

### Chapter 3 Affected Environment



*Photo Courtesy of  
National Park Service*



## CHAPTER 3

# Affected Environment

### HISTORIC STRUCTURES

Vancouver Barracks is the location of many historical buildings that encompass the entire history of the U.S. Army presence on the landscape of Fort Vancouver NHS and the VNHR. Twenty historical U.S. Army buildings, constructed between 1904 and 1940, remain within East and South Barracks (Figure 17; Table 10). All of these structures are listed on the NRHP as contributing elements to the VNHR National Historic District.

Most of these historical structures have undergone significant interior remodeling at least once since their original construction, dictated by changes in the use of the building through the years. Two buildings (buildings 733 and 746), were moved into East Barracks from south of the hospital in West Barracks, ahead of Interstate 5 freeway construction in the 1950s. Modifications to buildings include the addition, reconfiguration, and removal of windows, doors, entryways, rooms, staircases, porches, chimneys, fire escapes, roofing, bathrooms, heating and electrical systems, ramps, elevators, and loading docks. As seen in Table 10, all of these structures date from the early to mid-20th century, and are evocative of an Army post between the two World Wars.

The 400 series buildings are located in the South Barracks, and are a mixture of historic and early 1980s architecture. Not listed in Table 10 are buildings 400, 401, 402, 404, and 405, all of which are modern, 1980s-period brick structures, constructed for vehicle maintenance functions, and are not in keeping with the historic nature presented by the other structures in the East and South Barracks. Buildings 410 and 422 are the only remaining 1930s-period structures built specifically to support the efforts of the Civilian Conservation Corps (CCC).

The 700 series buildings are all located in the East Barracks, and mostly represent the activity and support structures that were core to the mission of the troops housed in the barracks. These include a gymnasium, mess houses, offices, repair shops, and storehouses. Pivotal among these is building 721, a large 1904 gymnasium that has also been used as an auditorium and even a mess hall.

The 900 series buildings are all barracks or administrative structures that front the Parade Ground, and are arguably the signature structures remaining in the East and South Barracks (Figure 16). Buildings 987, 989 and 993 are all Infantry Barracks constructed from 1904-1907, whereas building 991 is an Administration/Headquarters structure built in 1906. All of these structures are large and commanding, with colonnaded fenestrations that present the grandeur of early 20th century U.S. Army posts.



Figure 16. Buildings 987, 989, 991, and 993, as they appeared ca. 1920, facing east across the Parade Ground. (Photo courtesy of Oregon Historical Society, OrHi 31534)

**Table 10.** Historical Structures within East and South Barracks (Krafft and Krafft 2010)

Building Number	Historical Use	Date Built	Current Use
410	CCC Automotive Repair Shop	1935	Civil Air Patrol training classrooms, storage
422	Issue and Receiving Warehouse	1935	Offices and storage
704	Warehouse	1935	U.S. Army center, U.S. Army recruiting
721	Gymnasium	1905	Kitchen/banquet facility/gym, fitness center in basement
722	Mess House	1914	Administrative offices
725	Mess House	1914	Administrative offices
728	Finance House	1941	Administrative offices, classrooms
733	Hospital Storehouse	1919	Administrative offices
746	Barracks	1940	Band training building
748	Motor Repair Shop	1919	NPS storage and equipment parking
749	Temporary Storage	1941	storage
750	Temporary Storage	1943	Unoccupied
752	Quartermaster Storehouse	1906	Unoccupied
753	Quartermaster Storehouse	1917	National Guard storage
754	Quartermaster Storehouse	1909	Army Air Force Exchange System store – Shoppette grocery store
786	Quartermaster Workshops	1906	Barber shop, facilities operations office
987	Double Infantry Barracks	1907	Administrative offices
989	Double Infantry Barracks	1904	Administrative offices
991	Administration Building	1906	Administrative offices
993	Double Infantry Barracks	1907	Administrative offices

## CULTURAL LANDSCAPES

The National Park Service defines four cultural landscapes on the VNHR: the reconstructed HBC Fort Vancouver and HBC Village, the Great Meadow area of the HBC Fort Vancouver, the U.S. Army Vancouver Barracks and Parade Ground, and the Mission 66 Park Headquarters and Visitor Center (Figure 17). Of these, elements of both the East and South Barracks are within the U.S. Army Vancouver Barracks/Parade Ground Cultural Landscape, and the HBC Fort Vancouver and HBC Village Cultural Landscape are bounded on the west by the South Barracks.

*Reconstructed Hudson's Bay Company Fort Vancouver and HBC Village.* The South Barracks shares some of the same general characteristics as the East Barracks; however the area has substantially more paved surfaces and its adjacency to Interstate 5 alters both the soundscape and visual atmosphere. Here, patches of lawn are punctuated with trees and shrubs, and most buildings have foundation plantings. In many instances, heavily pruned shrubbery serves to identify the entryway to public buildings. Buildings in this area date from the middle and late 20th century. A portion of the Fort Vancouver Village is within the South Barracks. Formerly the southern entrance to Vancouver Barracks, McLoughlin Road and its 1880s heritage maple, oak and buckhorn tree Allée are surviving landscape features in this area. South Barracks, although highly modified over the years, has the potential to be reconnected to the Village and to add to the interpretation of this cultural landscape.



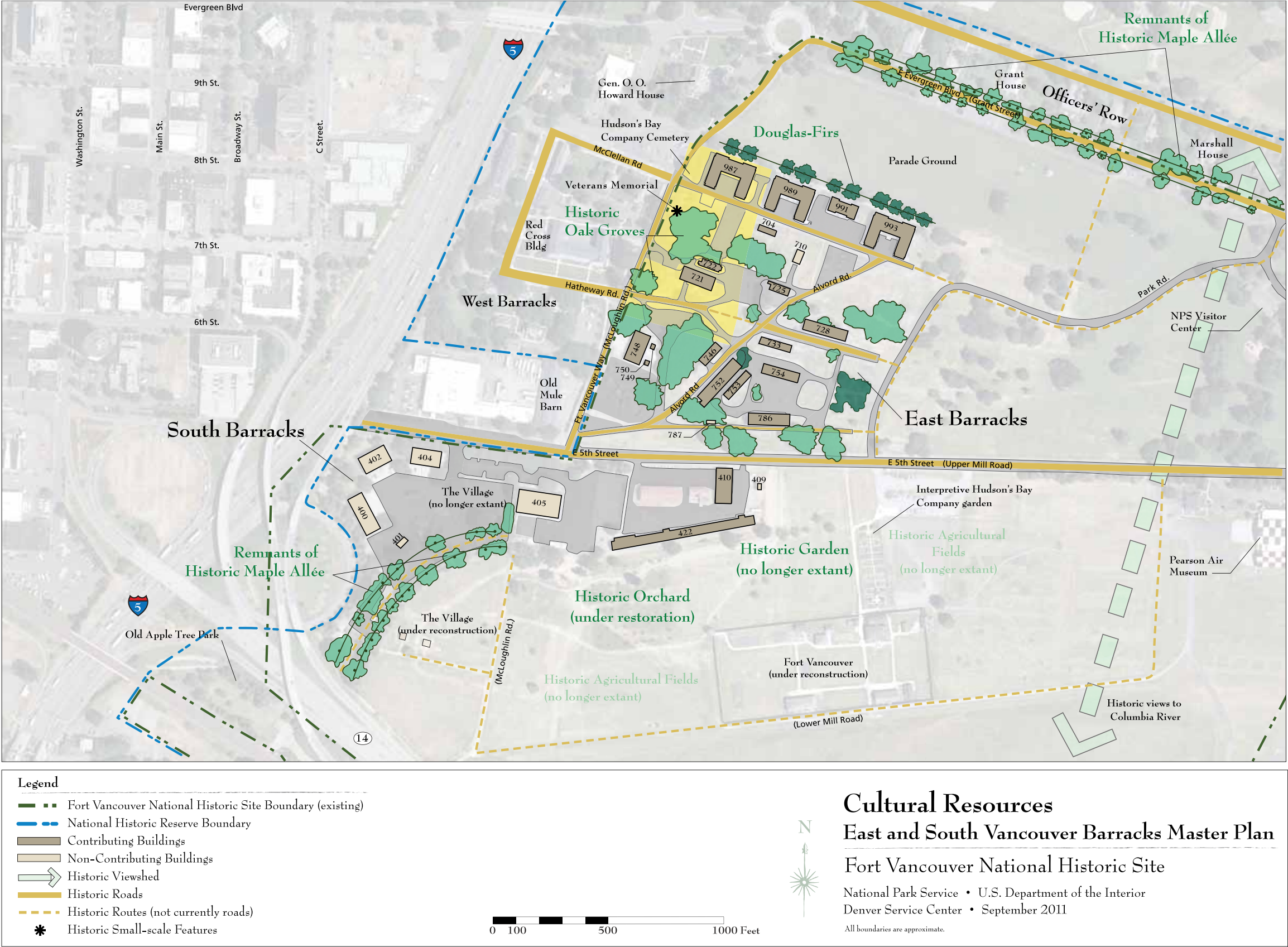


Figure 17. Extant, visible, cultural resources in the East and South Barracks



The cultural landscape related to the HBC has been reconstructed by the National Park Service since 1966, and is bounded by, and visible, from the South Barracks. Fort Vancouver, the heart of HBC operations, was located on a low-lying river plain that was known as Fort Plain, six miles upriver from the confluence of the Columbia and Willamette rivers. During the height of the HBC occupation, more than 20 buildings were present within the Fort. The area around the Fort contained agricultural fields, Gardens, and an Orchard, with the employee Village located to the west. The Village extended from Upper Mill Road (now East 5th Street) to the Columbia River waterfront, and contained as many as 100 houses, sheds, workshops, storehouses, and stables. Reconstructed fence lines define use areas within the Village, and many of the original employee houses probably had fenced kitchen gardens.

The stockade, bastion, and 15 structures have been reconstructed within the Fort. Two reconstructed Village houses and split rail fence lines reflect the historical scale and use of structures within the Village. Other reconstructed landscape features include a recreated Orchard with historical fruit varieties, an interpretive garden (on the historical site of a cultivated field), and historical roads, paths, and fence lines. The Land Bridge interprets the Village pond and reestablishes the connection between the Village area and the Columbia River waterfront.

The road system at Fort Vancouver was related to the transportation needs of a fur-trading post and a large agricultural establishment. Providing access was critical to the success of a remote trading establishment, and early roads and riverfront access became significant landscape features. River Road ran from the St. James Mission to the waterfront on the east side of the Village. This major north/south road that ran from Upper Mill Road, now East 5th Street, through the Village to the waterfront, named McLoughlin Road by the 1880s and lined with trees planted in October 1882, became the south entrance to Vancouver Barracks. Lower Mill Road, an east/west road, has been reconstructed along the south side of the Fort, defined with three-rail fence lines through an entry gate to the Village, where it meets River Road, represented by the decomposed granite-paved Land Bridge Trail. The Land Bridge Trail reconnects the waterfront area by traversing under the BNSF Railway berm, and over SR-14, leading through the reconstructed HBC apple Orchard and connecting to East 5th Street.

*U.S. Army Vancouver Barracks and Parade Ground.* As of the writing of this document, the Cultural Landscape Inventory boundaries for the U.S. Army Vancouver Barracks and Parade Ground only listed the historic U.S. Army Parade Ground. With the impending transfer of the East and South Barracks, the Cultural Landscape Inventory boundary is currently being rewritten and expanded by NPS-Seattle Regional Office staff to include the East Barracks.

A major consideration of the rewritten Cultural Landscape Inventory listing will be the 20 historic structures that are currently in the East and South Barracks. The historic character of these structures evokes the general architectural nature of U.S. Army posts of the between-the-World Wars period (ca. 1918-1941). Fortunately, the exteriors of most of these structures are overall very well preserved, with the only notable modifications being the change of most roofs from original slate tiles to 3-tab asphalt shingles; the removal or addition of loading docks, stairways, and fire escapes; and the relocation/removal/additions of doors and windows. Throughout the U.S. Army's occupation of this landscape, buildings were constructed, demolished, and moved according to the needs of the military. The last major building phase at Vancouver Barracks took place in the late-19th and early-20th centuries. Most of the remaining buildings, and circulation and landscape features, date from this period.

With the growth of the post through time, the U.S. Army created new transportation and circulation routes in the East and South Barracks. This area is divided north/south by McLoughlin Road (now Fort Vancouver Way), which ran north from the Columbia River to Officers' Row and beyond, and east/west by Upper Mill Road (now East 5th Street). Grant Avenue (now Evergreen Boulevard) was the main thoroughfare between the Parade Ground and Officers' Row at the north end of the Barracks. Other roads and circulation features served various portions of the post.

The landscape character in portions of the East Barracks is still suggestive of the vegetation associated with the historical period. For example, during the early years of the HBC at Fort Vancouver, the undeveloped area north of Upper Mill Road (including East Barracks) consisted of Oregon white oak and Douglas-fir trees scattered across a natural prairie in the transition zone between floodplain and forest. Today, relict Oregon white oak, likely descendants of the prehistoric fire-managed prairie landscape, and Douglas-fir trees scattered across the lawns of East Barracks, retain the general character of the historical period (Figures 18 and 19). The stand of Oregon white oak in the East Barracks meets the criteria of a Priority Habitat for conservation and management by the Washington Department of Fish and Wildlife (Larsen and Morgan 1998).

Over the course of U.S. Army development at the Vancouver Barracks, vegetation was planted to create formal areas (with rows of trees or expanses of lawn), and private, residential yards (lawn delineated by trimmed hedges and shrubs), and existing native oak trees were retained and incorporated into the landscape design of the area.

In the East Barracks, vegetation is characterized by substantial expanses of lawn between concrete sidewalks and buildings, a grove of native oak trees, and foundation plantings around



Figure 18. View of buildings 991 and 989, across the Parade Ground, facing south. (National Park Service)





Figure 19. View of one of the Oregon white oak groves in the East Barracks, with buildings 989, 991, and 993 in the background, facing northeast. (National Park Service)

the buildings. The buildings are interspersed with relict groves of native Oregon white oak and Douglas-fir that evoke the original transitional zone between floodplain and forest. Features in this area that overlapped with the HBC occupation include the St. James Mission and HBC Cemetery. The ages of the individual trees is not known, but historic records indicate that a grove of oaks has been in the location since the HBC era. An HBC post physician, William Tolmie, recorded the HBC Cemetery in 1833 as being located near “a pretty grove of young oaks & other trees” (Tolmie, correspondence May 1833). It is likely that the existing oaks are descendents of trees that were in this area in the 19th century and retain an important characteristic of the historic landscape that may have resulted from Chinook Indian seasonal burnings of the Fort Plain area.

Foundation plantings around the buildings include varieties of camellia, hydrangea, lilac and spirea, many of which are pruned to a globe form, typical of late 1800s/early 1900s military landscapes. Trees and shrubs lining the concrete walks and in lawns (English holly and spruce trees), may date to the historic period.

### Visual Resources

Closely tied to the cultural landscape of the East and South Barracks are the visual resources available in the area. The East and South Barracks is located along the westernmost area of the VNHR, itself a primary visual resource of the Portland/Vancouver metro area. In general, the VNHR is characterized by an open plain overlooked by a series of lightly forested terraced hills, narrow roadways, the reconstructed HBC Fort Vancouver and military structures associated with the Vancouver Barracks.

The East and South Barracks is visible from a variety of locations including several roadways—Evergreen Boulevard, East 5th Street, and Fort Vancouver Way. The Fort can also be viewed from open space locations such as the Parade Ground and the Great Meadow, as well as from the pedestrian and bicycle trails in the general study area—the Land Bridge and the Spruce Mill Trails. It is also visible from other park facilities, including the reconstructed HBC Fort Vancouver, the partially reconstructed HBC Village, and the VNHR Visitor Center.

The East and South Barracks is situated at the base of a gentle south-facing slope offering panoramic views from many areas to Mt. Hood to the southeast. The Parade Ground presents an open expanse to the north which is also fronted by the historic Officers' Row and the historic maple, oak, and buckhorn tree Allée along Evergreen Boulevard. The natural landform of the East and South Barracks site is a gentle grade paralleling the distant Columbia River shore which influenced the fort's architectural design and transportation patterns. Indeed, most structures are oriented along a series of stepped terraces parallel to the natural slope.

Current views of the East Barracks landscape reveal its original organization dating to the turn of the 20th century-period construction—an organization plan revolving around the central Parade Ground with the main barracks (buildings 987, 989, and 993) and administration (building 991) buildings bordering it. This plan was further enhanced during this period by the construction of support structures, such as mess halls, storehouses, and a gymnasium down slope from the Parade Ground, barracks and administration buildings.

The views of the South Barracks landscape are less aesthetically pleasing, and reflect the 1980s-period modifications that resulted from the upgrades to the Interstate 5 and State Route 14 highways. The western portion of the South Barracks has a predominant rise in topography resulting from the importation of fill soils to protect significant archeological deposits associated with the HBC Village and U.S. Army Quartermaster's Depot. The original ground level is demonstrated by small "tree wells" that were placed to protect 1880s-period trees that formed the historic McLoughlin Road maple, oak and buckhorn tree Allée. The area is also predominantly paved, and the four large maintenance structures (buildings 400, 402, 404, and 405) are all two-story, red brick, flat roofed structures that are in architectural opposition to the historic structures in the East Barracks.

## **ARCHEOLOGICAL RESOURCES**

The East and South Barracks are components of the NRHP-listed VNHR National Historic District, where as a result of over 60 years of archeological investigations more than two million artifacts have been recovered and curated on site at Fort Vancouver NHS, and scores of scholarly archeological reports have been produced and archived. The above ground features of the Fort, Village, and early U.S. Army post have disappeared, leaving behind the richest historical archeological site in the Pacific Northwest. Since its establishment as a monument in 1948, NPS professionals and scholars alike have understood the importance of the *in situ* archeological resources of Fort Vancouver, including foundations, features, and artifacts. The historical documentation of the HBC in the Pacific Northwest has continually been strengthened and enhanced by the analysis of the data and artifacts from excavations at Fort Vancouver. As a result of these archeological investigations, the interpretive theme at the park is as much a celebration of the archeological resources of the Fort area as it is the story of the HBC and the U.S. Army.

Although a large percentage of the VNHR has been systematically surveyed for the presence and absence of significant sub-surface archeological deposits, most of the East Barracks, and some of the South Barracks remains unsurveyed. As of September 30, 2009, approximately 55% of the 366 acres within the VNHR had been adequately surveyed for subsurface archeological resources.

The remaining lands within the authorized boundary of the VNHR, including East and South Barracks, will be surveyed. Fort Vancouver NHS staff will use geophysical and other types of remote sensing, and subsurface shovel probes and shovel tests, to determine the presence and extent of subsurface cultural deposits. This will help to determine their integrity and whether they are likely to contribute to the significance of the VNHR National Historic District.

*South Barracks and Fort Vancouver Village.* Much of the South Barracks area is located on what was once a portion of the HBC Fort Vancouver Village, extending west of the Fort stockade. Archeological deposits associated with the Village currently exist throughout this area. The first archeological study in the Village was conducted in 1968 and the data and artifacts resulting from these and subsequent excavations have provided important information on the life, culture, and culture change of this ethnically diverse community.

Extensive archeological testing completed by WSDOT contractual archaeologists in the HBC Village, along the right of way of State Route 14 and Interstate 5, occurred from 1974-1981. These excavations revealed significant archeological deposits associated with several HBC Village households; a HBC contagion hospital, boatsheds and workshops; structures associated with the 19th century U.S. Army Quartermaster's Depot; and the discovery of a historical pond used as a refuse dump by both the HBC and the U.S. Army. HBC Village artifacts and features were observed underlying early U.S. Army deposits throughout the Depot area and in the South Barracks. Archeological resources that were not fully excavated in the South Barracks were left in the ground and protected under a meter of imported fill.

In 2009, NPS archaeologists conducted test excavations on the west and south portions of South Barracks for the CRC, the proposed new Columbia River Interstate 5 bridge project. Archeological resources discovered included two buildings associated with the early U.S. Army Quartermaster's Depot, the historical McLoughlin Road and Maple Allée, and three HBC Village houses with associated between-house features. Most of these resources were protected under a meter of imported fill deposited after the construction of four new U.S. Army buildings in the 1980s.

*East Barracks.* Limited archeological investigations have been carried out within East Barracks, north of East 5th Street and east of Fort Vancouver Way. Few buildings have been demolished and only one new building has been constructed since WWII, so the historical setting remains largely unchanged over the last 50 years.

In 1987, the U.S. Army conducted archeological testing near the intersection of Alvord and McClellan roads for the proposed construction of a residence. A magnetometer survey and test excavations yielded the remains and foundation of an 1885 infantry barracks (building 710, demolished in 1955), an 1887 privy (related to building 55, demolished in the 1930s), and possibly a second privy. Because of the archeological resources, the proposed structure was not built. A new arms storage facility, building 710, was constructed nearby to the west in 1978, apparently without additional archeological testing. It lies within the footprint of an 1885 infantry barracks, building 35.

*The HBC Cemetery.* In the early 2000s, the U.S. Army and the National Park Service sponsored a joint project to study and better define the boundaries of the HBC Cemetery, located within East Barracks. In 2001, a cartographic contractor used historical maps and drawings of the Cemetery to estimate the boundaries. Geophysical remote sensing surveys were conducted in the Cemetery area using a magnetometer and ground-penetrating radar. The magnetic survey was conducted in 2002, and the ground-penetrating radar survey was conducted in 2003. This remote sensing work identified some subsurface anomalies associated with possible gravesites, and many anomalies

associated with later U.S. Army disturbance of the site, including trenches and pipelines. The cartographic analysis helped define the probable extent of the HBC Cemetery. These studies have provided a means to better manage and protect the historical HBC Cemetery.

According to historic records, human remains and coffin parts were encountered in the HBC Cemetery area in the East Barracks during excavations for a now non-extant new building in 1885, and during work in the basement of the Gymnasium/Auditorium (building 721) in 1982. There is no information as to the disposition of the remains from the 1885 event, and the remains discovered in 1982 were reburied *in situ* in 1993. An inadvertent discovery of human remains occurred during archeological monitoring of construction activities on the corner of Fort Vancouver Way and Hatheway Street related to the updating of infrastructure at the West Barracks in 2004. Through a NAGPRA consortium, these remains were reinterred in a location within the identified boundaries of the HBC Cemetery, to the southeast of the Clark County War Veterans Memorial.

## MUSEUM COLLECTIONS

Archeological excavations over the last 60 years at Fort Vancouver NHS have created a vast collection of artifacts unparalleled at any other HBC site. The collection also encompasses many artifacts of U.S. Army origin; objects that help interpret Vancouver Barracks and early military life in the area. Currently, Fort Vancouver curates more than two million objects. The collection, which includes artifacts from other northwest National Park Service HBC sites – Fort Colville at Lake Roosevelt National Recreation Area, Whitman Mission NHS's Fort Nez Percés, and Bellevue Farm at San Juan Island National Historical Park, represents the largest recovered HBC fur-trade period artifact collection in the world.

In 1995, the entire collection was moved into the reconstructed Fur Store building inside the reconstructed Fort stockade. This facility has provided an adequate storage and climate controlled system for the collections, and it has also been a rich resource for research and interpretation of the many cultures that helped shape the modern northwest community. The Fort Vancouver NHS museum collection also includes over 4,000 historical objects, many of which are used as furnishings in the interpretive spaces of reconstructed buildings. The preservation, management, and interpretation of these collections continue to be one of the most important cultural resource issues at the park. Representing the original fabric of Fort Vancouver and Vancouver Barracks and providing insight into the lives of its occupants, the collections are an internationally significant resource.

However, the curation space in the Fur Store facility is currently at capacity. Increased space is needed to fulfill the park's critical function not only as a repository, but also as a research and education center. As one of the recommendations in the *Fort Vancouver National Historic Site Museum Management Plan Addendum* (2010a), it is expected that building 405 in South Barracks will be developed into a new curation facility. In addition to serving the archeological collection that is already housed at Fort Vancouver, the National Park Service is recommending that archeological collections from around the Pacific West Region be consolidated at this new facility. At the time of this *Environmental Assessment*, some NPS parks from the Pacific West Region have expressed potential interest in using the facility for their museum collections in support of sustainability, shared efficiencies and better service to the public through co-location of these facilities. In addition, the National Park Service is in negotiations with the CRC, a bi-state commission for the construction of a new Interstate 5 bridge over the Columbia River, to curate all archeological collections from the state of Washington produced through archeological research necessary to build the new bridge. Fort Vancouver is working with the U.S. Army



Reserve and key community members to ensure that significant historical records and objects from Vancouver Barracks are preserved in the NPS museum program.

*Archives and Library.* The park research library, available for use by staff, volunteers, and the public, is currently located in the Fur Store collections and curation facility. Part of the museum collection includes archival collections with historical documents, maps and images, books and periodicals, and microfilm of Fort Vancouver records from the HBC archives. The collection also contains the papers of NPS historian John Hussey, who conducted seminal historical research on Fort Vancouver, and field records from over 60 years of archeological excavations. Archival materials cover the full range of history of the VNHR, from the American Indian pre-contact era, through the HBC, to the U.S. Army and modern National Park Service occupations.

*Northwest Cultural Resources Institute.* The Northwest Cultural Resources Institute (NCRI) is a cooperative partnership based at Fort Vancouver NHS, dedicated to facilitating research and educational activities relating to the cultural resources of the area. This partnership-based institute includes the National Park Service, Portland State University, and Washington State University Vancouver. The foundations of the NCRI include the archeological collections, the archeological resources remaining *in situ*, and the extant historical architecture of Fort Vancouver NHS and the VNHR. These cultural resources form an unparalleled opportunity for researchers, students, and members of the public to study within the fields of archeology, history, museum studies, preservation and conservation, and historical architecture.

Through place-based learning and working on the VNHR itself, participants have the opportunity to integrate their research topics with larger physical and social contexts. The mission of this vibrant partnership is accomplished through archeological excavations and field schools, analysis of collections and archives, recording of oral histories, development of digital educational tools, the fostering and publication of research papers, lectures and demonstrations on related topics, programs that highlight the cultural resources professions, and public outreach. This mission will be furthered through the creation of new and larger curation and learning space in building 405 in the South Barracks, when it is converted to a new curation space.

## CLIMATE CHANGE AND AIR QUALITY

As there are no direct climate and air quality data for the East and South Barracks, data from the City of Vancouver and Clark County are used for their interpretive value. The City of Vancouver and Clark County have mild wet winters and warm dry summers, with an average rainfall of 41.9 inches, snowfall of 6.5 inches, and a growing season of 218 days. Approximately 80% to 85% of the precipitation occurs in the months of October through May. Fog is common during the spring and fall months. Seasons are distinct, yet temperatures are not severe. Summer temperatures of 80° and 90° Fahrenheit are common (especially within the last 20 years), while temperatures frequently fall below 30° Fahrenheit in winter.

Prevailing winds during the summer are from the northwest averaging eight to nine miles per hour (mph). Prevailing winter winds are from the southeast, with an average velocity of eight mph. However, high winds do occur, and during the fall, winds from the southwest can exceed 60 mph on occasion. The highest recorded wind was on October 12, 1962, at 106 mph.

*Climate Change.* Climate change presents significant risks and challenges to the National Park Service. In 2009, a joint National Park Service and EPA Climate Friendly Parks workshop (National Park Service 2010c) was conducted to develop plans to reduce greenhouse gases and criteria air pollutants through the climate friendly management of park operations, and increased outreach and education efforts.

Scientists cannot predict with certainty the severity of climate change or its impacts. Average global surface temperatures have increased about 1.1° Fahrenheit since the late 19th century, and the 10 warmest years of the 20th century all occurred within the last 15 years. The single leading cause of this warming is the buildup of greenhouse gases in the atmosphere – primarily carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and water vapor – which are produced by the combustion of fossil fuels and the decomposition of organic matter, and which trap heat that otherwise would be released into space. The continued addition of greenhouse gases to the atmosphere will raise the earth's average temperature more rapidly in the next century; a global average warming of 4-7° Fahrenheit by the year 2100 is considered likely.

Fort Vancouver NHS committed to a set of actions to reduce energy, transportation, and waste greenhouse gas emissions from park operations to 24% below 2007 levels by 2016; and to preserve to the highest degree possible the park's natural and cultural resources and infrastructure from the impacts of climate change. A reduction in overall park emissions to 35% below 2007 levels – which includes emissions from visitor use of the park – will be achieved by 2016.

Current measures taken to achieve these goals included conducting an emission inventory, setting emission reduction goals, developing an action plan, and committing to educate park staff, visitors, and community members about climate change. Fort Vancouver NHS provides a model within the National Park Service to mitigate its impact on climate change.

*Air Quality.* Air pollutants of concern in Vancouver are similar to those of other urban areas and include carbon monoxide, ozone, fine particulate matter (PM) less than 10 micrometers in diameter (PM<sub>10</sub>), fine PM less than 2.5 micrometers in diameter (PM<sub>2.5</sub>), nitrogen dioxide, sulfur dioxide, and lead. The City of Vancouver, and therefore the area including the East and South Barracks, is currently meeting, or in “attainment” with, the National Ambient Air Quality Standards (NAAQS) for all seven air pollutants.

Current air quality monitoring in the Vancouver area includes a PM<sub>2.5</sub> monitor at East 82nd and 4th Plain Boulevard, approximately 5.3 miles from the park, and an ozone monitor at Mountain View High School, approximately 7.5 miles from the park. Historically, carbon monoxide was monitored at Fourth Plain Boulevard and East Reserve, approximately 1 mile from Fort Vancouver NHS.

A Southwest Clean Air Agency 2008 Annual Report, Washington State Department of Ecology 2010 Ambient Air Monitoring Network Report (Washington Department of Ecology 2010a), and Washington State Department of Ecology 2010 Ambient Air Monitoring Network Assessment Report (Washington Department of Ecology 2010b) provide the following information about air quality in the Vancouver area.

In 1987, the EPA determined that the Portland-Vancouver Interstate Air Quality Management Area (AQMA) was in nonattainment for carbon monoxide. The major source of carbon monoxide is the incomplete combustion of fossil fuels, and sources include woodstoves, outdoor burning, and industrial boilers. Because of success in reducing carbon monoxide levels, the Portland-Vancouver AQMA was declared in attainment of the carbon monoxide NAAQS in 1996. Carbon monoxide monitoring was discontinued in Vancouver in 2006.

Ozone is a secondary pollution that is formed when nitrogen oxides and volatile organic compounds released by automobiles and other sources react in the atmosphere. The reaction is driven by heat and sunlight, so ozone is primarily a concern in the summer. The ozone trend in the Portland-Vancouver AQMA has shown overall improvement in the last ten years. In 1997, the Portland-Vancouver AQMA was designated in attainment with the one-hour ozone NAAQS of

120 ppb (parts per billion). In 2004, the Portland-Vancouver AQMA was designated in attainment for the revised 8-hour ozone NAAQS of 75 ppb. If EPA issues a more stringent ozone NAAQS of 60-70 ppb as anticipated in the near future, the Portland-Vancouver AQMA may become nonattainment for ozone. A nonattainment designation would require local and state air quality agencies to develop a plan to bring the area back into compliance with air quality standards.

Particulate matter is predominantly a wintertime pollutant, coming primarily from smoke associated with woodstoves and fireplaces. Most PM pollution events are short in duration and are most often associated with wintertime stagnation. Although the Portland-Vancouver AQMA is currently in attainment with PM standards, on a number of days during 2007-2009, PM concentrations were elevated.

The East and South Barracks are within proximity to Pearson Field Airport, a municipal airport. Air quality impacts associated with the airport have not been monitored, and so are unknown.

## **VISITOR EXPERIENCE**

As previously mentioned, the East and South Barracks is part of Fort Vancouver NHS. Fort Vancouver NHS is one of the most visited park settings in the greater Portland-Vancouver metro area, with annual visitation of approximately 1 million.

The national park lands surrounding the East and South Barracks are unique not only in their diversity and quantity of cultural and natural features, but also in their proximity to a major urban population that has regional status as a tourist destination. This makes the East and South Barracks and surrounding park land's resources and recreational opportunities readily accessible to a large number of people, and enhances the importance of the special qualities for which it was set aside. Park visitors can be local residents who have the park as part of their "backyard" as well as visitors from all over the world who have traveled to the Portland/Vancouver metro area to see many different attractions, including the national park, as part of their visit.

The East Barracks provides some limited passive recreational activities such as picnicking, walking, running, dog walking, and biking. But visitors are generally discouraged from entering the Barracks. There is only one NPS interpretive wayside, which honors the first Post Exchange, in the East Barracks. In general, the lack of amenities and placement of jersey barriers for security in East Barracks does not create a welcoming visitor experience.

The South Barracks is currently not accessible to the public as it is surrounded by fencing. In the South Barracks, visitors are restricted to the roads and sidewalks, and there is no NPS interpretive signage or other amenities. There are no NPS-sponsored interpretive or permitted events in the East or South Barracks.

Within the other areas of the Fort Vancouver NHS, the National Park Service provides a variety of visitor services such as guided ranger tours, campfire programs, lantern tours, an audio tour, historic weapons programs, and cultural demonstrations with a living history component. In addition to the NPS seasonal ranger-led tours of the reconstructed fort and environs, there are also living history-based special events revolving around the history of both the HBC and the U.S. Army, and educational programs to over 20,000 fourth and fifth graders every year. Wayside exhibits tell the history of the U.S. Army throughout the VNHR.

Special events at the park draw tens of thousands of additional visitors, including the annual Independence Day fireworks event managed by the Fort Vancouver National Trust (averages over 40,000 visitors), and the annual Campfires and Candlelight living history event managed by the National Park Service (averages over 5,000 visitors). The Fort Vancouver NHS is also available

for private events and functions that require special use permits (weddings, receptions, organized events, etc.). Between 2009 and 2010, 130 such events meeting the permit threshold were held (an average of 65 per year) in the park. These events brought a combined 116,979 people to the park over the two year span. On average, the highest numbers of special use permits are issued in July and October (an average of 10). November, December, and January are the lowest use months for special permits, with one event per month on average. Note that these figures do not include events occurring at Pearson Air Museum complex, which is part of the Fort Vancouver NHS.

At 366 acres, the sites and features of the VNHR can be easily reached from the East and South Barracks. There are trails in the area, such as the Land Bridge Trail and the City of Vancouver's Discovery trails that lead to the Barracks. The Visitor Center is east of the Barracks, on the eastern edge of the historic Parade Ground. It is open daily from 9:00 AM to 5:00 PM in the spring and summer, and 9:00 AM to 4:00 PM in the fall and winter, and offers exhibits on the history of HBC Fort Vancouver, as well as a gift shop.

From the Visitor Center, visitors can access Fort Vancouver, a reconstructed 1845-period Fort stockade, by driving along the park road, or by walking the 300 yards to the Fort. Programs within the Fort interpret HBC activities, including the fur trade, lumbering, milling, blacksmithing, coopering, shipbuilding, salmon preserving, and agriculture.

Other visitor attractions near the Barracks include the HBC employee Village, which is located west of the reconstructed Fort and adjacent to the South Barracks. Visitors can access this area from Lower Mill Road on the south side of the Fort stockade, by a paved trail from East 5th Street that follows a portion of the historical River Road within the Village, and from the Land Bridge Trail. The National Park Service also owns approximately nine acres of shoreline on the Columbia River. Visitors can also access the Fort Vancouver waterfront. Pedestrians and cyclists can also travel between the Fort area and the waterfront along a 0.6-mile paved trail from East 5th Street, adjacent to East and South Barracks, through the Fort Vancouver Village, and onto the Land Bridge. The Land Bridge Trail crosses over State Route 14 into Old Apple Tree Park under the BNSF railroad berm and through a tunnel to the waterfront, which reestablishes the historical link between Fort Vancouver and the Columbia River. Wayside exhibits at the river explain the historical use of the Columbia River waterfront by the HBC and U.S. Army for commerce and communication, and by early settlers arriving after their journey on the Oregon Trail.

Other recreational venues within the VNHR include Officers' Row, the West Barracks, Old Apple Tree Park, and the Water Resources Education Center. The City of Vancouver owns and manages these venues. Officers' Row and the West Barracks include 22, 19th century, U.S. Army officer's structures, and 19 additional former U.S. Army structures, all of which are adaptively re-used as private or commercial rental space, including a restaurant and hospitality/meeting space.

## **Noise**

The soundscape of a park, and visitors' appreciation of it, is considered a component of the general visitor experience. The project area is a developed area, and when compared to backcountry areas, experiences higher noise levels as a result of, among other things, the elevated/concentrated human activity, the concentrated vehicular traffic, and mechanized noise associated with visitation and park operations (maintenance, visitor services, etc.).

Background noise in the park is generally much lower than that expected or tolerated in developed areas in which federal noise guidelines are applied. Park and park partner operations in and around the East and South Barracks generate noise intermittently from personnel, vehicles, generators, hand tools such as hammers and power saws, heavy equipment such as lawn



mowers and tractors, and smaller power equipment such as chain saws and weed-eaters. Noise from park operations above ambient levels is currently confined to daylight hours (National Park Service 2004).

The current ambient noise environment in the East and South Barracks is influenced by motor vehicles traveling on State Route 14 and Interstate 5. In addition, the BNSF Railway berm to the south of the Barracks produces train noises from upwards of 25 freight trains per day. Frequent aircraft over-flights from Portland International Airport, (and less frequently from Pearson Field Airport) also contribute to the ambient noise environment. Visitor activities (e.g., groups of visitors) can also frequently be heard, particularly around the VNHR Visitor Center and the HBC Fort Vancouver, where educational programming involves hundreds of students arriving by school bus during most school days.

The proposed CRC replacement project presents a noise analysis of specific locations within 100 ft. of the highway right-of-ways, associated with the VNHR. Some of these locations, specifically within the HBC Village area, are near to the South Barracks, so the analysis provides useful baseline data on the current ambient noise environment in the East and South Barracks (2009). These data were specifically collected to determine the ambient noise environment as influenced by State Route 14 and Interstate 5, and do not reflect noises originating from aircraft fly-overs or the BNSF railroad berm. They are presented in Table 11.

**Table 11. Results of the Columbia River Crossing Noise Analysis for Three Separate Locations in the VNHR**

Resource Name and Parcel Info	Noise Levels in dBA			
	Existing	No Build Projections	*LPA (with no sound walls)	*LPA (with sound walls)
Post/Barracks Hospital (Building 638)	70	71	78	69
HBC Village	62/64	63/65	68/67	63/65
Officers' Row (as measured and modeled for two locations near Interstate 5)	61/68	62/69	68/74	67/72

\*LPA (Locally Preferred Alternative): The LPA calls for a ten lane replacement bridge with light rail access and increased overall traffic volume.

### Accessibility

The National Park Service is committed to the inclusion of visitors with disabilities in all its facilities wherever possible. In June 2010, the National Center on Accessibility conducted a comprehensive physical and programmatic accessibility assessment of Fort Vancouver NHS. Although the report of this assessment had not been completed as of this writing, preliminary results indicate a high level of effort and accomplishment for accessibility throughout the park. Preliminary analysis of the East and South Barracks shows that there are accessibility challenges posed with many of these facilities, specifically most of the historic structures. These include lack of ramps into buildings, elevators within buildings, inaccessible pathways, etc.

## **TRAFFIC, CIRCULATION AND PARKING**

### **Access**

The East and South Barracks and the VNHR are centrally located within the Vancouver-Portland metropolitan area. Many transportation options are currently available to visitors, including surface streets, freeways, trails, public bus and air travel. The majority of visitors come by automobile, and the East and South Barracks are accessed via two main roads: Fort Vancouver Way from the north, and East 5th Street from the east.

### **Main Roads in the Study Area**

Surface street access to the East and South Barracks is from Evergreen Boulevard through to Fort Vancouver Way on the north and East Reserve Street through to East 5th Street on the east. The two main roadways that run through East and South Barracks and the VNHR are Fort Vancouver Way, which links Evergreen Boulevard with East 5th Street on the west side of East Barracks; and East 5th Street, which runs from the Interstate 5 freeway between East and South Barracks, and continues to East Reserve Street and beyond (Figure 18).

Roadways internal to East Barracks includes McClellan Road, which runs east/west across Fort Vancouver Way and continues on the south side of the Parade Ground infantry barracks buildings; Hatheway Road, which runs east/west across Fort Vancouver Way and continues into East Barracks; Alvord Road, which angles north and east from the intersection of Fort Vancouver Way and East 5th Street, crossing Hatheway Road to meet McClellan Road; and other minor access roads and driveways.

The southwest corner of South Barracks is adjacent to the junction of Interstate 5 and State Route 14, but there is no direct access between these highways and the South Barracks. State Route 14 is a four-lane highway that connects Interstate 5 with Interstate 205 and continues along the Columbia River to the east. Interstate 5 is the only continuous north/south freeway on the West Coast, connecting Canada and Mexico through the states of Washington, Oregon, and California. It allows high capacity, high-speed traffic movement in urban and rural areas. Interstate 5, a state designated freight route, is a heavily used part of the national highway system. This freeway connects downtown Portland, Oregon to Vancouver, Washington.

Interstate 5 generally consists of three through-lanes in each direction within the Vancouver-Portland metropolitan area. Just south of the VNHR at the Columbia River, Interstate 5 provides a critical connection to two major ports, deep-water shipping, up-river barging, two transcontinental rail lines, and much of the region's industrial land. For residents of the Vancouver-Portland area, the Interstate 5 Bridge provides one of two crossings of the Columbia River for automobiles, transit, cycling, and pedestrians. It connects the communities of Vancouver and Portland for work, recreation, shopping, and entertainment. Averages of 135,000 trips are made across the Interstate 5 Bridge every day (Washington State Department of Transportation 2008). Interstate 5 and State Route 14 experience heavy traffic volumes during peak weekday commute times (6:30-8:00 am and 3:30-6:00 pm).

### **Public Transit**

Public bus transportation to the VNHR is available through the C-TRAN, which serves the Vancouver area and outlying communities. Express commuter service is available between Vancouver and Portland. Bus service to the VNHR is provided by two routes along Evergreen Boulevard on the north side of Vancouver Barracks; visitors can also walk the short distance from downtown Vancouver to the VNHR. Future plans call for the creation of a lid over a portion of Interstate 5, providing a direct pedestrian link between downtown Vancouver and the VNHR. This community connector will provide vital resources protection as well as critical public access.

C-TRAN's 20-year development plan (Clark County Transit Benefit Area Authority 2010) will preserve the existing levels of service, expand the number of bus routes, increase the frequencies on many bus routes, increase service for people with disabilities, create two new park-and-ride locations, and provide a new rapid transit route on Fourth Plain Boulevard. C-TRAN will also fund the cost of operation and maintenance of an extension of the Portland MAX light rail system into downtown Vancouver as part of the CRC project.

### **Traffic Volume**

Data from a traffic study conducted during June 15-20, 2010 indicate very light traffic loads on the surface streets of the VNHR, around the East and South Barracks. Traffic flow within the VNHR is largely at the "A" LOS, where drivers are practically unaffected by the presence of other vehicles on the road. Traffic counters were placed on East 5th Street between Fort Vancouver Way and East Reserve Street, and on Evergreen Boulevard in front of the Grant House. Weekday peak traffic hours reflect travel to and from work and lunch. Weekend peak hours were the same, except that the peak hour for Sunday afternoon was earlier. The average number of cars traveling past the East 5th Street traffic counter was approximately 1,000 per day; the average number of cars traveling past the Evergreen Boulevard counter was approximately 3,000 per day. Within 10%, an equal number of cars were recorded traveling eastbound and westbound at these two locations. The average number of cars traveling southbound past a traffic speed detector on Fort Vancouver Way between Evergreen Boulevard and East 5th Street was approximately 700. At all locations, the heaviest travel day was Saturday, and the lightest travel day was Sunday.

The average speed of cars traveling southbound on Fort Vancouver Way between Evergreen Boulevard and East 5th Street was 20-30 mph: 70-75% of cars were traveling within 5 mph of the speed limit, and 90% of cars were traveling below 32 mph.

In the years 1999-2009, traffic counters recorded a monthly average of 3,626 cars at the Visitor Center and 4,302 cars at the Fort site, with the lowest numbers recorded in November-February (National Park Service 2010d).

### **Level of Service**

The LOS is defined by the *Highway Capacity Manual* (Transportation Research Board 2010) as a measure of the ability of an intersection or roadway segment to accommodate traffic volumes. LOS values range from LOS A, which indicates free-flow conditions with minimal delay, to LOS F, which indicates congested conditions with extremely long delays. LOS A, B, C, and D are generally considered satisfactory service levels in urban areas. LOS E and LOS F are typically considered unacceptable.

Traffic data from the City of Vancouver between 1997 and 2010 were analyzed for a 2011 NPS traffic study for four intersections; the roundabout at Evergreen Parkway and Fort Vancouver Way, the two-way stop controlled intersection at Evergreen and Park Road, the two way stop controlled intersection at Fort Vancouver Way and East 5th Street and the two way stop controlled intersection at East 5th street and Park Road (Hardin 2011). The LOS values for these four intersections for existing conditions are presented in Table 12, and with results of either A or B, are considered acceptable by urban design standards.

**Table 12. Traffic Level of Service of Four Intersections Surrounding the East and South Barracks**

INTERSECTION	LEVEL OF SERVICE
Evergreen & Fort Vancouver Way	A
Fort Vancouver Way & East 5th Street	A
East 5th Street and Park Road	A
Park Road and Evergreen Boulevard	B

## Parking

There are approximately 425 formal parking spaces currently available within the East Barracks, with an additional 80 spaces of potential parallel parking spaces along East 5th Street, and an additional 344 non-formal (unmarked) spaces and 66 formal spaces in paved areas in the South Barracks (Tables 13 and 14). All combined, using currently paved and graveled areas, there is the potential for a total of 835 parking spaces immediately around the East and South Barracks (or 773 parking spaces if the City of Vancouver owned lot on the corner of Fort Vancouver Way and McClelland Road is not included). The formal parking areas in the East Barracks are presented in Table 13, while the formal and non-formal parking spaces in the South Barracks are presented in Table 14.

### Parking Utilization

Parking utilization refers to the balance between parking supply and demand during peak visitation periods. A parking utilization survey conducted in the winter of 2010-2011 documented parking use at major parking sites over a few winter weekdays. The survey was conducted only at the major use sites and not for the entire park because of the large number of minor parking facilities.

At no point did the parking demand exceed overall parking supply under current conditions, other than on U.S. Army Reserve training weekends, when all of the available parking spaces within the East Barracks were occupied, and many cars were observed parking on East 5th Street.

Prior to September 2011, East and South Barracks use of parking was directly related to U.S. Army staff usage, Reservist training weekends, and use of the Army Air Force Exchange Service Shoppette shopping facility. Staff parking tended to be longer term, whereas customers of Army Air Force Exchange Service tend to park less than one hour at a time. The parking utilization survey showed an average of 93 military vehicles parked in open storage in the South Barracks—all of which has been moved from the site when the U.S. Army vacated the property in September 2011, freeing up these spaces. In addition, the parking utilization survey showed a Monday through Friday average of 69 vehicles parked in the East Barracks (including the City of Vancouver owned lot on the corner of Fort Vancouver Way and McClelland Road); and an average of 19 (non-military) vehicles parked in the South Barracks (National Park Service, unpublished data). In addition, the parking utilization study showed a Monday through Friday average of 65 vehicles parked on East 5th Street, from the Park Road, westwards to where East 5th Street dead-ends at Interstate 5. Most of these vehicles are assumed to be associated with the Federal Highway Administration facility located on the west end of East 5th Street.



**Table 13. Primary Parking Areas in the East Barracks**

Location	Description	Designation	Surface	Number of Parking Spaces (est.)
Corner of Fort Vancouver Way and McClelland Road*	Lot	Striped	Paved	62
South of Building 987	Head-In	Unmarked	Gravel	23
Between Building 722 and 725	Lot	Striped	Paved	30
South of Building 721	Lot	Striped	Paved	33
South of Building 991	Lot	Striped	Paved	27
South of Building 728	Head-In	Striped	Paved	25
Between Building 754 and Building 786	Lot	Striped	Paved	25
South of Building 748	Lot	Unmarked	Gravel	50
Courtyard of Building 987	Head-In	Unmarked	Paved	10
Courtyard of Building 989	Head-In	Unmarked	Paved	10
Courtyard of Building 993	Head-In	Unmarked	Paved	8
West of Building 721	Head-In	Striped	Paved	7
Corner of Alvord Road and McClellan Road	Lot	Striped	Paved	35
On-Street Parking, East 5th Street, from Fort Vancouver Way to the Park Road	On Street	Unmarked	Paved	80
<b>Total</b>				<b>425</b>

\*Note, this lot is outside of the project area, is owned by the City of Vancouver, and was traditionally used by U.S. Army Reserve staff as a general parking area.

**Table 14. Formal and Informal Parking Spaces in the South Barracks**

Location	Description	Designation	Surface	Number of Parking Spaces (est.)
Between Building 404 and Building 405	Lot	Striped	Paved	(Formal) 66
Southeast of Building 404	Lot	Unmarked	Paved	(Non formal)124
East of Building 405	Lot	Unmarked	Paved	(Non formal)120
Courtyard Between Building 410 and Building 422	Lot	Unmarked	Gravel/ Paved	(Non formal)100
<b>Total</b>				<b>410</b>

### **Pedestrian and Cyclist Circulation**

The many roadways, pathways, and sidewalks throughout the VNHR are well traveled by bicycle and foot traffic alike. East and South Barracks are served by sidewalks along Fort Vancouver Way and East 5th Street, and East Barracks has several internal roadways that are attractive to pedestrians and cyclists.

The Discovery Historic Loop, a popular route for cyclists and pedestrians, is a four-mile trail that winds through Officers' Row, Vancouver Barracks, Fort Vancouver NHS, the Village, and across the Land Bridge to Old Apple Tree Park and the Columbia River. It goes around the South Barracks via the Land Bridge Trail, and adjacent to the East Barracks via Fort Vancouver Way.

As determined by the National Park Service, pedestrian and cyclist counts on the Land Bridge in 2009 showed a total of 252,106 users (with no data recorded in January and February of that year). The lowest use month was April, with 2,595 users, and the highest use month was August, with 73,264 users.

## **SOCIOECONOMIC FACTORS AND LAND USE**

### **Regional Setting**

The East and South Barracks are owned by the U.S. Army and located in Clark County, which is one of seven counties included in the Portland-Vancouver-Hillsboro, OR/WA Metropolitan Statistical Area (MSA), the 23rd largest in the United States. The US consulting firm Mercer, in a 2009 assessment "conducted to help governments and major companies place employees on international assignments," ranked Portland 42nd worldwide in quality of living.

Vancouver is immediately north of the city of Portland, Oregon, on the north side of the Columbia River and 107 river miles from the Pacific Ocean. The region is bordered on the east by the Cascade Mountains and on the west by the Coast Range. Major road approach routes are Interstate 5 and Interstate 205 from the north and south; and Interstate 84, and Washington and State Route 14 from the east. Visitors may also arrive at the park by air by using Pearson Field Airport or Portland International Airport. Seattle is 165 miles north; Olympia is 100 miles north; Portland is 8 miles south; Eugene is 110 miles south; Pendleton, Oregon is 215 miles east; and Astoria, Oregon is 105 miles west.

### **Land Ownership**

The East and South Barracks are situated in an urban setting within the boundaries of the VNHR and Vancouver's Central Park. The 366-acre VNHR consists of a mixture of ownership and management among the federal government and the City of Vancouver. The VNHR includes the following: Fort Vancouver NHS (National Park Service); Pearson Air Museum Complex (owned by the National Park Service and managed through agreement by the City of Vancouver); Pearson Field Airport (portions owned by both the National Park Service and the City of Vancouver); East and South Barracks (U.S. Army, but in the process of being relinquished to the National Park Service); West Barracks (owned by the City of Vancouver); Officers' Row (owned by the City of Vancouver); Water Resources Education Center (owned by the City of Vancouver), and Marine Park and portions of the Columbia River waterfront (portions owned by both the National Park Service and the City of Vancouver).

There are 26 federally recognized tribes that have associations with Fort Vancouver NHS, and a few non-federally recognized tribes that also maintain cultural ties to Fort Vancouver. Some of these tribes do not have reservation lands, yet they constitute contemporary tribal communities that live among non-Indians in the area surrounding Fort Vancouver. Likewise, in this ethnically diverse area of Washington and Oregon, there are dispersed American Indian groups that may constitute American Indian or Native Hawaiian communities who have interests in, and enduring historical connections to, Fort Vancouver.

Because the relinquishment of East and South Barracks by the U.S. Army to the National Park Service is an imminent action, it is being considered as the existing, baseline condition for the purpose of this analysis.

### Population

According to the state of Washington's Office of Financial Management (2010) website, Clark County is Washington's fifth most populated county, accounting for 6.5% of the state's population in 2010. In 2000-2010, Clark County was the second fastest growing county in the state. Vancouver is Washington's fourth most populated city, and is currently the sixth fastest growing city in the state.

Clark County represented approximately 19% of the MSA total in 2009. The southwest portion of Clark County contains the largest share of the population. Vancouver and Clark County have experienced steady growth over the past 30 years (Table 15). From 1990 to 2000, Vancouver's population increased 210%. During this same period, Clark County's population increased 45%, and Washington State's population increased 21.1%. From 2000 to 2010 it is estimated that Vancouver's population increased 15.3%. During this same time period, Clark County increased 26.2%, and Washington State increased 14.2%. Most immigrants into Washington come from the states of Oregon and California.

**Table 15. Population Growth 1980-2010**

Year	Washington State	Clark County	Vancouver
1980	4,132,156	192,227	42,834
1990	4,866,692	238,053	46,380
2000	5,894,121	345,238	143,560
2010 (est.)	6,733,300	435,600	165,500

In the next 20 years, the population of Clark County is expected to increase by almost 150,000, or 34%, and this growth is expected to occur in designated urban growth areas. It is projected that the population of Washington State will increase 25% by 2030.

### Employment

The MSA's location is beneficial for several industries. Relatively low energy cost, accessible resources, north-south and east-west Interstates, international air terminals, large marine shipping facilities, and both west coast intercontinental railroads (BNSF and Union Pacific) are all economic advantages. However, Portland's history of attracting and retaining company

headquarters is mixed; some major businesses, as well as smaller companies, have moved headquarters out of the city. The City of Vancouver also offers a mix of businesses that support the financial and professional center of the community. Downtown Vancouver's largest employers include publishing, hospitality, telecommunications, public services, and finance. Large manufacturing firms are also located near the downtown core, which is entering into a period of major redevelopment. Vancouver is currently undergoing growth in both commercial and residential development, with major employers in health care, high-technology industry, education, paper manufacturing, retail, professional and service businesses, and regional and corporate headquarters.

The current recession, however, resulted in substantial job losses and high unemployment. Unemployment remains very high by historical standards. Population growth has exacerbated this increase in joblessness. The July, 2011 unemployment rate for Clark County is within the top third for the state at 10.1%. The overall unemployment rate for Washington State in July, 2011 was 9.3%. Jobs, or the lack of them, will continue to be the biggest challenge facing the Portland economy. Economic recovery is fragile; labor markets are weak and consumer confidence fell in June 2011, while consumer spending also declined. Unemployment claims rose in June, 2011 to their highest levels since November, 2010.

Where the region's population and employment numbers ultimately land will be affected by several factors. They include varying conditions in the local and global economies, changing population and workforce demographics, and policy decisions and investments made in local communities that may attract particular types of population and employment growth to certain areas of the region. In March 2009, the Metro Council, a regional government agency, released updated 20- and 50-year population and employment forecasts to inform upcoming policy decisions and investments to support the health and sustainability of the region. This report forecasted a 90% chance that there will be between 1.3 and 1.7 million jobs in the MSA in 2030 and a 90% chance that there will be between 1.7 million and 2.4 million jobs in the same area in 2060. In 2000, there were approximately 973,000 jobs.

### **Portland MSA Real Estate Market**

The buildings for lease in the real estate market can be divided into three classes and according to a combination of location and physical characteristics. Class B and Class C buildings are always defined in reference to the qualities of Class A buildings. There is no formula by which buildings can be placed into classes; judgment is always involved. However, the following generally describes the different building classes.

*Class A.* These buildings represent the highest quality buildings in their market. They are generally the best looking buildings with the best construction, and possess high quality building infrastructure. Class A buildings also are well-located, have good access, and are professionally managed. As a result of this, they attract the highest quality tenants and also command the highest rents.

*Class B.* Class B buildings are generally a little older, but still have good quality management and tenants. Often times, value-added investors target these buildings as investments since well-located Class B buildings can be returned to the Class A level through renovation such as facade and common area improvements. Class B buildings should generally not be functionally obsolete and should be well maintained.

*Class C.* Class C is the lowest classification of office building and space. These are older buildings (usually more than 20 years), are located in less desirable areas, and are in need of extensive renovation. Architecturally, these buildings are the least desirable and building

infrastructure and technology is outdated. As a result, Class C buildings have the lowest rental rates, take the longest time to lease, and are often targeted as re-development opportunities.

The MSA offers a mix of specialty retail, business services and large industries, with a leasable space in all building classes. The following statistics are for Vancouver, but they are assumed to be similar for the rest of the MSA. Currently there is a high percentage of vacant Class A and B office space in the MSA. The average vacancy rate in the Vancouver office market is over 20% and the majority of space is Class A or B. Older properties, Class C, total only 5% submarket, and have a lower vacancy rate of approximately 8%. In the near term future of the Vancouver office market, vacancy rates are expected to decrease and rental rates are expected to increase. Building space available for lease on Officers' Row is 3.5%. The Vancouver office submarket is the top ranked submarket in the region in terms of rent growth. Rental growth rates were higher in this area than in the region and nationally at the end of 2010. Rental rates are expected to slowly increase over the next five years with an annualized growth rate of 2% per year (Booz Allen Hamilton, 2011).

The Vancouver retail submarket is the top ranked submarket in the region (Portland). Rent growth and rental growth rates were higher in the area than in the region and nationally at the end of 2010. Its retail vacancy rate was low at 6.9%. Only 12% of the retail space was built before 1970 (Class C). Retail vacancy rates are expected to decrease and rental rates are expected to increase, but both slowly. The vacancy rate for Class C restaurant space is 13.7%.

The residential or multifamily submarket in Vancouver is on the road to recovery and leading all other submarkets in terms of leasing activity. Positive signs in the Vancouver economy are reinforcing a level of confidence in renters who are now more likely to sign leases. The average vacancy rate in the residential market was measured at 4.8 % in 2010. This is indicative of a very strong market for residential use. The occupancy rate for residential space in the West Barracks is 90-100%.

It is a tenant's market as landlords compete for new leases and lease extensions. But the market is showing upward trends: 77% of properties in the Vancouver area experienced positive rental rate growth in the last quarter, whereas only three properties experienced negative growth in the same period.

## **PARK OPERATIONS, FACILITIES, AND INFRASTRUCTURE**

Park operations that could be affected by this project include the relocation of existing NPS functions located at Fort Vancouver NHS, requirements related to the upkeep and maintenance of historic structures and landscapes, the provision of utilities, and staffing levels.

### **Staff**

There are between 25 and 30 full- and part-time staff (seasonally adjusted) working at Fort Vancouver NHS, including facility management staff, cultural resource specialists, interpreters, and administrators. Maintenance of the landscaping, buildings, and other facilities within Fort Vancouver NHS is performed by park facility management personnel. More than 600 dedicated volunteers provide invaluable services to the park throughout the year.

Currently, the only active U.S. Army use in the East and South Barracks is the Army Air Force Exchange Service Shopette.

Up until recently, approximately 40 full time civilian and military employees worked in these facilities. An additional 950 Reservists and 230 National Guard members trained monthly in these facilities. The U.S. Army currently contracts out custodial services, building maintenance, and landscaping for East and South Barracks to private contractors. The City of Vancouver manages and maintains boundary roads, sidewalks, paths, and landscaped areas along the park borders.

## **Utilities**

Utilities utilized within the East and South Barracks include potable water, sewage, stormwater disposal, natural gas, and power, all of which could be affected by the proposed *Environmental Assessment*. A *Schematic Design for Utility Upgrades for the East and South Barracks* (2010) was conducted by Kennedy/Jenks Consultants to evaluate the condition of the utilities in East and South Barracks, and to address improvements and upgrades necessary to bring the existing utilities into compliance with current codes and standards at the anticipated LOS. The study recommended improvements to the potable water, sanitary sewer, storm drain, and electrical/telecommunications systems; these recommendations are noted below.

### ***Potable Water***

The City of Vancouver supplies the drinking water for the East and South Barracks. According to U.S. Army records (2006), a total of 73,370 gallons of water were used in the East and South Barracks in that year. This averages 6,114 gallons per month, with U.S. Army records indicating a yearly high of 6,465 gallons in September, and a low of 1,111 gallons in March. The distribution system originates from a 6 inch buried pipe in Fort Vancouver Way, and is distributed through the East Barracks via pipes in McClellan and Alvord roads. The South Barracks receives water from an 8 in. buried pipe in East 5th Street.

All of Vancouver's drinking water comes from wells that tap three underground aquifers. Groundwater is first expected at 60 feet below ground surface in the Salmon Creek aquifer. This alluvial aquifer has an estimated thickness of 40 feet, with its base on top of the Troutdale Formation. Groundwater is inferred to flow toward the southwest, following the local topography (Department of the Army 1999). The region's most important groundwater aquifer is the Troutdale gravel aquifer, which supplies over 99% of the drinking water used in the area. This aquifer is estimated to be 100 feet below Vancouver Barracks with a thickness of about 150 feet. It was designated a "sole source" aquifer in 2006, which means that it supplies at least 50% of the drinking water for the area and that there is no viable alternative replacement source (U.S. Environmental Protection Agency 2006). The Upper Troutdale aquifer has a gradient of about 0.01 ft./mile, moving south toward the Columbia River. No drinking water wells are present in the East and South Barracks.

This existing water infrastructure system serving eastern portions of the South Barracks is deteriorating. The existing system has reached the end of its service life, is in poor condition, shows multiple signs of failure and is not capable of meeting fire suppression requirements. South Barracks has acceptable eight-inch mains, but the mains are connected to an aging six-inch system that does not meet current fire flow delivery standards. The eight-inch mains may not meet City of Vancouver design or construction standards. Service to the older South Barracks buildings consists of an older six-inch line that is in poor condition. Buildings 400, 402, 404, and 405 in South Barracks are relatively new construction and receive adequate capacity.

### ***Fire Flow***

Water for fire suppression comes from the same City of Vancouver distribution system as potable water. Acceptable rates of flow and water pressure meet the requirements for buildings within Fort Vancouver NHS and in the 400-series buildings in South Barracks. The water system in East Barracks and in the older buildings in South Barracks currently does not meet fire suppression requirements.

### ***Stormwater***

The East and South Barracks stormwater collection and discharge system is composed of shallow ditches and a subsurface drainage system. Several culvert and ditch systems are severely



undersized and require modifications. The subsurface system consists of lateral pipes ranging from six inches in diameter, to the City of Vancouver's 27-inch diameter municipal stormwater pipes. The Vancouver Barracks system discharges into the City of Vancouver's stormwater drainage system (which in turn discharges into the Columbia River). The City of Vancouver's storm drain enters Vancouver Barracks at Evergreen Boulevard. The storm drains converge south of vehicle maintenance building 400 in South Barracks, with the discharge point located approximately 800 feet from Vancouver Barracks' southern boundary (CH2M Hill 1998).

The City of Vancouver provides the direction and technical expertise needed in the planning, review, and design of efficient stormwater systems; and works to protect and improve surface and ground water resources for the community and environment. Every year, the City of Vancouver cleans 12,000-plus catch basins or storm water drains, removing approximately 500 tons of leaves, sediment, and other debris. They also maintain more than 300 miles of storm water pipe lines.

The East and South Barracks is currently operating under a National Pollutant Discharge Elimination System General Stormwater Permit, issued by the EPA after completion and certification of the Vancouver Barracks Stormwater Pollution Prevention Plan in 1998 (Department of the Army 1999). An Industrial Multi-Sector General Stormwater Permit was issued for the South Barracks motor pool area in 2008 (Palfy and Schell 2009).

### ***Wastewater***

The existing sanitary sewer system serving East and South Barracks is currently provided by a combination of public sewer lines and on-site lines owned by the U.S. Army. Wastewater from the East and South Barracks is treated at the Westside Water Reclamation Facility, located approximately two miles west of the Barracks at the Port of Vancouver. Treated water is discharged into the Columbia River. According to U.S. Army records (2006), a total of 2,564 CCF of wastewater (1 CCF= 100 cubic feet, or 748 gallons) originated in the East and South Barracks in that year. That averages to approximately 213.7 CCF of wastewater per month, or approximately 159,880 gallons per month.

Vancouver's wastewater collection system includes approximately 710 miles of wastewater pipes, 38 pumping stations, and 2 wastewater treatment facilities, which treat up to 25 million gallons of wastewater a day, with ample capacity to serve a population base of approximately 210,000. Pumping stations move wastewater from areas lacking gravity sewer lines to an adjacent area where gravity lines exist. The total size of the collection system expands each year due to growth. In recent years, developer extensions have added 15 to 20 miles of new pipe to the system annually.

In the East Barracks, the piping is in poor condition and does not meet current code, city or state design and construction requirements. The sewer system needs to be replaced to meet current standards and align it within utility corridors being established through the site. Building service laterals also need to be replaced between the sewer main and the building outfall connection point. In the South Barracks, only building 410 will need new service.

### ***Electrical/Gas/Telecommunications***

Electrical service to the East and South Barracks is provided by Clark Public Utilities District. Clark Public Utilities District maintains more than 62,000 poles, 55 substations/switching stations, and 6,600 miles of power lines. Northwest Natural Gas provides gas service. Telephone service and the data/fiber optic line in the East and South Barracks are currently operated by CenturyLink. Electrical service to East and South Barracks is fed from an overhead supply.

### ***Solid Waste***

Solid waste in East and South Barracks is managed by placement of waste in dumpsters within the Barracks and collection by the City of Vancouver's Waste Connections. Illegal dumping at dumpster locations, primarily household waste and home appliances, was reported at various locations in the Vancouver Barracks (Department of the Army 1999).

## **HUMAN HEALTH, SAFETY, AND THE ENVIRONMENT**

### **Safety and Emergency Services**

Police and fire services for the East and South Barracks are currently provided by the City of Vancouver. The City of Vancouver's West Police Precinct is located at 2800 Stapleton Road, three miles from the East and South Barracks. The closest fire station is the Downtown Fire Station, one mile away at 900 West Evergreen. Within the East and South Barracks, two fire hydrants are located in the East Barracks and two are located in the South Barracks.

As noted under Park Operations, the water lines do not meet the requirements for fire suppression, and there are some structural fire code deficiencies in the Barracks buildings. The two fire hydrants are insufficient for the need and do not meet current fire codes. The buildings are in need of upgrading to meet other code requirements, such as some seismic repairs.

The closest emergency medical facility is the Southwest Washington Medical Center, located four miles east of the VNHR on East 92nd Avenue and Mill Plain Boulevard. The Veterans Administration Hospital Campus is located 1.5 miles north of the VNHR off Fort Vancouver Way and Fourth Plain Boulevard.

### **Hazardous Materials**

Before the National Park Service can accept property, it must complete an Environmental Site Assessment (ESA) to confirm or deny the presence of any Recognized Environmental Conditions (RECs) on the property. RECs are defined as the presence or likely presence of any hazardous substance or petroleum products on a property that indicate an existing release, a past release, or a material threat of a release, of any hazardous substances or petroleum projects into structures on the property or into the ground, groundwater, or surface water of the property. A Level 1 ESA was completed for the East and South Barracks for the National Park Service by Tetra Tech, Inc. in July 2009.

The Level 1 ESA identified the following RECs in the project area:

- Residual organochlorine pesticides could be located in soils beneath building foundations, since the U.S. Army has historically applied these pesticides for termite control.
- Deteriorated lead based paint on buildings exteriors may have released lead into the soil, accumulating over time, and could be released when soils are disturbed.
- Lead dust with concentrations exceeding legal thresholds has been documented in former firing ranges at buildings 993, 989, and 987 and potentially in the basement of building 721.
- Approximately 8.15 acres, including portions of the South Barracks, was used as an ordnance depot and firing range from approximately 1849 until 1960. There is a potential that unexploded ordnances, hazardous materials associated with explosives, and elevated levels of lead or other metals, could be found in the soils of that area. The Army Corps of Engineers is currently conducting a Military Munitions Response Program (MMRP) Remedial Investigation, and it is anticipated that the field survey will be completed by December 2011.

- Asbestos containing material may be encountered in soils during future soil disturbance. Deteriorating exterior asbestos containing material can release asbestos to soils over time if not abated.
- Wood preservers were commonly used on railroad ties, which are associated with the property. Hazardous chemicals associated with coal tar creosote, such as arsenic, could have been released into the soil.

Additionally, because of the activities historically conducted within certain buildings, a variety of chemicals and waste have likely been stored in the workshops and maintenance buildings of East and South Barracks. These materials may include facilities maintenance supplies in building 786; fuels, lubricants, and solvents associated with the vehicle maintenance facilities in buildings 400, 402, 404, and 405; and other similar materials.

A Level II ESA was conducted in the spring of 2011, the results of this study include:

- Organochlorine compounds were detected in several samples from the site, but all were well below the corresponding Environmental Screening Level (ESL) for Unrestricted Land Use (3 mg/kg DDT).
- Lead (likely originating from lead based paint from pre-1978 structures) was detected in almost every soil sample analyzed. Most of these samples came in at results above the corresponding ESL for Unrestricted Land Use.
- Asbestos was not detected in any of the bulk soils collected from the areas of non-extant buildings.
- Gasoline-range organics were detected in only two composite soil samples collected from the Soil Staining RECs. Diesel-range and residual-range organics (DRO) were detected in multiple composite soil samples, however, no result exceeded the corresponding ESL.
- Polychlorinated biphenyls were not detected in any composite or discrete soil sample above the corresponding reporting limits.
- Semi-volatile organic compounds were present in four composite soil samples. No individual semi-volatile organic compounds exceeded the corresponding ESL in any sample.
- Various Resource Conservation and Recovery Act metals were detected in composite soil samples, however, with the exception of lead, none of the metals (silver, arsenic, barium, cadmium, chromium, mercury, or selenium) exceeded the corresponding ESL for that constituent.

The authors of the Level II ESA had the following conclusions and recommendations:

- Further assessment of the lateral and vertical extent of lead in soil is warranted, particularly in the East Barracks near buildings 991, 993, 728, 754, 786 and non-extant buildings south of building 993, east of building 754 and east of building 410. Concentrations of lead in soil are high enough to pose a potential threat to human health and the environment and are well above the Unrestricted Land Use ESL in this area. Soil disturbance in these areas should not be performed other than by properly trained personnel.
- With the exception of lead, none of the composite or discrete samples contained Resource Conservation and Recovery Act metals above the corresponding residential ESL.

## **Unexploded Ordnance**

There is a small possibility for unexploded ordnance to be present throughout the East and South Barracks – especially in the South Barracks. The Army Corps of Engineers completed a Munitions Historical Records Review in 2006, and recommended that two Munitions Response Sites should be further evaluated. These included an underwater site in the Columbia River outside of the East and South Barracks, and an 8.15 acre site in the South Barracks. The Army Corps of Engineers is currently conducting a MMRP Remedial Investigation, and it is anticipated that the field survey will be completed by December 2011. Any future suspected unexploded ordnance should be reported to the City of Vancouver Police Department.