBP risk assessment was performed to supplement a previous assessment conducted in September 1995. The homogenous areas included housing units in Belvoir Village, Gerber Village, T-400 Area (Park Village and part of Jadwin Loop), 100 Area, Dogue Creek, Rossell Loop, Jadwin Loop, Fairfax Village, Colyer Village, George Washington Village, River Village, and Woodlawn Village.

The assessment determined that housing units sampled in Gerber Village and Dogue Creek Village had lead exceeding HUD action levels in the paint on the interior painted surfaces. Housing units in Belvoir Village, T-400 Area (Park Village and part of Jadwin Loop), 100 Area, Rossell Loop, Jadwin Loop, Fairfax Village, Colyer Village, George Washington Village, River Village, and Woodlawn Village may have been painted with LBP based on the age of the units, those constructed prior to 1979.

In addition to sampling the painted surfaces, representative soil samples for lead analysis were also collected during the 1997 survey. The soil sample results identified the housing units listed in Table 4-38 as having a lead content above the HUD action level of 400 ppm. For more detailed information concerning the soil survey please refer to the EBS (CH2M HILL, 2003).

TABLE 4-38
Lead Exceedances in Soil (>400 ppm)

Village	Housing Unit(s)
Belvoir Village	6, 13, 14
Lewis Heights	1714
Dogue Creek Village	911, 914
Jadwin Village	451
Gerber Village	136

Source: Department of Army, O&M Plan for Lead Based Paint in Housing at Fort Belvoir, 1997.

An interim control measure was implemented in the Dogue Creek Village areas, to prevent human exposure where lead was detected in the soil. Flower beds were built around the

houses, extending out 2 feet from the foundations of the houses. These flower beds were then filled in with dirt and mulch (DPW&L-ENRD, personal communication, October 2002).

An Operation and Maintenance (O&M) Plan was developed as a response to the 1997 LBP risk assessment. Until screening of all painted surfaces for LBP is conducted, according to the O&M Plan, all paint in the housing units located in Belvoir Village, T-400 Area (Park Village and part of Jadwin Loop), 100 Area, Rossell Loop, Jadwin Loop, Fairfax Village, Colyer Village, George Washington Village, River Village, and Woodlawn Village are assumed to contain LBP.

Pesticides

Pesticides are applied at Fort Belvoir by government personnel and government contractors who are DoD certified and licensed by the Commonwealth of Virginia to apply these products, including pesticide application on the properties within the RCI foot print. For clarification, "post-wide" in this section is considered to be any area that is greater than 50 feet away from any housing unit. Any area within 50 feet of the housing unit is considered residential. All Fort Belvoir Pest Control operations are managed by DPWL-ENRD, except for the Fort Belvoir Golf Course and specific tenant activities (DPWL-ENRD, personal communication, 2003). Approximately 60 percent of the pesticides applied on Fort Belvoir is on the North 36 Golf Course and 20 percent at the South 9 Golf Course. The South 9 Golf Course is located adjacent to the New South Parcel. The types of pesticides used on the golf course include fungicides and herbicides.

All pesticide applicators and contractors on Fort Belvoir comply with the current Fort Belvoir Integrated Pest Management (IPM) and Pest Management Policy Letter. The IPM is a process for achieving long-term environmentally sound pest suppression through the use of a wide variety of technological and management practices. IPM is intended to reduce the use of pesticides and is in accordance with the Army's Pollution Prevention Program.

All pesticides used by the contractors are required to be registered with USEPA for the use intended and to have written approval of the Army. Whenever a new chemical is proposed for use by anyone on Fort Belvoir (except residents), an IPM Form must be filled out and be approved by the Army before the chemical can be applied.

Preventative spraying is not authorized in housing units. Interior pest control within the residential areas is the responsibility of the tenant. Approved self-help products and information brochures are available to all housing residents. (DPW&L-ENRD, personal communication, July 2002). If a pest control problem arises that would requires additional assistance, a service order is submitted to the current in-house facility licensed contractor.

The areas within Fort Belvoir's residential villages in which pests are most commonly encountered include the multiple family housing units and the multiple apartment units. The problem pests include roaches, ants, spiders, and flies. The garbage pickup areas within the residential areas normally attract flies. These pickup areas are cleaned once a month by the tenants and the contractor picks up the containers for comprehensive cleaning every 6 months (DPW&L,ENRD, personal communication, July 2002).

Termiticides

Pesticide data and records from 1995 to present were available for review and information, records prior to 1995 are archived and were not available for review at the during the preparation of the EA. Based on experience at other Army installations, it is probable that chlorinated pesticides were used in the past. Specifically, it can be assumed that chlordane was used on houses built before 1980. At that time, USACE Applications Guidelines instructed that chlordane should be used for termite control. Therefore, it is likely that chlordane was used at select locations (units) requiring termite treatment in the housing villages at Fort Belvoir, except for Woodlawn Village, which was built in 1980-1981. The renovated units in Dogue Creek were gutted down to bare brick walls, so the presence of residual chlordane is unlikely, but cannot be ruled out.

Other chemicals that have been used in the past for termite control include diazinon, malthion, and dursban. Fort Belvoir stopped using dursban in 2001 and as of December 2002, dursban can only be used on the golf course, not in the residential, administrative, or warehouse areas. Fort Belvoir is currently using cypermethrin for termite control (DPW&L-ENRD, personal communication, January 2003).

Mosquito Management

A mosquito management plan is implemented on Fort Belvoir. All IPM mosquito control operations on Fort Belvoir (monitoring, trapping, the reduction of breeding sites and larviciding) are conducted by DPWL-ENRD, Environmental Health and Preventative Medicine, and licensed contractor. No fogging to control adult mosquitoes has occurred on Fort Belvoir in the last 10 years. The mosquito treatments used on Fort Belvoir are only for mosquito larvae (larvicide), to prevent hatching of new mosquitoes.

Larvicides are a type of biological control and are a non-chemical way to control the mosquito population. The larvicide products used on Fort Belvoir include Bti (*Bacillus thuringiensis israelensis*) and Altocid. Bti is applied as a briquette or liquid application to storm drains, culverts, and other breeding sites where the potential exists for it to enter permanent wetlands and tidal waters. Altocid is also applied as a briquette or liquid and is used in all other areas where standing water has created potential breeding sites for mosquitoes.

These larvicide areas are decided by mosquito counts done by the Preventive Medicine Division at Fort Belvoir, who are responsible for the monitoring and trapping of mosquitoes. The larvicide areas currently include Dogue Creek, Little River, Woodlawn Village, George Washington Village and Fairfax Village (DPW&L-ENRD, personal communication, June 2002).

Radon

Radon gas is a naturally occurring, colorless, and odorless radioactive gas that is produced by the decay of naturally radioactive material (e.g., potassium, uranium, etc.). Atmospheric radon is diluted to insignificant levels; however, when concentrated in enclosed areas, radon can present human health risks.

Radon testing for residential buildings was completed in 1991. Radon testing is only required for the residential buildings on Fort Belvoir as required by USEPA, the state of Virginia, and the Army. Two housing units located within the southwest corner of Gerber

Village (VIP Quarters), and one housing unit in Colyer Village were the only residential buildings with recorded elevated radon levels (above 4.0 pico-Curies per liter [pCi/L]). The two units in Gerber Village have been renovated but never used. No radon testing has been done for new or renovated buildings since 1992 (Karl Hezel, personal communication, June 2002). For additional information concerning the radon testing performed and survey results please refer to the EBS (CH2M HILL).

4.12.2 Consequences

4.12.2.1 Proposed Action

This section presents the proposed actions and mitigations, if necessary, to be implemented within the RCI footprint to address existing environmental conditions as well as those conditions, if not properly managed, that could result in an environmental impact to the property. Pursuant to CERCLA 120(h), any prior contamination found at any time during the projects will remain the responsibility of the Army. This section describes the general approach for mitigating environmental impacts during demolition, rehabilitation, and reconstruction activities proposed with the RCI foot print. The EMP, which FBRC will prepare in consultation with DPW&L-ENRD prior to closure will provide procedures. Identification of all the necessary stepwise actions can not be described in detail, as the full range of conditions that could be encountered will not be known until actual construction activities are underway.

4.12.2.1.1 Use, Storage, and Disposal of Hazardous Materials

Housing Demolition and Construction Activities

During the initial demolition and construction activities for each of the housing units within the RCI footprint, FBRC will perform all work in accordance with federal, state, and local laws. FBRC will not store hazardous substances or wastes in the housing villages beyond those materials that are required to perform the required construction activities. FBRC will develop an Army approved Hazardous Waste Management Plan and Spill Prevention Plan for the use, storage and disposal of all hazardous materials brought in or existing on the property. FBRC activities will be coordinated with the Army to minimize disturbance or impacts affecting the current status of SWMU sites, closed POL sites, and ongoing remedial activities on the RCI properties as well as the adjacent properties.

All debris generated as a result of initial demolition or rehabilitation activities at each housing unit will be sampled, classified, and disposed of in accordance with applicable regulations (VDEQ) and the standards of the appropriate licensed off-post receiving facility. To the extent practical, all non-hazardous building debris will be segregated from hazardous debris and handled, stored, and disposed of properly by FBRC (CDMP, 2003).

Hazardous construction debris generated from initial rehabilitation or demolition will be classified, manifested and disposed of in accordance with applicable environmental laws and regulations.

All materials including construction materials, wastes, and potentially hazardous or hazardous wastes will be stored onsite in accordance with all relative and applicable State and Federal regulations. A portion of the erosion control and sediment plan will include requirements for routine inspections of equipment, materials, and waste storage areas to

ensure best management practices are being used to prevent a release of wastes to the environment.

Many of the housing units do contain ACM and LBP, which if not properly managed during demolition could result in a release to the environment. Removal of these constituents will be performed only by qualified personnel in accordance with the EMP. As rehabilitation or demolition and reconstruction of the many of the housing units known to contain ACM and LBP, demolition of ACM and LBP containing materials will likely result in construction debris requiring disposal as a hazardous waste. Disposal of ACM and LBP containing construction debris generated as a result of initial demolition and remediation activities will be manifested under the Army's existing permit(s).

During activities at the northern (panel construction and lumber storage) and the southern temporary construction sites (stone crushing activities and concrete plant), hazardous materials will be generated. All hazardous materials generated at these sites will be stored and disposed of in accordance with relevant and applicable federal and state of Virginia environmental laws. Additionally, temporary construction storage facilities will need to provide for regular site and equipment inspections, and spill control procedures, to ensure that large, stored, on-site equipment does not release petroleum products to the environment.

Housing Operations

FBRC will be expected to apply for their own RCRA small quantity generator permit from Virginia for the operation and maintenance of their facilities. Fort Belvoir will apply to the Department of the Army for a waiver to 10 U.S.C. Sec. 2692 to allow FBRC to store materials on post that contain hazardous constituents. This material will be stored in proper containers or cabinets that will be located in Building 1126. Large quantities of paints, pesticides, cleaning solvents and the like will not be stored on post, because FBRC will subcontract functions such as landscaping, maintenance of lawns, housing turnover cleaning and painting, Recreation Center cleaning and maintenance, and office cleaning to commercial operators, who will be responsible for their own offsite storage and disposal of hazardous materials and wastes. Such materials would be brought on-post the day they are to be used. Any future spills or releases caused by project activities will be the responsibility of FBRC.

4.12.2.2Petroleum Storage Tanks (USTs and ASTs)

If USTs or contamination (soil or groundwater) associated with former USTs or ASTs are found during the construction and demolition activities, the Army, in accordance with CERCLA 120(h), is ultimately responsible for the removal and/or disposal of the USTs, or any soils or groundwater contaminated by them. FBRC may agree to assist in abatement efforts to ensure development schedules are met. This assistance may include removal of USTs in connection with demolition and construction activities. POL-contaminated soil that resulted from prior Army activities (i.e., leakage from Army-owned USTs) will be turned over to the Army to be manifested and handled in accordance with the laws of the Commonwealth of Virginia and the requirements of Fort Belvoir's PMP.

To the extent practicable, all demolition, rehabilitation and new construction activities by FBRC will be coordinated with the Army and directed to minimize impacts to the existing closed, POL sites within the RCI foot print. For areas where disturbance of the closed POL

sites or suspected POL contaminated media is unavoidable, DPW&L-ENRD will coordinate with VDEQ to sample affected media for the appropriate parameters (as required by VDEQ) prior to ground disturbance. In other areas, if previously unknown POL contamination is encountered, the construction activities will be halted until the media is sampled for the appropriate parameters and a Corrective Action Plan (CAP) is filed with VDEQ.

During the rehabilitation efforts at each of the villages, new heating systems will be placed in the units. The energy source for the all new heating systems is planned to be natural gas. The current tanks (USTs and ASTs) located within the villages that currently use oil, will be removed or closed in-place and replaced with the new natural gas heating system. In historic housing areas (Belvoir, Gerber, Jadwin and Park), where ASTs are located in the basements or subfloors of the housing buildings and cannot be removed without impacting the historic structure, the ASTs may be closed in-place. Closure will include purging and capping the AST.

Demolition activities planned for Rossell Loop will include the removal of current USTs (30 total) within the village. These USTs contain No. 2 heating oil which is used for heat and hot water for each unit. According to DPW&L-ENRD, there have been past issues of spills and overfills, which occurred as non-reportable spills. No documentation of spills were located during the file review at VDEQ.

Additionally, Building 1001, located within the New South Post Village parcel will be demolished to provide a space for new housing. Before demolition, the existing 4,000 gallon No.2 fuel oil UST will be decommissioned and closed.

The existing tanks within Rossel Loop and at Building 1001 will be decomissioned and removed according to the requirements of Fort Belvoir's PMP and with extensive coordination with the DPW&L-ENRD.

4.12.2.3 Polychlorinated Biphenyls (PCBs)

Small quantities of PCB waste may be generated during the demolition and/or rehabilitation of the housing units. These PCBs may be contained in the ballasts associated with fluorescent lights. PCBs from inside the housing units will be managed by FBRC in accordance with applicable environmental laws. Management may include components outlining the requirements for resident and worker protection during rehabilitation and demolition. FBRC may create PCB abatement specifications to address fluorescent light ballasts in accordance with applicable environmental laws. No PCB waste will be disposed of on-site. All PCB waste will be manifested and disposed of in accordance with applicable environmental laws and regulations pertaining to PCB waste at the time the waste is disposed.

4.12.2.4Asbestos

FBRC, in accordance with applicable environmental laws, will manage asbestos-containing building materials (ACBM) during rehabilitation or demolition activities. FBRC may create ACBM abatement specifications to address ACBM in accordance with applicable environmental laws and regulations. No ACBM waste will be disposed of on-site. All ACBM waste will be handled, stored and disposed of in accordance with applicable environmental laws pertaining to ACBM waste at the time the waste is generated (CDMP,

2003). In addition, ACBM will only be handled by licensed and qualified personnel during all activities, including demolition, rehabilitation, operations, and maintenance of the facilities within the RCI footprint. FBRC will manage ACBM that remains within buildings in accordance with the installation's current Operations and Maintenance (O&M) Plan until such time as a new O&M plan is required.

4.12.2.5 Lead Based Paint

During rehabilitation work, LBP will be abated on all painted surfaces disturbed by the work. During maintenance, rehabilitation and demolition activities all LBP work will be accomplished by USEPA-certified LBP workers and in accordance with applicable environmental laws and regulations. No LBP waste will be disposed of on-site. All LBP waste will be handled, stored and disposed of in accordance with applicable environmental laws and regulations pertaining to LBP waste at the time the waste is generated (CDMP, 2003).

Elevated levels of lead in soils (> 400 ppm) around some of the housing units have been identified in the past. The Army will be responsible for all abatement and/or disposal of any identified LBP hazard not contained within the structures. FBRC will comply with USEPA/HUD guidelines regarding lead in surface soil in locations that exceed the 400 ppm USEPA/HUD guideline as identified in the 1995 and 1997 LBP assessments performed within the RCI foot print.

FBRC will manage LBP that remains within buildings in accordance with the installation's current LBP Operations and Maintenance (O&M) plan until such time as a new O&M Plan is required.

4.12.2.6Pesticides

Any pesticide contamination found at any time during the project will remain the responsibility of the Army, as appropriate. The Army will remain the owner of contaminated soil and/or building materials during and after remediation and shall ultimately be responsible for its proper disposal and for any claims based upon or relating to the presence and removal of pesticide-contaminated soil and/or building materials introduced to the sites on or before the effective date. Pesticide contaminated soil/wastes may be temporarily staged in a central location on post or appropriate location at each of the sites until the Army can arrange for final disposal.

FBRC will apply pesticides on an as-needed basis only. Pesticides will be applied by contractors licensed in the Commonwealth of Virginia for the purpose of administering pesticides. Pesticide applications will be in accordance with all manufacturers' recommendations and a pesticide management plan that will be reviewed by the Army. FBRC has not included the use of self-help pesticides as part of their Operations Plan and will not make them available to housing residents (CDMP, 2003).

4.12.2.7 Radon

During the rehabilitation process, family housing units potentially subject to radon contamination should be vented. FBRC may mitigate the units identified as having elevated radon levels upon review of existing data. FBRC may also complete a testing program for units that will not be demolished within a year of taking possession and mitigate as

appropriate (CDMP, 2003). New construction in areas susceptible to radon will be tested and may, as necessary, include an engineered control (such as subfloor venting or barriers) to minimize or eliminate radon accumulation.

4.12.2.8 No Action Alternative

Minor adverse effects could occur. Fort Belvoir will continue to manage and address the potential hazards of ACM and LBP in accordance with applicable laws, but abatement may be over a much greater period of time than under the proposed action. Therefore, the possibility of adverse effects must be recognized. No additional adverse effects beyond those currently present from the actual and suspected hazardous or POL materials in the RCI foot print would occur if no rehabilitation, demolition, or new construction was performed. Should rehabilitation, demolition, or new construction be performed by the Army within the RCI foot print, the adverse effects are assumed to be the same as if the activities were performed by FBRC under the RCI program.

4.13 Cumulative Effects Summary

Cumulative effects are defined by the CEQ in 40 CFR 1508.7 as "impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions."

There are a number of projects involving construction that are being considered on Fort Belvoir in addition to the RCI program. In addition, the Fort Belvoir Master Plan is in the process of being updated and an associated Environmental Impact Statement will be prepared.

Six projects are either ongoing or in the advanced stages of planning and design and likely to proceed to implementation:

- **Relocation of Headquarters AMC personnel**: This project is ongoing. About 1,600 personnel are being relocated from leased space in Alexandria into temporary modular buildings on Fort Belvoir. The temporary site selected for relocation of AMC head-quarters to Fort Belvoir is on the east of the South Post Golf Course and about 2,000 feet north of the proposed New South Post Village parcel. An EA was prepared for this action in May 2002. There will be cumulative effects from short-term construction noise and construction traffic. Headquarters AMC personnel will occupy these temporary facilities for approximately 5 to 10 years, until a location is found where they could be accommodated permanently.

- **New North Post Chapel:** This new structure will be approximately 20,000 sq ft in size, with a 600-seat capacity. It will be built on a 6-acre site adjacent to Lewis Height Village, south of Woodlawn Methodist Cemetery and north and east of the Abbot and Franklin roads intersection. Construction is expected to take place in 2003 - 2004.

- **Replacement of Hospital:** A new Army hospital/medical treatment facility is proposed, to replace the existing 44-year old Dewitt Army Community Hospital on South Post. The preferred site is on North Post, north of the PX and west of Woodlawn Road, about

¾ mile northwest of Lewis Heights Village. An EA was prepared for this action in July 2002. Site preparation and construction would begin in 2004 and the facility would open in 2007. The new facility will focus less on inpatient care and more on emergency care, birthing and outpatient services, to include outpatient and same-day surgery, primary and secondary care, preventive medicine and dental care. On a daily basis, the new hospital would serve an estimated 926 outpatients, 25 inpatients in an observation unit for the emergency room, and 77 dental patients. The existing hospital site and seven buildings (hospital, administrative support, warehouse, the dental clinic, a mental health and preventive medicine building, and an aviation medicine clinic) on South Post would be turned back over to the installation for reuse. The new hospital is not expected to increase trips to the installation beyond those generated by the existing hospital (US Army Garrison, Fort Belvoir, July 2002).

- **Construction of T Block Addition to the Defense Communications Electronics Evaluation and Testing Agency**: DCEETA plans to add 122,000 sq ft of administrative office space to their headquarters building, which is located on North Post roughly 1 mile north of Lewis Heights Village, to accommodate approximately 250 new personnel and to construct a new parking structure on an existing surface parking lot.
- **Fort Belvoir Improvements to DCEETA Infrastructure**: Fort Belvoir proposes to build new infrastructure on North Post that would include remote fuel oil and gasoline delivery, storage and distribution facilities, remote water storage and distribution facilities, and an underground electrical duct bank. The purpose is to improve force protection for critical facility operations in the northern part of the installation.
- **Defense Threat Reduction Center** - Project to construct an additional pod on the DLA Headquarters Building to house 1,354 personnel of the Defense Threat Reduction Agency. This project will include a 982 space, three-level parking deck. Construction scheduled for completion in August 2005. A site on North Post has been designated for overflow parking until project is complete.

Each of these proposed projects individually may not introduce severe adverse impacts, but taken together, the projects have the potential to do so, particularly if mitigation measures do not consider all the proposals together.

Fort Belvoir will employ all possible safeguards to protect the environment during construction of these facilities. Although these projects are scheduled to occur in the same years that family housing is planned to be renovated, and would therefore have some cumulative effects on noise and regional air quality, with the exception of the ongoing AMC Headquarters relocation and North Post Chapel construction, most of the projects are not in the immediate vicinity of the planned family housing construction.

During this period of construction activity, adverse cumulative effects on air quality and the noise environment are expected due to construction projects scheduled to occur concurrently with the family housing construction activities. However, these adverse cumulative impacts to air quality are expected to have occurred even without the proposed RCI action. From a 2002 Air Program brief showing projected 2001-2008 NOx emissions from upcoming projects (not including the RCI proposed action, emissions from 2004-2008 range from 19.8 tpy to 52.2 tpy, without the RCI proposed action. Concurrent projects that

contribute to these emissions include DCEETA, DAAF FS, INSCOM HOT, DTRA, DeWitt Hospital, AMC, Tompkins Basin, Prime Power, Chapel and other miscellaneous sources (DIS-ENRD, August 2001). The combined impact of these sources will most likely cause stationary sources at the post to be subject to nonattainment NSR permitting requirements because of the potential post-wide NOx net increase. Under this condition, new sources would likely be required to use the lowest-achievable emission rate (LAER) technology and obtain emission offsets to satisfy NSR regulatory requirements and reduce overall emissions post-wide. The applicability of NSR requirements as well as General Conformity requirements because of the potential post-wide NOx net increase will need to be reviewed again as these projects reach the air permitting and facility final design stage.

There are not expected to be any cumulative effects on utilities, specifically with regard to the relocation of Headquarters AMC personnel as the AMC building is being powered from a new circuit that was run specifically for the building. As AMC is on a separate circuit there should be no issue relative to power for both the AMC project and the proposed action. Increases in solid waste due to demolition and construction of cumulative projects is expected.

Short-term minor adverse effects would be expected with the introduction of noise generated during the construction and renovation activities. Sensitive receptors to noise include existing occupants within the RCI properties, DeWitt Hospital, administrative offices and commercial areas directly adjacent to the RCI footprint. Additionally, noise produced by the stone crushing temporary construction site may be a nuisance to the animals within the Veterinarian Clinic located 200 feet east of the site. However, because stone crushing activities will generally occur during the project after major demolition activities, the noise generated at this site will be in short duration and intermittent.

Long-term cumulative traffic effects are primarily expected on North Post in association with the DeWitt Hospital and the DCEETA facility. Gunston and Kingman Roads would be expected to see increases in traffic volumes with these facilities. Traffic impacts with the new North Post Chapel are expected to be confined to weekends and other periods outside of peak periods of congestion on area roadways. South Post cumulative impacts are associated with the temporary relocation of the AMC Headquarters. Gunston and Belvoir Roads are expected to see increases in traffic with the relocation of the temporary AMC Headquarters. When the hospital relocates to North Post, local trips to the existing hospital, which is adjacent to Colyer Village and the proposed New South Post Village, would be eliminated (for a time, until new activities were located there). Long-term cumulative traffic effects with the Headquarters AMC relocation, DeWitt Hospital, and other potential projects are accounted for in the background traffic growth assumptions for the 2011 horizon year in the traffic analysis presented in section 4.10 of this EA.

Additionally, there would be adverse short-term cumulative effects on traffic due to the temporary increase in construction traffic. Most construction traffic is expected to utilize the roadway network outside of the peak period of the adjacent roadway system. Peak construction is expected to last less than one year and add up to 225 vehicles to the transportation system in non-peak times. Local, on-post trips could be impacted for short times during construction.

Throughout the construction and renovation activities, long-term beneficial effects would be expected with the removal and proper disposal of all hazardous materials brought in (for construction activities) or existing on the RCI properties (ACM and LBP). FBRC activities will coordinate with the Army to minimize disturbance or impacts affecting the current status of SWMU sites, closed POL sites, and on-going remedial activities on the RCI properties, as well as the adjacent properties.

Increased impervious surface from all of these facilities will result in an increased volume of stormwater runoff, however the proposed stormwater management for each facility is anticipated to provide sufficient mitigation to prevent cumulative adverse impacts.

The new DeWitt Hospital Site is located within Accotink Creek Watershed, subwatershed 30. The RCI project will result in only minor increases in impervious surface within this subwatershed. The AMC headquarters project is split between the Accotink Creek and Accotink Bay watersheds, in subwatersheds 01 and 03. There are no proposed impacts to subwatershed 01 from the RCI Project, therefore there is no increase to cumulative impacts in this area. There are substantial increases in impervious surface from both projects within subwatershed 03, however both projects will mitigate with storm water management in order to prevent an increase in stormwater runoff in this area. No adverse cumulative impacts are expected. Due to the added potential for cumulative impacts in this subwatershed, however, FBRC will specifically target this subwatershed for additional infiltration where practicable. The new North Post Chapel is located immediately adjacent to Lewis Heights. Stormwater from the chapel site will be specifically reviewed during development of the storm water management controls for Lewis Heights to ensure there are no cumulative impacts.

Because there is currently a limited amount of stormwater management in the RCI footprints, there is expected to be a beneficial impact on surface waters as a result of the proposed action. This is not anticipated to change as a result of cumulative effects from other projects under consideration.

Potential impacts to vegetation, wildlife, and wetlands from the RCI project are not expected to significantly increase overall effects from the relocation of DeWitt Hospital and of AMC headquarters and the construction of the New North Post Chapel. Moving the hospital will cause approximately 19 acres of mixed hardwood-pine forest to be cleared. Mitigation for this action is to replace the trees with a 2:1 replacement ration. In addition, according to the DeWitt Hospital EA, the project will cause impacts to less than half an acre of wetlands along ephemeral streams, which will be replaced according to the EA. According to the AMC EA, 21 acres (including a mowed grass, a grass shrub strip, 3 acres of a wooded area and scattered landscape trees) will be impacted. All trees will be replaced at a 2:1 replacement ratio. The DTRA EA states that there will be approximately 1.5 acres of impacts to pine forest, which will be replaced on Fort Belvoir. Therefore, after replacement of lost trees and shrubs, and lost wetlands, significant adverse impacts are not expected. The Hospital site and the Chapel site both drain to the western side of the post, while the closest housing village, Lewis Heights, drains to the east and towards Dogue Creek. In addition, no impacts to vegetation or wildlife are expected from the planned reconstruction at Lewis Heights. Removal of vegetation from the combined projects will be compensated for in accordance with the Fort Belvoir Tree Protection Policy and in consultation with the Fort Belvoir Environmental Office. In addition, all sensitive species on Fort Belvoir are protected

under Federal and State laws and will not be impacted during these construction projects. The Army has a policy of no net loss of wetlands; therefore, all potential impacts to wetlands will be compensated. On-site compensation for lost acreage is the most preferable choice, however, compensation may take place off-post in the same watershed if possible. Replacement of lost functionality will be replaced on Fort Belvoir.

Eleven other major projects are in earlier stages of conceptualization and planning and may or may not eventually be implemented, or different plans may be developed:

- **Future Family Housing under RCI:** As part of the process of updating the Master Plan, the Army and Fort Belvoir will continue to attempt to identify additional land that could leased to the RCI partnership for building additional housing, up to the levels identified by the (then-current) housing market analysis. The Army and FBRC will consider the commercial feasibility of constructing additional housing on Fort Belvoir, environmental commitments made by the Army and Fort Belvoir and other relevant information, before determining whether or not to construct any additional housing. The Army will await the updated Master Plan and the Master Plan EIS (expected in 2004) and will perform additional site-specific NEPA analysis as necessary. River Village is a likely candidate site, as it will be depopulated at the end of this project, but the other potential locations for additional housing have not been determined. However, they are likely to be near existing housing villages and community services. Based on the 2001 Housing Market Analysis, up to 998 additional units could be proposed. However, that number could easily change, because another HMA is due in 2006, and also because both available land and commercial feasibility will be factors in deciding how far FBRC should go in attempting to meet the requirement. Timing is also unknown, but a decision to transfer additional land for housing could not be made until 2005 at the earliest. After completing additional NEPA analysis and amending the CDMP and ground lease, construction would be phased over at least 6 years.

- **JPRA Expansion:** Joint Personnel Recovery Agency is currently housed in Building 358. A 1391 is being prepared for an FY08 project to renovate the existing facility and construct an addition to accommodate increased staff and student load (increase of 55 personnel).

- **ATEC Permanent Headquarters** - ATEC proposes to construct a permanent Headquarters building on Fort Belvoir relocating approximately 750 personnel from leased space in Alexandria (potential FY08 project).

- **South Post Fitness Center** - Project to construct a new state of the art physical fitness center on South Post, which will include an indoor pool and indoor jogging track (potential FY09 project).

- **Museum of the US Army:** Proposals have been under consideration for some time to build a museum on Fort Belvoir that would commemorate the Army's history and exploits. The Army does not currently have a central museum. It is anticipated that the museum would receive up to a million visitors a year. The most likely location is an approximately 50-acre site near the southeast corner of US Route 1 and Belvoir Road, but other sites (including a parcel near Pence Gate that was considered and eliminated from this proposed RCI action) are possible. A support facility and storage site is

tentatively located just south of the existing RCI Office, which would be in between the two proposed RCI central construction staging areas (US Army Garrison, July 2002).

- **Building for US Army Intelligence:** The US Army Intelligence Command is planning to build a new office building and parking structure, to accommodate about 800 personnel, near their existing headquarters building on North Post, east of Beulah Road and south of Kingman Road.
- **Improvements to US Rt. 1:** The Virginia Department of Transportation (VDOT) is considering widening US Route 1 through Fort Belvoir and north to the Capital Beltway. This action would require outgrants of land to VDOT by Fort Belvoir and would affect traffic levels near the post. An EA for this project was completed in May 2003. The *FY 2003-2008 Transportation Improvement Program* does not yet include funding for this project.
- **North Post Transportation Study –** As part of Fort Belvoir's on-going process to evaluate options for increasing force security, this study identified transportation alternatives for the North Post to improve security. Examined were north-south roadway alternatives to replace existing Beulah Street and Woodlawn Road, the potential to completely close the North Post to off-site traffic, and improvements to local off-site roads to accommodate traffic redirected around North Post. The impacts of closing old roads and locating new ones would be evaluated in further environmental documentation if any of the plans proposed in the North Post Transportation Study are pursued.
- **Administrative Park Site Evaluation Report –** In this study, completed in May 2000, several sites were investigated for their potential to accommodate an office park with several million square feet of office space. The sites investigated were located in the EPG, on North Post, and the southwest area of the post south of US Route 1 and west of Pohick Road. No decision has been reached about a preferred site or even whether the proposal will go forward into the next phase of study.
- **Renovation of Dogue Creek Marina –** This proposed project would involve dredging Dogue Creek and replacing the existing Marina facilities. No decision has thus far been made about the economic feasibility of this project. As noted in this EA, the Marina will not be included in the ground lease to FBRC. Fort Belvoir will continue to operate the existing Marina until a decision is made about whether and how to pursue renovation. If renovation is not chosen, the Marina could be demolished and replaced by a waterfront park.
- **Soldier Support Center** - Consolidated community service center (1 stop in/out processing). The future of this project is uncertain.

Should another phase of residential housing construction occur under RCI, based upon land identified by the updated Master Plan (estimated completion in 2004) and commercial feasibility, it is possible that this phase of construction could occur concurrently with the proposed action's construction year of highest air quality impact (2007). This would necessitate another evaluation of General Conformity applicability, in addition to New Source review standards.

Impervious surface would be increased. Stormwater impacts would need to be reviewed for cumulative impacts and additional stormwater mitigation would be required, particularly for those subwatersheds where impervious surface is above or nearing the level that can result in impaired streams. Cumulative impacts to vegetation and wildlife are likely. If a rebuilt River Village is one of the proposed new housing sites, cumulative impacts to floodplains are possible.

If up to 988 additional housing units are proposed, that could bring over 3,000 new residents to the installation. Even if the proposal is for considerably less than that, the project would result in cumulative impacts to on-post and off-post traffic, utilities, and demand for community services. Preliminary coordination with FCPS indicates that one or possibly two new elementary schools would be required for up to 998 housing units. If (or when) Dogue Creek Village is redeveloped, unless the housing units are rebuilt on the existing slabs, impacts to active and closed POL sites will require investigation and corrective action. Upon completion of corrective actions, a cumulatively beneficial effect to the environment will result over the long-term, with the removal from Fort Belvoir and/or treatment of POL-contaminated soil.

In addition to construction projects, recent changes in vehicular control at Fort Belvoir have the potential cumulative impacts with any other future activity. Following the 9/11 attack, all roads through the post other than the Fairfax County Parkway, US Route 1, and Backlick Road were closed to public access. Beulah Street at Telegraph Road was subsequently reopened to DoD-registered vehicles. Other changes being considered to ameliorate access problems include opening the Gunston Road overpass and Lieber Gate during peak traffic hours. Personnel from VDOT and Fairfax County are participating in a working group reviewing access control issues on Fort Belvoir's roads and at the gates. When long-term decisions on access are made, they will have an effect on the traffic patterns in and around the post.

4.14 Mitigation Summary

The ground lease is expected to require FBRC to accomplish mitigation measures that will reduce, avoid, or compensate for potentially-significant adverse effects. Army policy requires mitigation measures to be monitored. In addition, certain measures are proposed to further minimize adverse effects where mitigation is not required.

Table 4-39 summarizes the proposed minimization and mitigation measures to be taken for each of the affected resources.

TABLE 4-39
Summary of Mitigation Measures

Aesthetics and Visual Resources

Mitigation for on-post historic viewsheds will be addressed by the Section 106 consultation process. Mitigation for removal of historic and park trees is addressed under Vegetation.

The following measures will further minimize impacts:

- Maintain existing vegetation to screen the view of housing villages from outside the installation, along the boundaries of Lewis Heights Village with Woodlawn Plantation and of River Village

TABLE 4-39
Summary of Mitigation Measures

with Mount Vernon Memorial Highway.

- Develop a landscape planting and maintenance plan in coordination with DPW&L-ENRD that uses native plants and addresses invasive exotic vegetation management.
- Place new utility lines underground within the housing villages. Move those above-ground utility lines that are located on the perimeter of villages and that primarily serve the housing villages underground where practicable.
- Consult Fort Belvoir's Installation Design Guidelines for guidance in design of new structures and landscapes.
- Final design of elements including garages, street benches, street and yard lighting in the historic areas will be in accordance with the Section 106 consultation process.

Air Quality

Due to the phasing of construction activities, annual NOx emissions will be below *de minimis* levels established for the severe ozone non-attainment area. FBRC will document annual usage of NOx – emitting construction equipment throughout the IDP. FBRC will coordinate with DPW&L on tracking the equipment operating hours to remain below *de minimis* levels established for the severe ozone non-attainment area.

The following measures will further minimize impacts:

- FBRC will follow all applicable state regulations with regard to utilization of BACT in selecting and installing new heating unit appliances.
- FBRC will make every effort to further minimize construction equipment emissions.
- Air quality permit conditions provided in any permits obtained by FBRC will become incorporated into the CDMP and implemented
- Spray water on exposed soil, demolition debris and rock crushing debris to control fugitive dust.
- Implement soil erosion and sedimentation control to reduce dust.
- Restrict where vehicles can travel on-site.
- Implement speed controls for construction vehicles and equipment.

TABLE 4-39
Summary of Mitigation Measures

Noise

The following measures will minimize impacts:

- Limit noise-generating construction activities to daylight hours.
- Consult with the Post Industrial Hygienist and coordinate with representatives of sensitive receptors (such as the Chapel, Child Development Center and Hospital) regarding further protective measures if needed.

Geology and Soils

The following measures will minimize impacts:

- Minimize redevelopment of buildings and roads in areas with slopes of 15% or greater in currently developed areas.
- Maintain vegetated buffers in areas currently not developed between impervious areas and the top of slopes of 15 to 25% where practicable.
- Avoid development on slopes greater than 25% within currently undeveloped areas.
- Avoid development of roads and buildings on natural slopes between 15 and 25% (except for an eastern edge perimeter road in New South Post Village traversed in small increments where needed to provide proper connectivity for the residents). A road or a building may encroach on a slope of 15-25% in isolated areas in an increment of no more than 5,000 square feet.
- Use appropriate BMPs (such as silt fences, strawbale dikes, diversion ditches, rip-rap channels, water bars, and water spreaders) to reduce soil erosion and sedimentation.
- Explore the use of retaining walls to minimize grading

Water Resources

Floodplains

There are no significant impacts to the 100-year floodplains, therefore no mitigation is required.

Streams and Resource Protection Areas

- A field delineation of all Waters of the U.S. and a field assessment of stream perenniality will be conducted using the Fairfax County Perennial Stream Field Identification Protocols, in consulation with ENRD
- The site plan will be modified, where practicable, to avoid and minimize impacts to waters of the U.S., including intermittent and perennial stream channels.
- A mitigation plan will be developed, in consultation with the regulators, for any jurisdictional streams that are impacted.
- Mitigation may include restoration and enhancement of stream channels and upland buffers within the impacted subwatershed, and within the installation to the extent practicable, as required by the USACE and VA DEQ.
- Based on the field delineations and stream evaluations, the RPAs will be defined. The site plans will then be modified to ensure consistency with the Fairfax County Chesapeake Bay Preservation Ordinance and Environmental Qualtiy Corridor Policy.
- In addition to the protections provided to the 100-foot RPA buffer by the Fairfax County Chesapeake Bay Preservation Ordinance, vegetated buffers of up to 25 feet from top of bank around intermittent streams, ecologically significant ephemeral streams, and wetlands will be

TABLE 4-39
Summary of Mitigation Measures

maintained to the maximum extent practicable.

Stormwater

Mitigation for the increases in impervious surfaces will be provided through compliance with the Fairfax County Public Facilities Manual, as follows:

- Water quality BMPs (such as infiltration trenches, bioretention, amended soil, infiltration from underground stormwater management, structural BMPs, or retrofits to existing stormwater management facilities) will be provided to achieve all minimum standards in the Fairfax County Public Facilities Manual, to include a 40% reduction in phosphorus concentrations in stormwater runoff.
- Stormwater quantity controls will be provided in all areas where adequate outfall requirements are not met, as required by the Fairfax County PFM.
- Where practicable, infiltration-type stormwater management practices will be implemented, in an attempt to more closely mimic the hydrology of a vegetated site and reduce the impacts of concentrated flows.
- Special attention will be paid to provide the most effective BMPs in any watersheds where impervious surface is nearing the 25% threshold, which can lead to impaired streams. Stormwater runoff from New South Post Village will be specifically targeted for infiltration or additional retention, due to cumulative impacts in subwatershed 03.
- Erosion and sediment controls will be provided, as required in the Fairfax County PFM, to minimize excess erosion and sediment transport during construction. This will include reseeding and revegetating all disturbed areas following construction activities.
- Comply with all requirements of the VPDES General Permit for Construction, to include preparation, in coordination with ENRD, of a Storm Water Pollution Prevention Plan (SWPPP) for all construction activities.
- Comply with any requirements set forth in the Fort Belvoir Stormwater Management Master Plan, developed in compliance with the VPDES General Permit for Municipal Separate Storm Sewer Systems (MS4).

Discharge to Surface Waters

- If a concrete batch plant is utilized, all requirements of the VPDES General Permit for Industrial Facilities will be followed to minimize impacts of any discharge.

TABLE 4-39
Summary of Mitigation Measures

Biological Resources

Vegetation

In order to protect and avoid or minimize impacts to vegetation, the following measures will be taken:

- Conduct a survey for small whorled pogonia (*Isotria medeoloides*), which is federally listed as threatened and state-listed as endangered, in forested or wooded areas in each of the existing housing villages and the proposed new housing village. Avoid impacts to the plant, if identified within the housing footprint or immediately adjacent, by avoiding construction in the area surrounding the plant. Consult with USFWS and the VDCR (VDCR represents the Virginia Department of Agriculture and Consumer Services under an MOA) to discuss appropriate avoidance measures such as minimum protective radius for the plant.
- Conduct a tree survey (by qualified personnel) prior to construction. Assess the species, age, size, and health of each tree. Survey every park tree and tree stand location within the footprint of the existing housing villages and the proposed New South Post Village. Identify drip lines and canopy edges. Identify list of possible trees to save and/or relocate in concert with ENRD. Consider relocation for each new home, garage and road location for opportunities to reduce tree and viewshed impacts. Review impacts on a tree-by-tree and house-by-house basis, prior to completing the final construction site plans, in an attempt to reduce impacts to vegetative communities on Fort Belvoir.
- Limit disturbed areas to the planned housing footprint and a minimal amount of adjacent construction staging areas. Avoid clearing vegetation for construction staging to the extent practicable.
- Employ erosion control practices and tree protection devices at all proposed sites to protect vegetation and habitat areas.
- Preserve, to the extent practicable, the existing road networks in each village in an attempt to preserve existing vegetation such as street trees along the roadways.

In order to compensate for losses to vegetation including mature trees (after taking the above-mentioned actions to minimize losses), the following mitigation measures will be taken:

- Replace historic and park trees and trees that will be removed by construction on Fort Belvoir at a 1:1 ratio for every lost tree over 6 diameter at breast height. All replacement trees planted by FBRC must be approximately 2.5 inch caliper and nursery grown.
- Replant with native trees and shrubs near homes, along streets, in parks, in open spaces, and around the storm water management structures. Plant wet tolerant species in the appropriate storm water management structures such as vegetated swales.

Wildlife

In order to avoid or minimize these impacts, the following protective measures will be taken:

- Prohibit free roaming pets and remove feral cat colonies in order to prevent increased predation upon wild bird and small mammal populations.
- Impacts to wildlife through removal of trees will be compensated by tree replacement elsewhere on Fort Belvoir, as discussed under Vegetation.

Rare, Threatened, and Endangered Species

Potential impacts to rare, threatened, and endangered species are not significant. However, in order to avoid and/or minimize these impacts, the following protective measures will be taken:

- Prevent additional encroachment into bald eagle foraging areas and limit activities in these areas to passive recreational use.

TABLE 4-39
Summary of Mitigation Measures

- Provide proper stormwater management practices, minimize lawn chemical applications, and prohibit discharge of household chemicals into storm drains, in order to prevent potential impacts to downstream riparian wood turtle habitats from stormwater flow.
- Conduct a survey for small whorled pogonia (*Isotria medeoloides*), which is Federally and State-listed as threatened, in forested or wooded areas in each of the existing housing villages and the proposed New South Post Village. Avoid impacts to the plant if identified within the housing footprint or immediately adjacent, by avoiding construction in the area surrounding the plant. Consult with USFWS and the VDCR (VDCR represents the Virginia Department of Agriculture and Consumer Services under an MOA) to discuss appropriate avoidance measures, such as minimum protective radius for the plant.
- Distribute awareness and educational information developed by ENRD to residents and encourage residents to participate in natural resource awareness/training events hosted by ENRD.

Wetlands

Potential impacts to wetlands are not significant. However, in order to avoid and/or minimize these impacts, the following protective measures will be taken:

- Conduct a delineation of Wetlands and other Waters of the United States in each of the existing housing villages, the proposed housing village, and the two construction sites. Have the jurisdictional boundaries approved by the USACE. With a jurisdictional determination.
- Avoid all wetlands to the maximum extent practicable by reviewing site plans and relocating new homes, garages, and roads.

If avoidance is not practicable, the following mitigation measures will be taken:

- Obtain a Section 404 Permit from USACE and Virginia Water Protection Permit from VDEQ. Consult with the USACE and VDEQ regarding mitigation ratios and methods.
- Provide compensation through wetlands creation, enhancement and restoration with a preference for on-post, in-kind mitigation.
- Provide a functional assessment of the wetlands which will be impacted in order to also replace the functionality of these wetlands on Fort Belvoir.

TABLE 4-39
Summary of Mitigation Measures

Cultural Resources

No transfer of historic buildings, leasing of land containing historic resources, construction in the vicinity of historic resources or rehabilitation of historic buildings will occur until the requirements of Section 106 have been met.

Stipulations of the Programmatic Agreement, currently being developed in consultation with the VA SHPO and other consulting parties, will be incorporated into the ground lease. The public will be given adequate notification of the execution of the Programmatic Agreement.

Specific mitigation measures will be determined and implemented prior to commencement of work specifically affecting cultural resources.

Mitigation for the demolition of selected historic houses is expected to include:

- Maintaining two of the L-shaped houses in Park Village
- Performing Historic American Buildings Survey (HABS) documentation prior to removal or substantial alteration of buildings, in coordination with the Fort Belvoir Cultural Resources Manager
- Preparing an Internet-ready, multi-media presentation on the history of Army family housing at Fort Belvoir, in coordination with the Fort Belvoir Cultural Resources Manager.
- Explore the feasibility of deconstructing historic properties that will be removed to facilitate the salvage of reusable components

Mitigation for potential impacts to archeological sites is expected to include:

- Completing archeological surveys to determine the NRHP eligibility of known potentially-eligible resources in the area of potential effect and consultation to determine how to avoid or resolve adverse effects on NRHP-eligible properties that will be affected.
- Including clauses in construction contracts requiring that, if archeological artifacts are unearthed during construction, construction activities in the immediate area will immediately stop. The Fort Belvoir Cultural Resources Manager will be notified and FBRC will make every reasonable effort to ensure that no unauthorized personnel have access to the site and that no further damage is done to the discovery, until Fort Belvoir has complied with 36 CFR 800.13(b) and any other legal requirements.

Socioeconomics and Protection of Children

Potential impacts are not significant and mitigation is not required. The following measures will minimize impacts:

- Environmental justice: Implement measures as necessary to minimize construction traffic, noise and fugitive dust that might affect nearby neighborhoods.
- Protection of Children: Secure construction vehicles and equipment when not in use. Place barriers and "No Trespassing" signs around construction sites where practicable. Avoid the use of building products containing hazardous materials.

TABLE 4-39
Summary of Mitigation Measures

Traffic and Transportation

Potential impacts to traffic are not significant and mitigation is not required. However, in order to minimize impacts, the following measures will be taken:

- Work with the garrison and tenants to address incremental contributions of traffic from this project to existing and future traffic problems.
- Advocate mass transit opportunities by constructing on-post bus shelters and providing links to transit agency websites that provide bus, Metro and carpooling information.
- Establish temporary parking to replace Hospital parking spaces lost to the extension of 12th Street and Dental Clinic overflow parking. Replace South Post Golf Course parking spaces.

Utilities

Potential impacts to utilities are not significant and mitigation is not required. The following measures will minimize impacts:

Potable Water: Capacity serving the existing villages, New South Post Village (including the neighborhood centers, Welcome Center and Recreation Center) is adequate. Potential effects on drinking water quality, pressure, and flow will be evaluated in final engineering. Water-efficient control devices such as low-flow showerheads, faucets, and toilets will be installed in all new facilities.

Wastewater: Capacity serving the existing villages and New South Post Village is adequate. However, a new wastewater pump station onsite and (pending final engineering) an upgraded offsite wastewater pump station is expected to be needed to serve a portion of New South Post Village.

Energy: Consumption is not expected to increase. Capacity serving New South Post Village will be evaluated in final engineering. All new appliances in new and rehabilitated housing units will meet Energy Star energy efficiency standards. Ranges, ovens, water heaters and furnaces installed in new and rehabilitated housing units will use natural gas.

Solid Waste: Explore opportunities to salvage, reuse and recycle demolition materials, including donation of usable appliances to charitable organizations. The proposed stone crusher will recycle brick, stone and concrete as road materials.

Recycling: FBRC will participate in Fort Belvoir's mandatory recycling program in accordance with federal, state and local policies and regulations and will provide information on recyclable items, by weight or by volume removed, to DPW&L on a monthly or quarterly basis.

Hazardous and Toxic Substances

No mitigation is necessary, because compliance with the law will protect the environment. However, the following measures will utilized to minimize impacts:

- Perform sampling, classification and disposal of demolition material in accordance with applicable regulations (VDEQ) and the standards of the appropriate, licensed off-post receiving facility, at the time of demolition and rehabilitation activities.
- Comply with USEPA/ HUD guidelines regarding lead in surface soil, in locations that exceeded the 400 ppm USEPA/ HUD guideline in 1995 and 1997 LBP assessments.
- Avoid disturbing closed petroleum contamination sites where practicable.
- Sample areas where petroleum contamination is known or suspected to exist for appropriate parameters prior to ground disturbance. As applicable, a corrective action plan will be filed with VDEQ.

TABLE 4-39
Summary of Mitigation Measures

- Coordinate construction near active and closed corrective action sites with ENRD.
- Control LBP and ACM during demolition to avoid the potential to contaminate the environment. Construction, demolition, renovation and maintenance work that could affect LBP and ACM will be conducted by licensed and qualified personnel.
- Implement Army-approved Spill Plan to prevent releases.
- Conduct sampling for radon where necessary. As needed, new construction in areas susceptible to radon will include an engineered control (such as subfloor venting or barriers) to minimize or eliminate radon accumulation.

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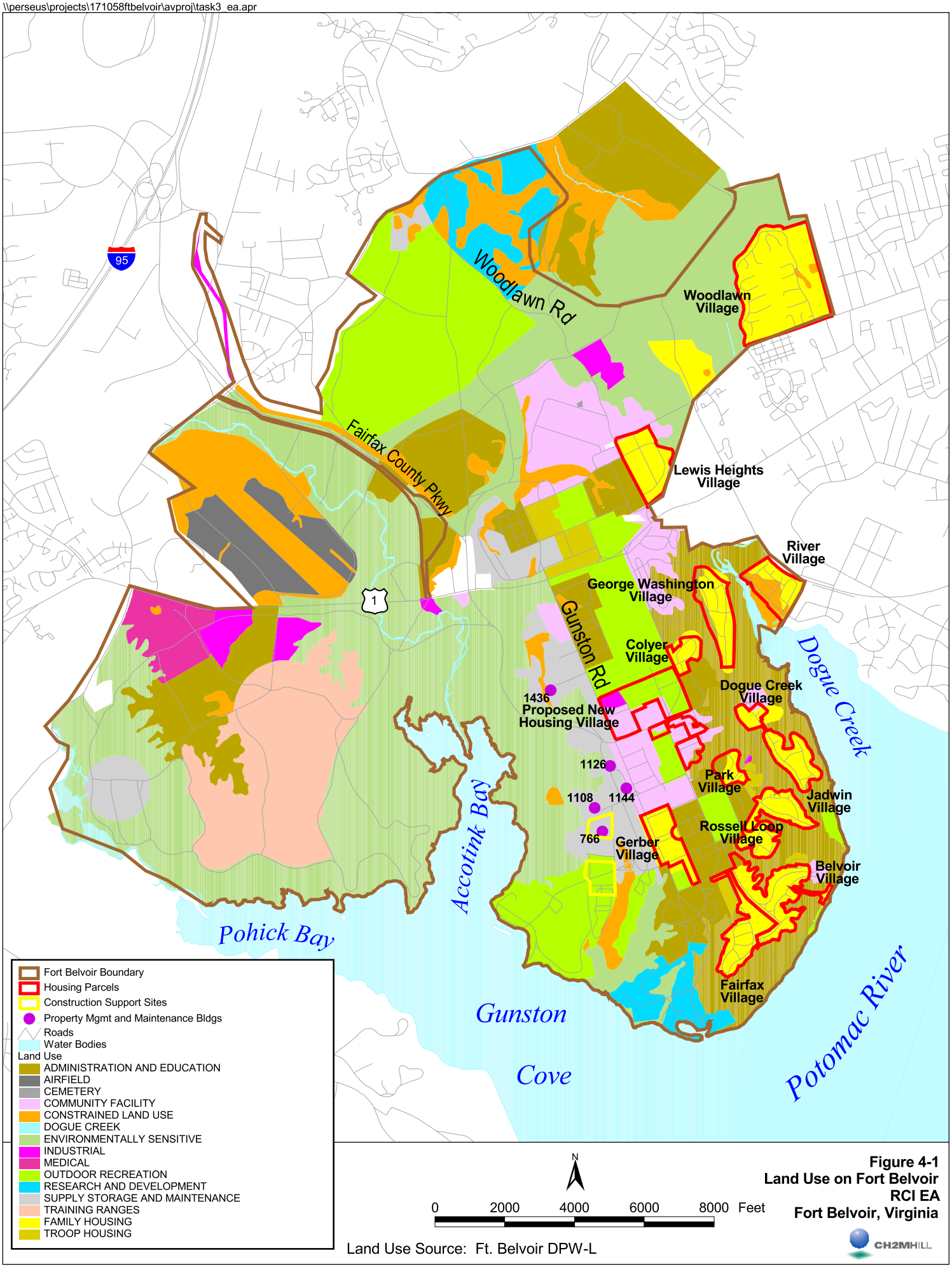

Land Use Source: Ft. Belvoir DPW-L

Figure 4-1
Land Use on Fort Belvoir
RCI EA
Fort Belvoir, Virginia

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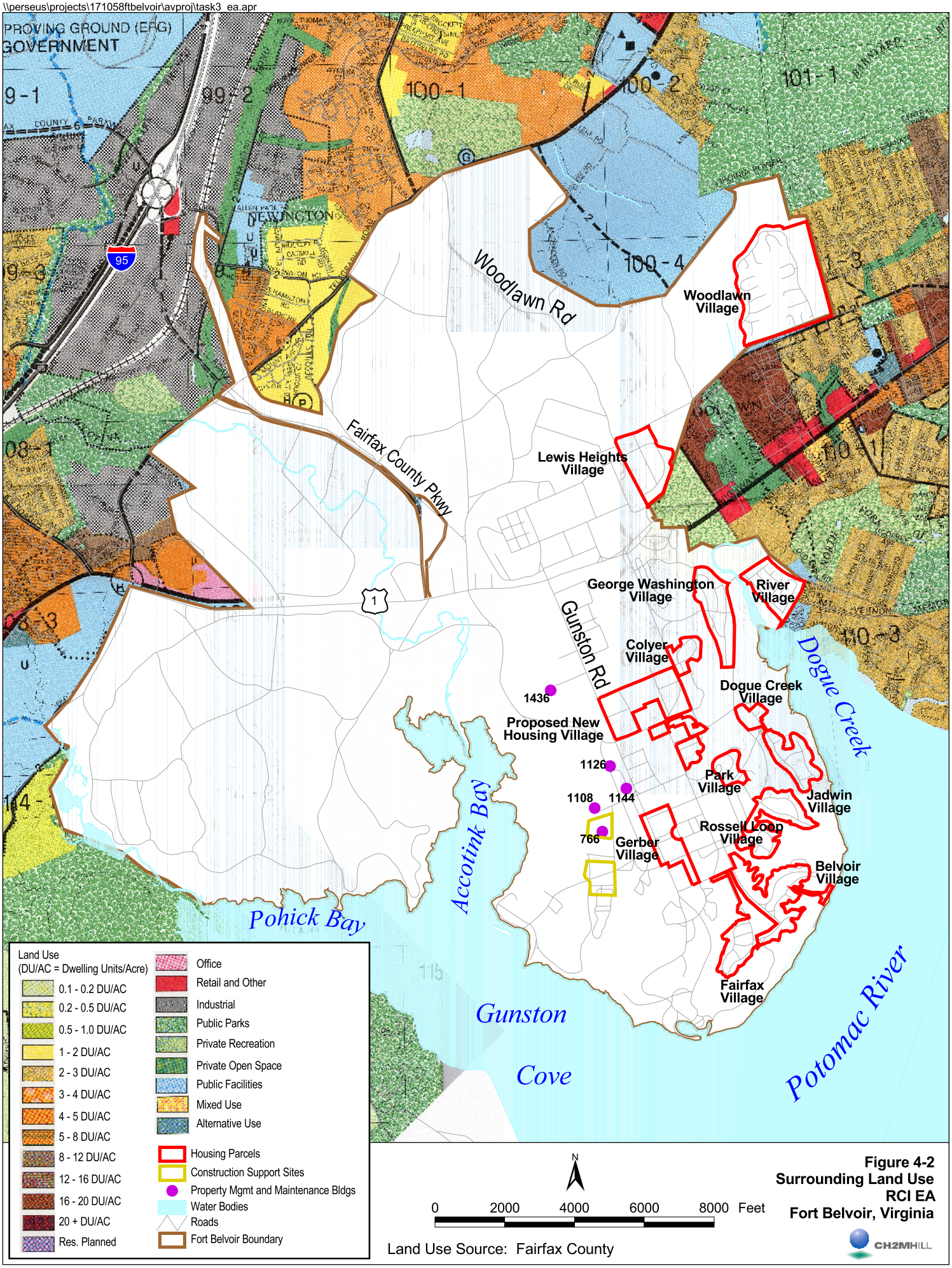

Land Use Source: Fairfax County

Figure 4-2
Surrounding Land Use
RCI EA
Fort Belvoir, Virginia

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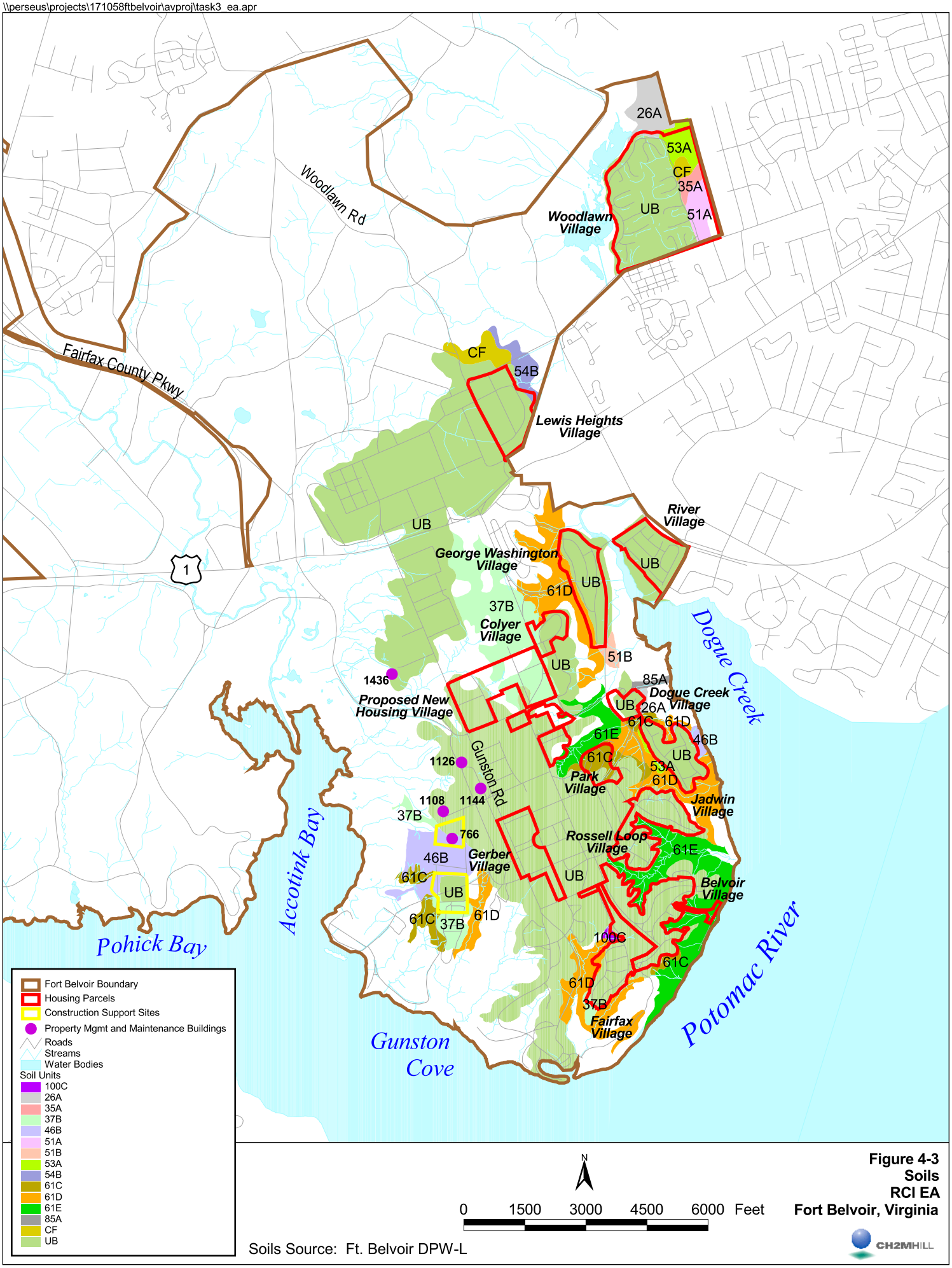
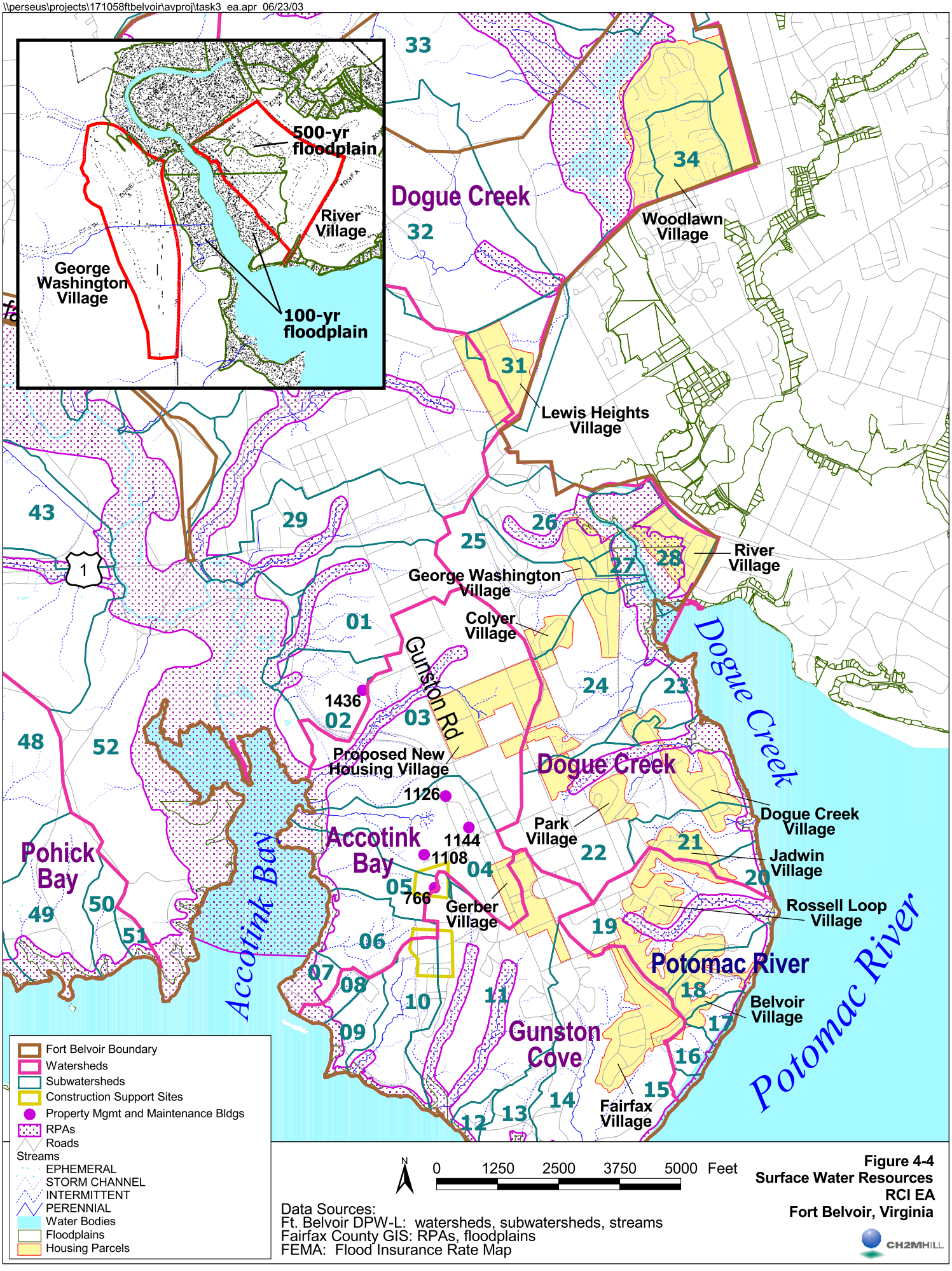


Figure 4-3
Soils
RCI EA
Fort Belvoir, Virginia



Data Sources:
Ft. Belvoir DPW-L: watersheds, subwatersheds, streams
Fairfax County GIS: RPAs, floodplains
FEMA: Flood Insurance Rate Map

Figure 4-4
Surface Water Resources
RCI EA
Fort Belvoir, Virginia

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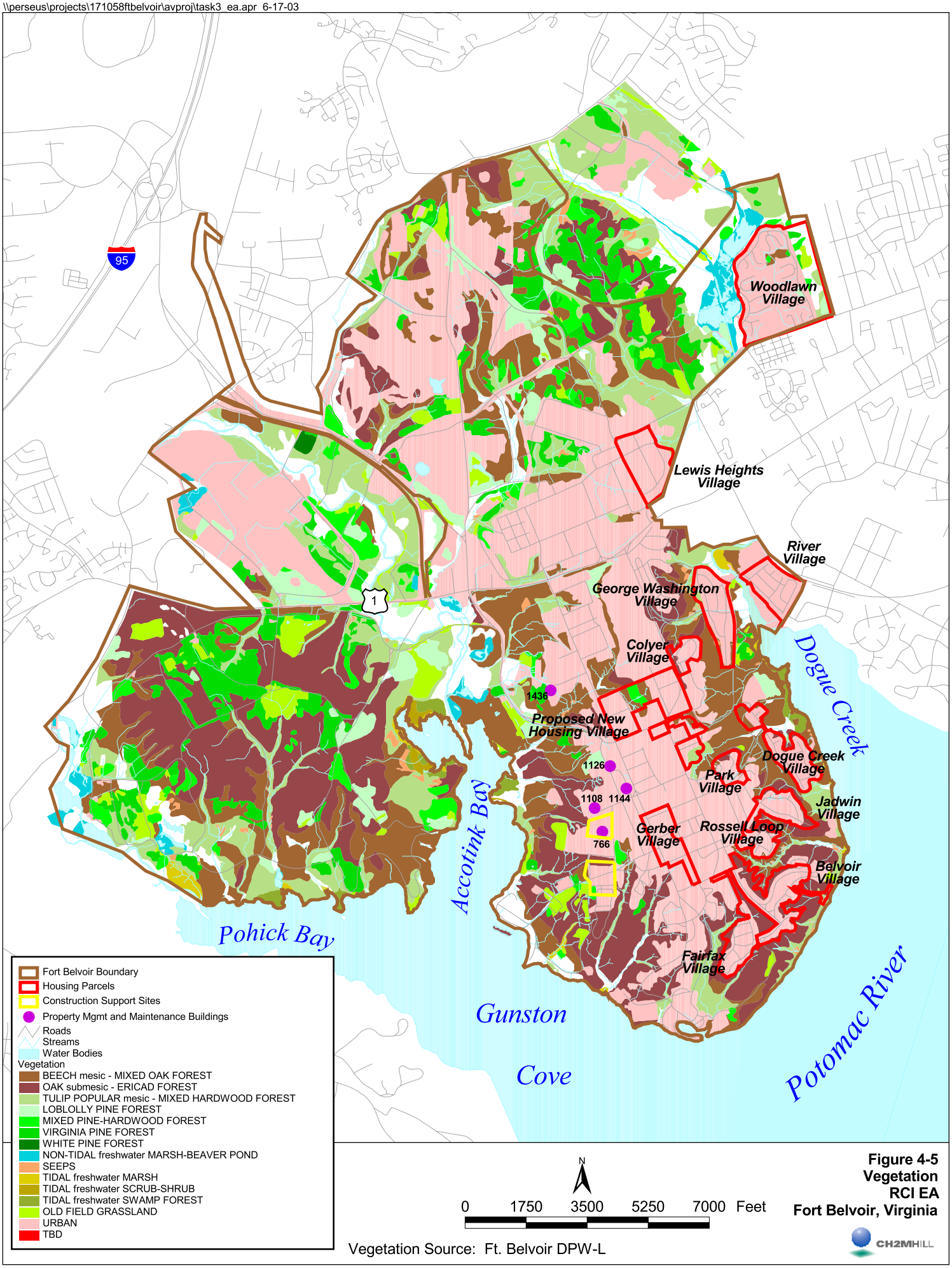

Figure 4-5
Vegetation
RCI EA
Fort Belvoir, Virginia

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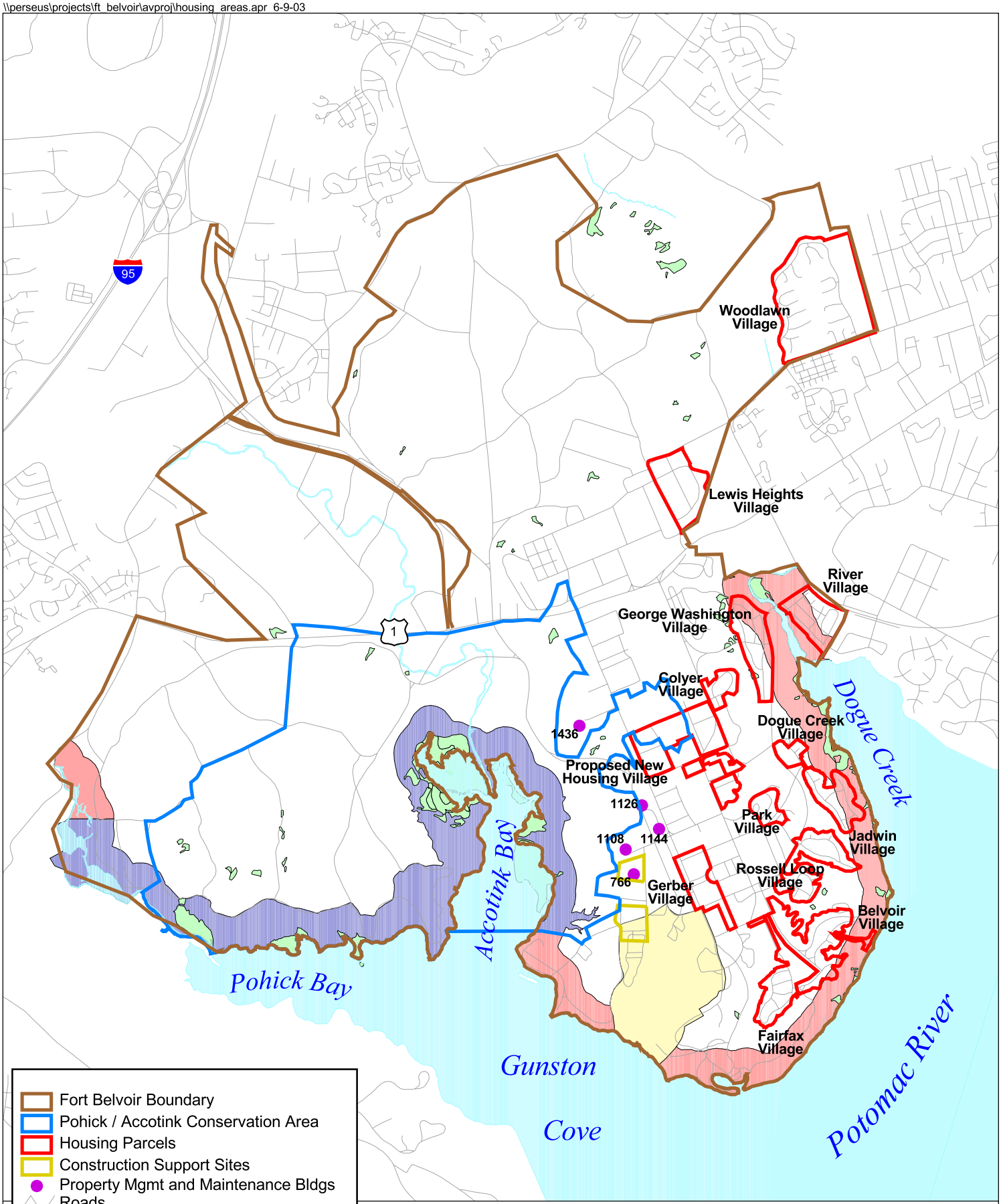

Source: Ft. Belvoir DPW-L

Figure 4-6
Rare, Threatened, and Endangered Species
Fort Belvoir, Virginia

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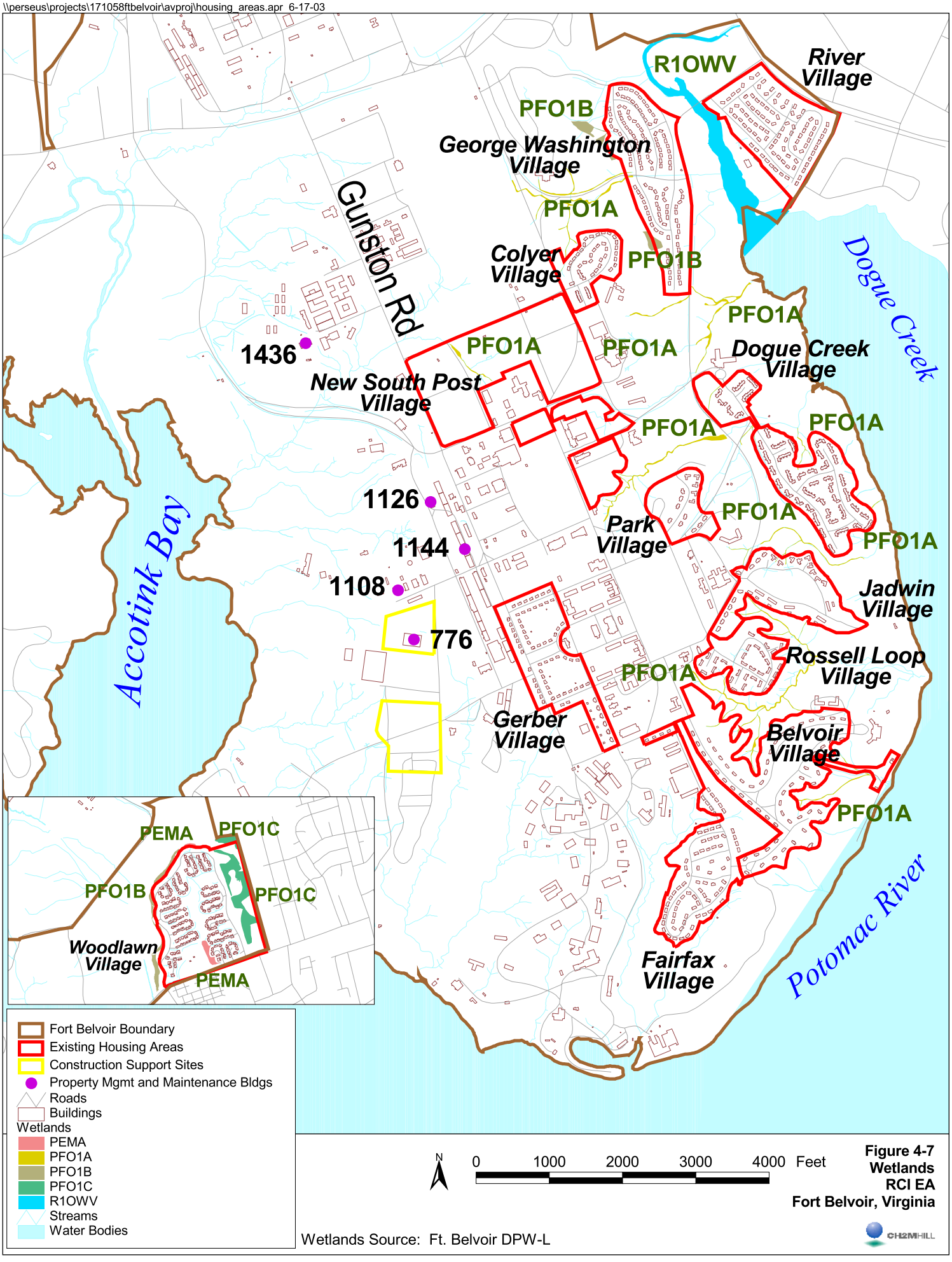

Wetlands Source: Ft. Belvoir DPW-L

Figure 4-7
Wetlands
RCI EA
Fort Belvoir, Virginia

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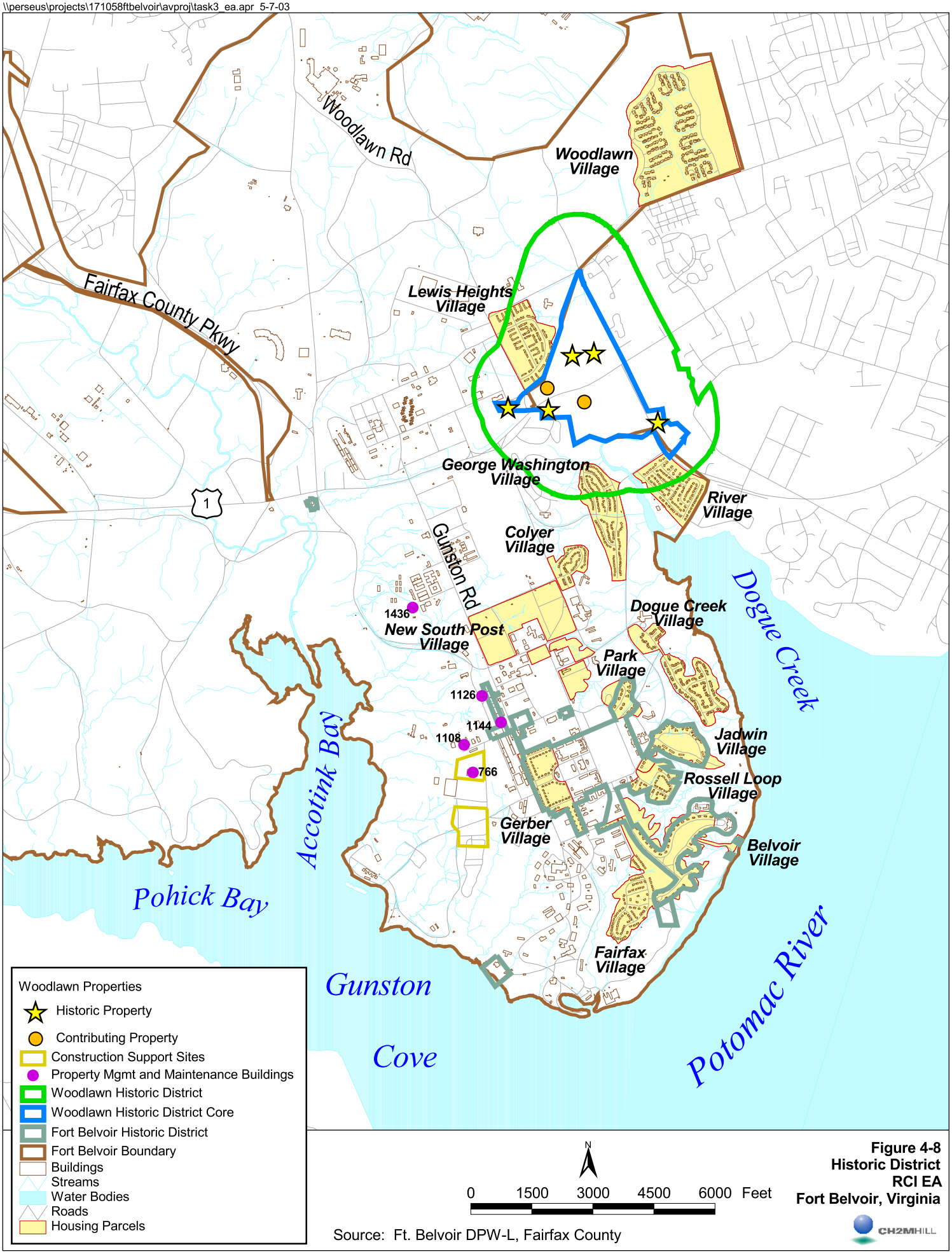

Source: Ft. Belvoir DPW-L, Fairfax County

Figure 4-8
Historic District
RCI EA
Fort Belvoir, Virginia

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95
Fairfax County Pkwy
1
Woodlawn Rd
Beulah St
Kingman Rd
Meeres Rd
Abbott Rd
Goethals Rd
Gunston Rd
Belvoir Rd
Mt. Vernon Rd
Pohick Rd
12th St
18th St
235
Woodlawn Village
Lewis Heights Village
George Washington Village
River Village
Colyer Village
Dogue Creek Village
New South Post Village
Park Village
Jadwin Village
Rossell Loop Village
Gerber Village
Belvoir Village
Fairfax Village
1436
1126
1144
1108
776
Dogue Creek
Accotink Bay
Pohick Bay
Gunston Cove
Potomac River

Study Area Intersections
Fort Belvoir Boundary
Property Mgmt and Maintenance Bldgs
Roads
Buildings
Streams
Water Bodies
Proposed New Housing Areas
Construction Support Sites

N

0 2500 5000 7500 10000 Feet

Source: Ft. Belvoir DPW-L

Figure 4-9
Study Area Intersections
RCI EA
Fort Belvoir, Virginia

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