

CHAPTER 3: AFFECTED ENVIRONMENT

This chapter describes existing environmental conditions in the areas potentially affected by the alternatives evaluated. This section describes the following resource areas soils, vegetation, terrestrial wildlife and habitat, cultural resources to include historic structures and archeological resources; visitor use and experience, and park management and operations. Potential impacts are discussed in “Chapter 4: Environmental Consequences” in the same order.

SOILS

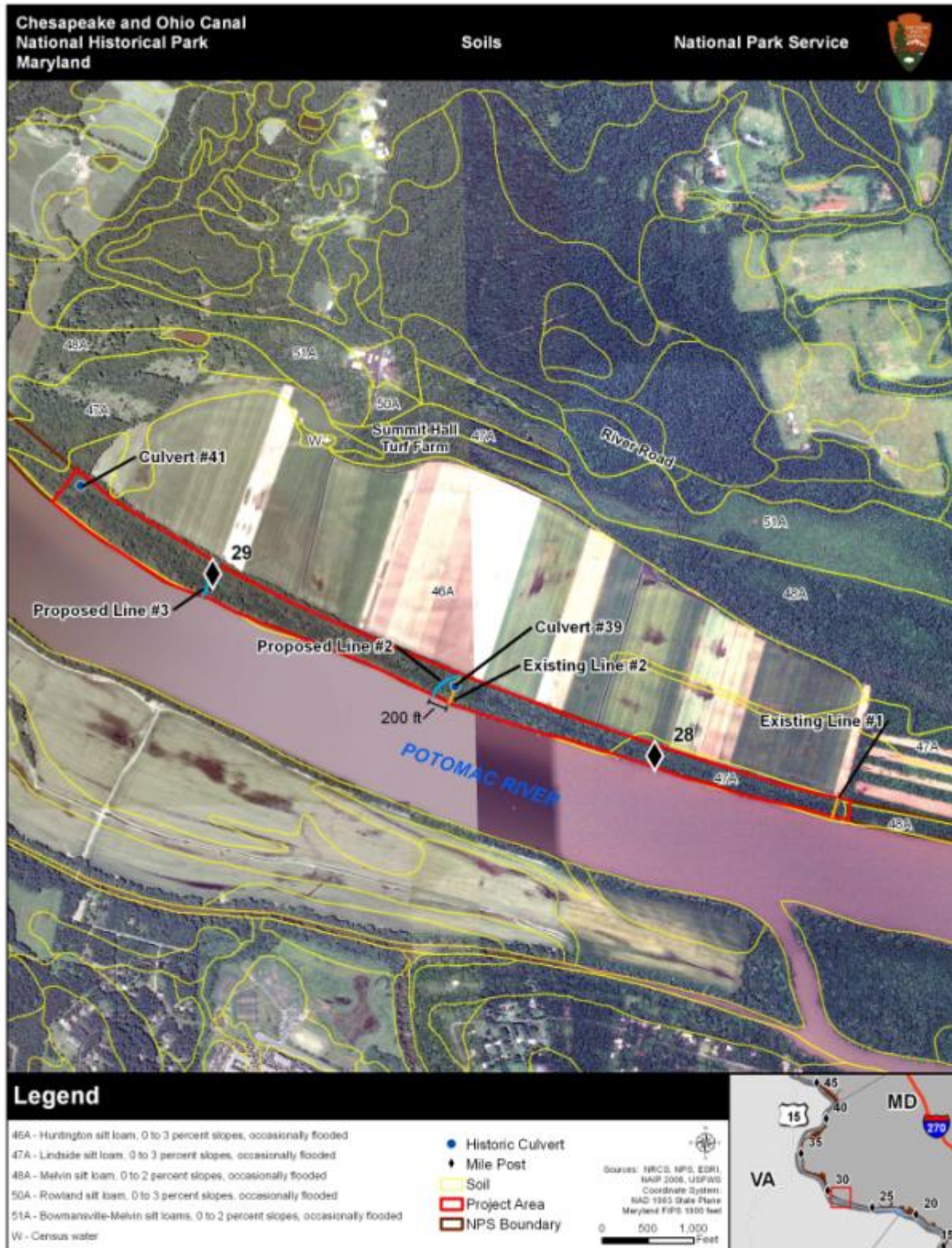
The information presented below, which describes soils within the study area, is taken from the *Soil Survey of Montgomery County, Maryland*, part of the National Cooperative Soil Survey conducted by the Natural Resources Conservation Service (NRCS).

The project area is located along the Potomac River, southeast of the Town of Poolesville, Maryland, and east of Ashburn, Virginia, between canal Mile 28.46 and canal Mile 29.35 of the C&O Canal NHP. This area overlies the Huntington and Lindsides general soil series. The *Soil Survey of Montgomery County, Maryland*, shows two soil map units in the project area: Huntington silt loam (46A) and Lindsides silt loam (47A). Modification of Line #2 and installation of Line #3 would affect soils classified as Huntington silt loam.

Huntington silt loam soils are found primarily in river valleys and floodplains with a 0 – 3 percent slope. They consist of very deep, well-drained soils with moderate permeability, a slight erosion hazard, and are prone to occasional flooding. These soils are formed in alluvium washed from shale, sandstone, and limestone and are primarily used for cropland and pasture; they make up 0.7 percent of all soils found in Montgomery County (NRCS 1995).

Within the project area, Lindsides silt loam soils are located in the floodplain along the southernmost and northernmost portion of the project area with a 0 – 3 percent slope. This soil type is very deep, moderately well drained with moderately slow permeability and a slight erosion hazard. These soils formed in loamy alluvium derived from limestone-sandstone-shale and primarily are cleared and cultivated or pastured. These soils make up 0.7 percent of all soils found in Montgomery County (NRCS 1995).

Figure 4. Project Area Soils Map



PRIME FARMLAND

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Prime farmland is of major importance in meeting the nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our nation's prime farmland. Both soil types occurring within the project area are recognized as prime farmland (NRCS 1995); however, they are not used as farmland within the C&O Canal NHP.

VEGETATION

Natural vegetation within the area of analysis resembles that of a Piedmont/Central Appalachian Rich Floodplain Forest, specifically a Sycamore Floodplain Forest. Historically, this area has experienced various land uses including grazing, logging, farming, and construction of the C&O Canal. Currently, the floodplain forest exists immediately adjacent to the Potomac River and extends for an average of 250 – 500 feet beyond the river to the boundary of Summit Hall. Beyond Summit Hall the land use changes to a rural community, with largely farmed lands, typical of Montgomery County's Agricultural Reserve.

Sycamore Floodplain Forest usually develops in low terraces of major Mid-Atlantic Rivers, in this case the Potomac River. The vegetation type is a canopy with a mixed overstory dominated by species typical of floodplain communities, including American sycamore (*Platanus occidentalis*), eastern black walnut (*Juglans nigra*), bitternut hickory (*Carya cordiformis*), common hackberry (*Celtis occidentalis*), American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), sugar maple (*Acer saccharum*), tulip poplar (*Liriodendron tulipifera*), and willow (*Salix* sp.), or early successional species such as black cherry (*Prunus serotina*), red maple (*Acer rubrum*), and black locust (*Robinia pseudoacacia*) (NPS 2006c).

The understory consists of a moderately dense mixture of tree saplings, shrubs, and vines as well as herbaceous vegetation covering the ground. Typical saplings and shrubs include paw paw (*Asimina triloba*), boxelder (*Acer negundo*), and northern spice bush (*Lindera benzoin*). Vines such as Virginia creeper (*Parthenocissus quinquefolia*) and poison ivy (*Toxicodendron radicans*) are most frequent. Common herb species include Virginia bluebells (*Mertensia virginica*), wild blue phlox (*Phlox divaricata* ssp. *divaricata*), Canada waterleaf (*Hydrophyllum canadense*), wood nettle (*Laportea canadensis*), and Eastern cottonwood (*Populus deltoides* sp. *deltoides*) (NPS 2006c). Invasive plants such multiflora rose (*Rosa multiflora*), Japanese barberry (*Berberis thunbergii*), Japanese honeysuckle (*Lonicera japonica*), Morrow's honeysuckle (*Lonicera morrowii*), and Oriental lady's thumb (*Polygonum caespitosum*) can also be present in some locations and within the canal prism.

A tree inventory and walk-through forest investigation was completed by the Louis Berger Group, Inc. within the area proposed for installation of Line #2 in November 2008. The study area included 200 feet upstream and downstream of the current location of Line #2, from the boundary of Summit Hall to the Potomac River. All trees greater than or equal to six inches DBH were recorded. Each inventoried tree was marked with chalk, and the species and DBH were recorded. The tree inventory identified more than 150 trees. Sycamore Floodplain Forest association dominated the forested areas within the study area. Red maple, sugar maple, American sycamore, and green ash dominated the overstory, with several individuals of hickory, sycamore, and sugar maple having a DBH greater than 25 inches.

TERRESTRIAL WILDLIFE AND WILDLIFE HABITAT

The Summit Hall Farm runs directly parallel with the C&O Canal and near the Potomac River. The terrestrial environment includes forests and agricultural fields.

Terrestrial environments support wildlife habitat in this project area. Common terrestrial mammals include white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), gray squirrels (*Sciurus carolinensis*), fox squirrels (*Sciurus niger*), rabbits, mice, shrews, moles, and other small mammals. Numerous bird species are known to populate this area of the C&O Canal NHP, including permanent inhabitants and migratory birds utilizing nesting habitats. Volunteer groups conducted bird surveys within the C&O Canal NHP between the years of 1995 and 2001. As a result, 108 bird species were documented to breed within the park (NPS 2006b).

The American Bird Conservancy and National Audubon Society designated the lower portion of the C&O Canal (between the Washington, D.C., Beltway and Antietam Creek, Washington County) as an Important Bird Area (IBA) in the United States. IBAs are sites that are critical to rare species or that support large concentrations of a species, including Forest Interior Dwelling Species (FIDS). FIDS require large, intact areas of forest. Although no IBA was noted by the MDNR to occur in the area of Summit Hall, the forested areas adjacent to the project site could potentially contain FIDS habitat. Bird species observed year round include turkey vulture (*Cathartes aura*), black vulture (*Coragyps atratus*), red-tail hawk (*Buteo jamaicensis*), great horned owl (*Bubo virginianus*), blue jay (*Cyanocitta cristata*), northern cardinal (*Cardinalis cardinalis*), Carolina chickadee (*Parus carolinensis*), and black-capped chickadee (*Parus atricapillus*), and FIDS such as the red-shouldered hawk (*Buteo lineatus*) and barred owl (*Strix varia*) (NPS 2006b).

CULTURAL RESOURCES

For the purpose of compliance with Section 106 of the NHPA, as amended, cultural resources include prehistoric and historic archeological sites, buildings, structures, objects, districts, cultural landscapes, or museum objects that are eligible for or are listed in the NRHP. The consideration of these resources by the NPS meets pertinent requirements of the NHPA, the NEPA, and related legislation and implementing regulations. For this project, analysis focuses on historic districts and structures and archeological resources; consideration of cultural landscapes, ethnographic resources, and museum objects was dismissed because there is little, if any, likelihood that these types of cultural resources are present in the study area as determined through consultation with various NPS resource databases, expert advice, and professional judgment, and all potential impacts on historic views are addressed under the historic structures and districts topic.

For this study, efforts to identify cultural resources included a review of information provided by the park, supplemented by interviews with park staff and other published and unpublished sources. The C&O Canal is listed on the NRHP as a historic district. In addition to the NRHP nomination form (Romigh and Mackintosh 1979), which contains extensive photographic and narrative description of the canal, there is also important documentation of the C&O Canal in the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER files for many of the locks, bridges, culverts, tunnels, aqueducts, and associated industrial structures. The NPS's List of Classified Structures (LCS) database also contains an extensive inventory of the C&O's numerous ruins, foundations, military earthworks, and industrial sites that have been field-verified along the canal lands. Harlan Unrau's recently published *Historic Resource Study* (Unrau 2007) also contains extensive documentation on the historical development of the C&O Canal.

The primary sources for archeological resources are the archeological site survey forms at the MHT, a draft overview and assessment of the park's archeology and history (Barse and Wuebber 2002), and a three-year archeological inventory and evaluation study of the lower 59 miles of the park (Fiedel, Bedell, and Leedecker 2005), which was completed for the NPS Systemwide Archeological Inventory Plan.

ARCHEOLOGICAL RESOURCES

Overview of Prehistory and Early History

The Upper Potomac Coastal Plain has been the focus of human activities for 13,000 years, spanning the Paleoindian (9000 – 8000 BC), Archaic (8000 – 1200 BC), and Woodland (1200 BC – AD 1600) periods of prehistory. Researchers have noted progressive changes during the Archaic Period, with increasing sedentism and increasing reliance on harvested foods. Researchers commonly subdivide the era into Early (8000 – 6500 BC), Middle (6500-3000 BC), Late (3000-2000 BC), and Terminal Periods (2000-1200 BC).

Occupation by mobile bands of hunter-gatherers was light and sporadic from the Paleoindian period, through the Early Archaic, Middle Archaic, and Late Archaic. In the Terminal Archaic, the river bank seems to have been occupied much more frequently, probably by larger social groups who may have taken fish from the river, although as yet no organic evidence of fish has been recovered from any Terminal Archaic sites. These hunter-gatherers may also have relied more than their predecessors on seeds gathered in the floodplain, although this is an inference unsupported by physical evidence.

In any case, the region was uninhabited at the end of the seventeenth century, when it was traversed by Seneca (western Iroquois) hunting and war parties, and occupied briefly by refugee Indian tribes displaced far from their homelands (Susquehannocks, Piscataway-Conoys, Shawnees, and Tuscarroras). Wary of encountering Iroquois warriors on their way to raid the Catawbas in the Carolinas, few white colonists, apart from French-Canadian and Delaware Swedish fur traders, ventured above the falls of the Potomac before 1722. In that year the chiefs of the Iroquois Confederacy signed the Treaty of Albany, by which the Iroquois agreed to stop using the path down the Monocacy as their main raiding route. At the same time large numbers of German and Scots-Irish immigrants were arriving in Philadelphia and following the wagon roads into the interior, where they carved out frontier farmsteads. The main route from Philadelphia to the fertile Shenandoah Valley crossed the Potomac at Packhorse Ford, near Shepherdstown. Land speculators rapidly took out patents for parcels along the Potomac, west of the Monocacy, in the 1730s. Tenant farmers began to settle the region. Mills were soon built to process timber and grains. An iron forge (Vestal's Bloomery) was operating south of Harpers Ferry after 1745.

Settlement of the western frontier suffered a major setback with the outbreak of the French and Indian War in 1754. After the French repelled Braddock's troops in 1755, panic swept the frontier and settlers fled east and south. Fort Frederick was built to help stabilize the frontier in 1756. The process of frontier expansion only resumed after the defeat of Pontiac's rebellion in 1763. Mills and iron forges were established on the Maryland bank of the Potomac in the 1760s and 1770s; Hahn (1997:138) reports that the gristmill now known as McMahon's was first built in 1778, about 3.7 miles upriver from Dam No. 4. Speculators and entrepreneurs, including George Washington, began to envision a canal that would facilitate shipment of crops from the frontier down the Potomac to ports such as Georgetown and Alexandria. Although investors began to raise money for a Potomac canal in the 1770s, that scheme had to be put on hold for the duration of the War of Independence (1776 – 1783).

Archeological Resources

Even though the banks of the Potomac River have attracted the attention of professional and amateur archeologists for more than a century, and some of the region's most important prehistoric and historic archeological sites have been identified in the C&O Canal NHP, reflecting 13,000 years of human activity along the river, professional and academic surveys of the Potomac Valley have been infrequent and not often well documented.

A number of archeological sites have been identified on the river terrace that is occupied by the Summit Hall and the adjacent park lands, as well as the McKee-Beshers Wildlife Management Area which is just downriver from the Summit Hall. Many of these sites have been collected by various archeologists over

the years, but for the most part the site boundaries are poorly defined. Most of the known sites have been identified on the basis of surface collections in cultivated fields adjacent to park lands, and the extent to which these sites extend into the wooded park lands along the canal is not known. Formal site boundary determinations would be made when archeological sites are evaluated for NRHP eligibility, and relatively few of the archeological sites in this area have been investigated at this level. It should be noted that the previously identified archeological sites in the study area represent sites that are present in surface and near-surface contexts. In this area, it is also likely that additional sites are present in deeply buried contexts, owing the deposition of river-deposited sediments. In some cases, archeological sites may be buried beneath more than 10 feet of soil. Table 2 lists the archeological sites that have been recorded within 500 feet of the proposed new intake lines.

Table 2. Archeological Resources in the Summit Hall Area

Site Number and Name	Description
18MO3 (Shepard)	Late Woodland village site with human burials; Archaic and Early Woodland occupations also reported; major excavations completed at the site in the 1930s, followed by additional excavations in the 1950s. It was reported that that construction of the C&O Canal had cut through the site, destroying about half of it
18MO4 (Shepard Barracks, a.k.a. Beshers Site)	Prehistoric site with Paleoindian, Archaic, and Woodland period components; site initially recorded in 1958, subsequently investigated by Archeological Society of Maryland and American University; site size not described on MHT site survey form; NRHP status is unevaluated
18MO6 (Beshers Site)	Prehistoric site with Paleoindian and Late Archaic occupational components; site initially recorded in 1974, subsequently investigated by Archeological Society of Maryland; site size not described on MHT site survey form; NRHP status is unevaluated
18MO93 (Summit Hall Site)	Prehistoric site with Paleoindian and Archaic occupational components as well as 19th century historic component; site initially recorded in 1974, subsequently investigated by R.E. McDaniel of American University; site size originally given as 91x30 meters; comment on MHT survey form indicates that the site has potential for deeply buried deposits; NRHP status is unevaluated
18MO104 (Easter Site)	Prehistoric site with Archaic and Woodland occupational components; site initially recorded in 1975, subsequently investigated (surface collection) by R.E. McDaniel; site size not given on MHT form; NRHP status is unevaluated
18MO106 (First Road Site)	Prehistoric site with Archaic and Woodland occupational components; site initially recorded in 1975, subsequently investigated (surface collection) by R.E. McDaniel, Charles Pettit, and Tyler Bastian of Maryland Geological Survey; site size not given on MHT form; NRHP status is unevaluated
18MO232 (Summit Hall)	19th century house site and farm; Late Archaic to Late Woodland; site initially recorded in 1983 by R.E. McDaniel
18MO233 (Rainy Day Site)	Prehistoric site with Archaic and Woodland occupational components; site initially recorded in 1983; size not given on MHT form; NRHP status is unevaluated

Source: MHT site survey forms. Note that these sites are in the general vicinity of the proposed intake lines, not necessarily in the direct path of the intake lines. Locational information for sites recorded decades ago is not reliable, and final engineering has not been completed.

HISTORIC STRUCTURES AND DISTRICTS

The C&O Canal is one of the most intact and impressive survivals of the American canal-building era, and its historical importance is the basis for creation of the C&O Canal NHP. The C&O Canal is historically significant primarily because it embodies 19th century engineering and architectural technology. The entire 184.5 miles of the canal is listed on the National Register, having historical significance merits under architecture, engineering, commerce, transportation, military history, and conservation. The magnitude of the engineering achievement is exemplified by the 184.5-mile length of the canal, which includes 74 lift locks that cumulatively rise 605 feet. Eleven stone aqueducts were built to carry the canal prism over large Potomac River tributaries, and 241 historic culverts were built to carry smaller streams and roads under the canal. Seven supporting dams were also constructed (Romigh and Mackintosh 1979).

The proposed action would involve a section of the canal located between canal Miles 28.26 and 29.35. In this section of the park, the historic structures include the canal prism, the towpath, and Culvert #39 (see table 3 and figures 5 and 6). The canal prism is located inland of the towpath, and it is overgrown with small trees and shrubs. The study area is located along an 8-mile segment of C&O Canal NHP between Lock 24 (Mile 22.80) and Lock 25 (Mile 30.84) that was relatively undeveloped historically and remains so today. The nearest concentration of historical structures is located in the vicinity of Seneca Creek, where the canal passes through the Seneca Creek Aqueduct (Mile 22.81).

Table 3. Historic Structures in the Study Area

Structure Name	Description and Location
Culvert #39 canal Mile 28.26	Culvert #39 was built around 1831 of Seneca red sandstone. It has an 8-foot span that allows runoff water to pass beneath the canal and towpath. The structure is essentially unaltered, although it is silted in and an 8-inch water intake pipe (Line #2) passes through it, drawing water from the Potomac River to Summit Hall.
Canal Prism	Along canal Miles 28 and 29, the canal channel was about 60 feet wide and 8 feet deep. The canal prism is located on the landside of the towpath. It is currently overgrown and silted in.
Towpath	Along canal Miles 28 and 29, the towpath was an 8-foot wide earthen berm for mules. It stood about two feet above the water level of the canal and sloped slightly to drain toward the river.

Source: NPS LCS database

Figure 5. View along the Towpath near Mile 28

(The canal prism is in the right-hand side of the photograph. Photo date October 2008.)



Figure 6. View of Culvert #39, Showing Existing Water Intake Line

(This view shows the landward (inlet) of the culvert. Photo dated October 2008.)



VISITOR USE AND EXPERIENCE

The C&O Canal NHP annually hosts millions of visitors (approximately 4 million in 2009) who come to enjoy its many natural and cultural attributes (NPS 2010a). The park parallels the Potomac River from Washington, D.C., to Cumberland, Maryland, providing easy access for daily users and overnight campers. Park amenities and facilities include interpretive centers, boat ramps, campgrounds, picnic areas, and parking areas. Although the park is open year-round, over 70 percent of visitation occurs between April and October (NPS 2010b). The NPS does not collect visitor use statistics for the area of the towpath within the project area specifically, but visitation is expected to follow seasonal patterns observed for the entire park. Season, weather, day of the week, and Potomac River flow conditions are likely the key factors that influence the number of visitors who access the park on any given day.

The project area is located in an area of the park that is classified as Zone D – Short-Term Remote Zone. Zone D sections, such as the project area, typically have limited access, resulting in low-density use and a sense of remoteness (NPS 1976). Key elements of the visitor experience in these areas are the ability to find solitude in a natural setting due to the remote location, and infrequent disturbance from others (NPS 1976). Visitors come to this area to hike, bike, and ride horses on the towpath and to fish and boat on the Potomac River. A number of attractions located within a mile of the project area offer other visitor use opportunities such as wildlife viewing at the McKee-Beshers Wildlife Management Area and camping at both the Chisel Branch Camping Ground and the Horsepen Branch Camping Ground. The park is open during daylight hours with entrance fees only at the Great Falls Entrance Station.

PARK OPERATIONS AND MANAGEMENT

The NPS is responsible for maintaining the entire length of C&O Canal NHP. The park has designated access points that serve maintenance, law enforcement, river rescue, emergency medical, interpretive ranger, and other support staff. The park has approximately 135 park personnel, including maintenance personnel, and an annual operations and maintenance budget of approximately \$9.8 million.

Routine park operations at and in the immediate vicinity of the project area include towpath maintenance, grass cutting and tree/vegetation maintenance, and inspections of the towpath. Currently, NPS will issue Summit Hall a special permit to allow them to cross park property to access their existing lines. Signage at the boundary of C&O Canal NHP and Summit Hall advises visitors that it is private property beyond this point.

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