3 AFFECTED ENVIRONMENT

Existing environmental conditions were identified and mapped within the project corridor. These environmental considerations are based on guidelines established by the Federal Highway Administration (FHWA) Technical Advisory T 6640.8A – *Guidance for Preparing Environmental and Section 4(f) Documents* and the National Park Service (NPS) Director's Order #12 - *Conservation Planning, Environmental Impact Analysis, and Decision-Making*. The environmental data and findings presented herein were gathered from federal, state, and local agencies; previous area studies; various existing literature and websites (see Chapter 8 References); aerial photography; and field surveys of the project area.

3.1 NATURAL RESOURCES

3.1.1 GEOLOGY, SOILS, AND TOPOGRAPHY

3.1.1.1 Geology

This project is located in the Piedmont province on the edge of the Coastal Plains province. The region is made up of late Proterozoic and Paleozoic igneous rock (formed by molten rock that has come to the surface and cooled) and metamorphic rock (physically and/or chemically changed due to heat and pressure) that has been strongly weathered and is buried under 2 to 20 meters of soil. The metamorphic rock is very complex due to the number of times it has been altered and often contains mineral deposits including gold, talc, kyanite, slate, and feldspar (William and Mary, Department of Geology, 2009).

The project crosses the boundary of two of the US Environmental Protection Agency's (EPA) Level IV Ecoregions: the Piedmont Uplands (Ecoregion 64c) in the northwestern end and the Chesapeake Rolling Coastal Plain (Ecoregion 65n) in the southeastern end (Woods, et al., 2003). Ecoregions designate areas of general similarity in wildlife and vegetation communities and in the type, quality, and quantity of environmental resources.

The Piedmont Uplands (part of the Piedmont Level III Ecoregion) is composed of hills, irregular plains, and isolated ridges. Ultisol formations are common and have developed from weathered parent material; they are typically clay-rich, acidic, and relatively low in base saturation. Streams have silt, sand, gravel, and rubble-bottom materials and bedrock is only occasionally exposed. Differences in stream gradient, due to topography, greatly affect fish habitat (Woods, et al., 2003).

The Chesapeake Rolling Coastal Plain (part of the Southeastern Plains Level III Ecoregion) is a rolling, hilly, dissected portion of the Inner Coastal Plain that is made up of sedimentary material. Stream margins can be swampy and stained water can occur. Parts of the Fall Zone are included in the westernmost portion of the Rolling Coastal Plain; here, aquatic habitats vary between the islands, pools, swampy streams, and cascades (Woods, et al., 2003).

3.1.1.2 Soils

Analysis of soil maps within 500 feet of Broad Branch Road reveals that the majority of the soils have a moderate to high erosion potential, as described in **Table 3-1**. The majority of the areas where construction is expected to occur have been previously disturbed and are considered urban or cut/fill land. These locations are not rated for characteristics of concern for sensitive soil types.

Table 3-1. Soil Types within 500 feet of Broad Branch Road

SOIL TYPE	PERCENT OF CORRIDOR	DESCRIPTION	CONSTRUCTION LIMITATIONS	HYDROLOGIC SOIL GROUP
Ashe loam (AsD) 15-40% slopes	29.7	Somewhat excessively drained soil that occurs on ridge tops and side slopes in strongly dissected areas of the Piedmont Plateau. High erosion potential.	Very limited due to slope, frost action, and depth to bedrock	B
Brandywine - Urban Land Complex (BtC) 8-15% slopes	0.1	Brandywine soils that have been graded or otherwise altered for residential, commercial, or industrial development. Moderate to high erosion potential.	Somewhat limited due to slope, frost action, and depth to bedrock	A
Brandywine - Urban Land Complex (BtD) 15-40% slopes	10.9	Brandywine soils that have been graded or otherwise altered for residential, commercial, or industrial development. Severe erosion potential.	Very limited due to slope, frost action, and depth to bedrock	A
Codorus silt loam (Ck)	1.2	Moderately well-drained soil that occurs on ridgetops and side slopes in strongly dissected areas of the Piedmont Plateau. Severe erosion potential.	Very limited due to frost action, flooding, and depth to saturation	C
Cordorus-Urban land complex (Cn)	12.0	Moderately well-drained soil that has been graded or otherwise altered for residential, commercial, or industrial development. Moderate to high erosion potential, occasional flooding potential.	Not rated	D
Glenelg-Urban land complex (GhB) 0-8% slopes	1.3	Well-drained soils that have been graded or otherwise altered for residential, commercial, or industrial development. Moderate to high erosion potential.	Not rated	B
Manor loam (MbC) 8-15% slopes	0.3	Well-drained to somewhat excessively drained soil that occurs on ridgetops and side slopes in strongly dissected areas of the Piedmont Plateau. Moderate to high erosion potential.	Somewhat limited due to frost action and low strength	B
Manor loam (MbD) 15-40% slopes	26.3	Well-drained to somewhat excessively drained soil that occurs on ridgetops and side slopes in strongly dissected areas of the Piedmont Plateau. Severe erosion potential.	Very limited due to slope and frost action	B
Manor - Urban Land Complex (MdC) 8-15% slopes	0.2	Well-drained to somewhat excessively drained Manor soils, most areas of which have been graded, cut, filled, or otherwise disturbed during urbanization. Severe erosion potential.	Somewhat limited due to slope, frost action, low strength, and depth to bedrock	B
Manor - Urban Land Complex (MdD) 15-40% slopes	8.7	Well-drained soils that have been graded or otherwise altered for residential, commercial, or industrial development. Very severe erosion potential.	Very limited due to slope, frost action, and depth to bedrock	B

► *Continued.*

Table 3-1. Soil Types within 500 feet of Broad Branch Road

SOIL TYPE	PERCENT OF CORRIDOR	DESCRIPTION	CONSTRUCTION LIMITATIONS	HYDROLOGIC SOIL GROUP
Neshaminy-Urban land complex (NuD) 15-40% slopes	2.7	Well-drained soils that have been graded or otherwise altered for residential, commercial, or industrial development. High erosion potential.	Somewhat limited due to slope and frost action	B
Udorthents, loamy (U4)	6.1	Well drained soil that occurs on ridgetops and side slopes in strongly dissected areas of the Piedmont Plateau. High erosion potential.	Somewhat limited due to slope	C
Water	0.4	n/a	Not rated	n/a

Source: USDA, 2013

The rating for the project corridor soils for building local streets is approximately 80 percent "very limited" and seven percent "somewhat limited." These ratings indicate that there are one or more factors that should be taken into consideration when used for that specified purpose. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance of the soil can be expected if these steps are taken (USDA, 2013).

3.1.1.3 Topography

Topography on and adjacent to the project corridor is dominated by low, rolling hills. Some sharper changes in topography exist along streams where erosion has removed the topsoil and exposed the bedrock. For the majority of the alignment, Broad Branch Road is located alongside Broad Branch stream in the stream's valley. Steep grades on the side of the road opposite the stream increase stormwater velocity as the runoff flows downward from adjacent hillsides and neighborhood streets, across Broad Branch Road, and into Rock Creek Park. Unimpeded, the high velocity causes erosion as it leaves the pavement. This erosion exposes and degrades roadway infrastructure and removes soil, making it difficult for plants to root and grow. Deep stream erosion results in deteriorated habitat and unstable banks.

3.1.1.4 Agricultural Lands, Prime and Unique Farmland Soils

In recognition of the need to identify and preserve lands that are important for the production of the nation's food supply and major cash crops, the Natural Resources Conservation Service (NRCS) and the federal, state, and local governments have coordinated to inventory important farmlands. Important farmlands fall into two nationwide categories, Prime and Unique Farmland, and can also be recognized on the state or local levels as Farmland of State or Local Importance.

The project is located in a highly urbanized area that has already been developed or designated as park land. There is no mapped Prime or Unique Farmland in the project vicinity, and none of the land within the project area is available to be farmed. In addition, no Agricultural or Forestal Districts occur in the project vicinity.

3.1.2 WATER RESOURCES

Section 404 of the Water Pollution Control Act of 1972, also referred to as the Clean Water Act (CWA), provides protection for Waters of the United States (WOUS). WOUS can be generally defined as all navigable waters and waters that have been or can be used for interstate or foreign commerce, their tributaries, and any waters that, if impacted, could affect the former, including wetlands. Broad Branch and Soapstone Creek are WOUS in the project area and are discussed further in the Surface Water subsection. Impacts to wetlands are considered separately from other WOUS for permitting processes. For this reason, existing wetlands and open waters will be addressed independently of streams in this analysis.

Water resources are regulated by several federal and local laws and regulations in addition to the CWA, including the Code of Federal Regulations (CFR) Part 122.26 – Storm Water Discharges; Safe Drinking Water Act (SDWA) of 1974; DC Water Pollution Control Act of 1984; DC Storm Water Permit Compliance Amendment Act of 2000; and Title 21 of DC Municipal Regulations (Chapter 11- Water Quality Standards and Chapter 19 – Water Quality Monitoring Regulations). Construction projects can affect ecosystems and water quality by eliminating resources, increasing runoff, adding pollutants, and altering hydrology.

Broad Branch Road parallels and crosses several water resources, as depicted in **Figure 3-1**. These features are discussed in detail below.

3.1.2.1 Drinking Water and Groundwater

In 1974, the SDWA was passed by Congress to regulate the public drinking water supply. The 1996 Amendments mandate that states assess, delineate, and map protection areas for their public drinking water sources and determine potential risks to those sources. Source water protection is not specifically mandated by the SDWA; however, states, tribes, and communities are encouraged to use this information to protect the sources from pollution of major concern and may pass local regulations (EPA, 2004). The project area is serviced by public water and there are no private wells or source waters located along the project corridor. No sole source aquifers are located in the project vicinity.

Groundwater of the Piedmont Physiographic Province occurs in crystalline-rock aquifers, which consist of bedrock overlain by unconsolidated material called regolith. Due to the low permeability of the underlying bedrock, water is generally found in the regolith layer or along fractures in the rock. Recharge areas generally include the entire land surface, except for lower parts of valleys where it discharges in seeps, springs, and baseflow for streams such as Broad Branch.

The project is located in a stream valley with recharge areas uphill to the east (Rock Creek Park) and to the north and the west (lawns and undeveloped areas). The entire western side of the project area and the eastern side in the northern end is urban residential or institutional with a moderate amount of impermeable surface, which does not allow for as much rainwater to recharge naturally. Excess stormwater flows unchecked and unfiltered directly into the local stream system.

Soapstone Creek upstream from Broad Branch Road

Broad Branch Floodplain (view from Beach Drive)

BBR_049

Figure 3-1. Water Resources

3.1.2.2 Surface Water

The project corridor runs parallel to and crosses Broad Branch, a perennial stream with a mapped 100-year floodplain. This stream is classified as riverine, upper perennial, unconsolidated bottom (R3UB) by the Cowardin Classification System (Cowardin, et al. 1979). Several tributaries to Broad Branch are also crossed by the alignment, including Soapstone Creek. Most of the streams that feed Broad Branch, including the upstream portion of Broad Branch itself, are currently completely culverted until their confluence with Broad Branch. Prior to urbanization, the streams in this area were spring-fed headwater intermittent streams that conveyed water for the majority of the year. These streams would likely be classified under the Cowardin Classification System as riverine, intermittent, streambed (R4SB), if above ground.

Increased impervious surfaces, culverted streams, and lack of stormwater mitigation have led to water volumes and velocities during storm events that are too high for the existing natural channels to convey. As a result, erosion has occurred, damaging infrastructure and affecting sensitive habitats downstream.

3.1.2.3 Floodplains

The project area is located in the Federal Emergency Management Agency (FEMA)-mapped 100-year floodplain for Broad Branch. Erosion from additional stormwater has deteriorated infrastructure along the project area and stream bank stability. Flooding in April 2011 resulted in large sink holes and culvert failure in the roadway at the crossing of Soapstone Creek. An emergency replacement for the culvert is currently in place; a permanent solution is incorporated in the Preferred Alternative/Build Alternative 3 Modified.

3.1.2.4 Water Quality

According to Title 21 of the DC Municipal Regulations, Chapter 11, Water Quality Standards, last updated June 21, 2017, Rock Creek and its tributaries are considered Special Waters of the District of Columbia (SWDC). Waters designated as SWDC have quality better than needed for their current use or have scenic or aesthetic importance and shall be maintained at or above the existing level. All streams located in the project vicinity are tributaries to Rock Creek.

In compliance with Sections 303(d), 305(b), and 314 of the federal CWA and the SWDA, it is the responsibility of the states to develop a prioritized list of water bodies that currently do not meet water quality standards. The 303(d) list includes those water bodies and watersheds that exhibit levels of impairment requiring investigation and restoration.

EPA lists Broad Branch as impaired due to high levels of fecal coliform. The *Rock Creek Watershed Implementation Plan* lists both Soapstone Creek and Broad Branch as exceeding the Total Maximum Daily Load (TMDL) for organics and fecal coliform (DOEE, 2010e). Additionally, a study referenced in the *Rock Creek Watershed Implementation Plan*, which was conducted in 1993, found Broad Branch to be moderately impaired and Soapstone Creek to be severely impaired, based on an analysis of both biological and physical characteristics of the streams.

A TMDL is the determined maximum amount of a pollutant that a water body can contain and still meet applicable water quality standards. While no TMDLs exist for nitrogen, phosphorus,

or total suspended solids (TSS) in the District portion of the Rock Creek watershed, the District is still committed to reducing total nitrogen, phosphorous, and TSS loads in accordance with the Chesapeake Bay Agreement. Organics include chlordane, dichlorodiphenyltrichloroethane (DDT) and the compounds formed from its breakdown (DDD and DDE), dieldrin, heptachlor, epoxide, and various polycyclic aromatic hydrocarbons (PAH); all of which are found in Broad Branch and Soapstone Creek (DOEE, 2016).

Impairment of local water quality is attributed in large part to uncontrolled runoff that is causing erosion and allowing for roadway contaminants to flow directly into adjacent streams. As water flows over impervious surfaces, it collects dirt, rubber and metals from tires, fluids that have dripped from vehicles onto the pavement, pesticides and fertilizers from lawns, and discarded litter. Left untreated, these pollutants enter into the local water systems. The project area also suffers from degraded sewers that are leaking into the local water systems.

3.1.2.5 Wetlands

Wetlands provide valuable habitat for fish and wildlife; improve water quality; perform important hydrologic functions, such as regulating storm flow; maintain food chain and nutrient cycling functions; serve socioeconomic roles; and may support rare and endangered species. Executive Order (EO) 11990, *Protection of Wetlands*, mandates that each federal agency take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance their natural values.

Wetlands are defined by the US Army Corps of Engineers (USACE) (33 CFR 328.3[b]) and the EPA (40 CFR 230.3[t]) as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

There are no wetlands located in the project area according to National Wetlands Inventory (NWI) maps.

3.1.2.6 Navigable Waters

The Potomac River, downstream of the project area, is a traditional navigable water. Soapstone Creek and Broad Branch are perennial tributaries to this traditional navigable water and as such are, by definition, WOUS. No waters in the immediate project vicinity are designated as navigable waters.

3.1.2.7 Wild and Scenic Rivers

In 1968, Congress passed the Wild and Scenic Rivers Act to preserve rivers with outstanding natural, cultural, and recreational values in a free-flowing condition. In accordance with this law, federal projects are prohibited from supporting actions such as dams or other in-stream activities that would impact a river's free-flowing condition, water quality, or other outstanding resource values.

According to NPS, no Wild or Scenic Rivers are located in the project vicinity; however, Rock Creek, from the Porter Street Crossing to the Maryland border (downstream from the project area), is listed on the National Rivers Inventory (NRI) for recreational and historic values. Rivers on the NRI list are free-flowing rivers that possess one or more Outstandingly Remarkable Values (ORVs) and could potentially qualify as national wild, scenic, or recreational rivers (NPS, 2009a).

3.1.2.8 Coastal Zone

Federal actions occurring within or with the likelihood to affect any land or water use, or natural resource of a state's coastal zone, including cumulative and secondary effects, must be consistent with a state's federally approved Coastal Zone Management Plan (CZMP) according to Section 307 of the Coastal Zone Management Act of 1972, as amended (CZMA), and National Oceanic and Atmospheric Administration (NOAA) regulations (15 CFR Part 930).

The District of Columbia does not have a designated coastal zone and has not developed a CZMP under the CZMA. The Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), however, amended the CZMA to clarify that federal consistency requirements apply when any federal activity, regardless of location, affects any land or water use or natural resource of the coastal zone.

3.1.2.9 Chesapeake Bay Protection

The District has been a partner of the EPA's Chesapeake Bay Program since its inception in 1983. President Obama's executive order in 2009 on the Chesapeake Bay included goals for restoring clean water by reducing nitrogen, phosphorus, sediment, and other pollutants; recovering habitat by restoring a network of land and water habitats to support priority species and other public benefits; sustaining fish and wildlife; and conserving land and increasing public access.

The District achieved its goal of reducing the controllable portion of nitrogen and phosphorus by 40 percent. In June of 2000, partners of the Chesapeake Bay Program adopted a new agreement in which the District plans to further reduce nutrient loading and control sediment by limiting its contribution of pollutants to 2.4 million pounds/year of nitrogen, 0.34 million pounds/year of phosphorus, and 0.006 tons/year of sediment (DOEE, 2011).

3.1.2.10 Marine and Estuarine Resources

There are no marine or estuarine resources located in the project vicinity.

3.1.3 Wildlife including Threatened and Endangered Species

The Federal Endangered Species Act (ESA) (16 USC 1531 through 1544; 50 CFR 17) provides for the conservation of endangered and threatened species of fish, wildlife, and plants and their associated habitats. The US Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) share responsibility for evaluating potential harm to endangered species.

The Migratory Bird Treaty Act of 1918 (MBTA) makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit.

The District's Fisheries and Wildlife Division is the responsible agency for managing wildlife in the District. Species and habitat are protected under the District's 2015 Wildlife Action Plan (WAP). In addition, the DC Fisheries and Wildlife Omnibus Amendment Act of 2016 (D.C. Act 21-675) provides for the designation and regulation of critical areas for environmental protection, including areas containing species of local importance, fish and wildlife habitat, conservation areas, floodplains, and wetlands.

Wildlife in the project area includes species adapted to urban/suburban conditions, such as common birds, squirrels, raccoons and opossums as well as species associated with less-disturbed forest habitats within Rock Creek Park, such as whitetail deer, turtles, red fox, grey fox, and coyote. Green areas on the west side of the roadway consist of mainly fragmented urban forest that provides moderately valuable habitat for wildlife.

Information regarding sensitive species and resources that may be impacted by the project was obtained from the USFWS Information for Planning and Consultation (IPaC) system and coordination with NPS biologists at Rock Creek Park. The IPaC system is an online conservation planning tool used by USFWS to streamline the environmental review process associated with Section 7 of the ESA. The USFWS IPaC system identified two federally-listed threatened or endangered species that may occur within the project vicinity and could potentially be affected by the proposed project (USFWS, 2018). These species include the endangered Hay's spring amphipod (*Stygobromus hayi*) and the threatened Northern long-eared bat (*Myotis septentrionalis*).

According to the USFWS IPaC system, there are no critical habitats under USFWS jurisdiction, and no wildlife refuges or fish hatcheries within the project area (USFWS, 2018). IPaC identified 9 migratory birds of particular conservation concern, including the bald eagle, which could be affected by activities within the project study area.

Rock Creek Park provides habitat for the Hay's spring amphipod (*Stygobromus hayi*), an endemic amphipod in springs and groundwater within the park. Communications with park officials indicate that the closest known population is approximately three quarters of a mile northeast of the southern end of Broad Branch Road and is not in the Broad Branch tributary watershed (Yeaman, 2013; Ferebee, 2019).

The Northern long-eared bat was federally listed as threatened effective May 4, 2015 (80 FR 17974). The Northern long-eared bat ranges across much of the eastern and northcentral United States (including all or portions of 37 States and the District of Columbia), and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia. Winter habitat includes underground caves and cave-like structures such as abandoned or active mines, tunnels, and highway underpasses. During summer, Northern long-eared bats typically roost singly or in colonies underneath bark or in cavities or crevices of both live trees and snags. Mature forests provide important foraging habitat for this species. Northern long-eared bat roosts have been observed in the vicinity of the southern end of the project. ***During review of the Revised Draft EA, USFWS informed DDOT via an email dated October 22, 2020 that there are potentially two Northern long-eared bat maternity roost tree buffers (150 foot radius around roost trees) that occur within the project area.***

3.1.3.1 Wildlife and Waterfowl Refuges

No wildlife or waterfowl refuges are located in the project vicinity.

3.1.3.2 Anadromous Fish, Trout Waters, and Shellfish

According to Rock Creek Park natural resources specialists, suitable habitat conditions for spawning anadromous fish exist within Broad Branch adjacent to the project area; however, anadromous fish are only able to travel as far as the insurmountable box culvert that carries Beach Drive over the Broad Branch stream, downstream of the project area (Yeaman, 2011).

Rock Creek does not support trout and there are no shellfish of concern within the project vicinity (Rock Creek Park, 2010).

3.1.4 VEGETATION

Rock Creek Park is the only large area of mostly contiguous deciduous forest habitat in the District metropolitan area, and the adjacent forests play a major factor in defining the character of Broad Branch Road. The Broad Branch Road right-of-way is owned by the District of Columbia, but lands adjacent to the roadway on much of the eastern edge of the alignment are administered by NPS.

As with all NPS units, management of the park is guided by numerous congressional acts and executive orders, in addition to the enabling legislation. Some of these laws and executive orders are applicable primarily to units of the national park system. These include the 1916 Organic Act creating the NPS and the General Authorities Act of 1970 relating to the management of the national park system.

The Organic Act created the NPS in 1916. This act defines the NPS mission to "conserve the scenery and the natural and historic objects and the wildlife [in national parks, monuments, and reservations] and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

Protection of the deciduous forest has been a long-term management goal at Rock Creek Park. Protection has included such actions as minimizing or avoiding clearing of trees, suppressing wildfires, and controlling the presence and distribution of invasive species.

The 1890 legislation establishing Rock Creek Park states that the area is to be “perpetually dedicated and set apart as a public park or pleasure ground for the benefit and enjoyment of the people of the United States.” It specifies that the park is to “provide for the preservation from injury or spoliation of all timber, animals, or curiosities within said park, and their retention in their natural condition, as nearly as possible.” It directs park managers to provide for public recreation, specifically to “lay out and prepare roadways and bridle paths, to be used for driving and for horseback riding, respectively, and footways for pedestrians.”

The majority of the land along the Broad Branch Road alignment has been previously disturbed. Green areas on the west and north (residential) sides of the roadway consist of landscaped lawns with shrub and tree privacy strips adjacent to the road and larger lots of fragmented urban forest. The east (park) side of the roadway is forested. Sections of the area have been disturbed by

roadway, trail, and utility construction and maintenance. Invasive, non-native grasses and herbaceous vegetation are present.

3.1.4.1 Trees and Shrubs

The forested areas along the east side of the roadway corridor are mostly dominated by mixed oak and beech with May apples, in addition to a few patches of chestnut oak and sycamore (NPS, 2009b). Trees vary in age, size, and condition as a result of the various roadway and utility maintenance operations over the years (see **Figure 3-2**). These activities have required the periodic removal and trimming of trees and occasionally have harmed root systems, which has led to the declining health of some individual trees.

A tree survey was conducted along the roadway corridor as part of the roadway survey. The tree survey documented species, health, and size for trees greater than 4 inches in diameter. The inventory was used to determine the potential impact (direct and indirect) to trees adjacent to the roadway and help determine the level of replacements required to mitigate any loss (see **Chapter 4**).

3.1.4.2 Invasive Species

Invasive species are non-native plant, animal, or microbial species that cause, or have the potential to cause, economic or ecological harm or harm to human health (Presidential EO 13112). Seeds and propagules of invasive species may be transported from one place to another on construction equipment that has not been properly cleaned before transport.

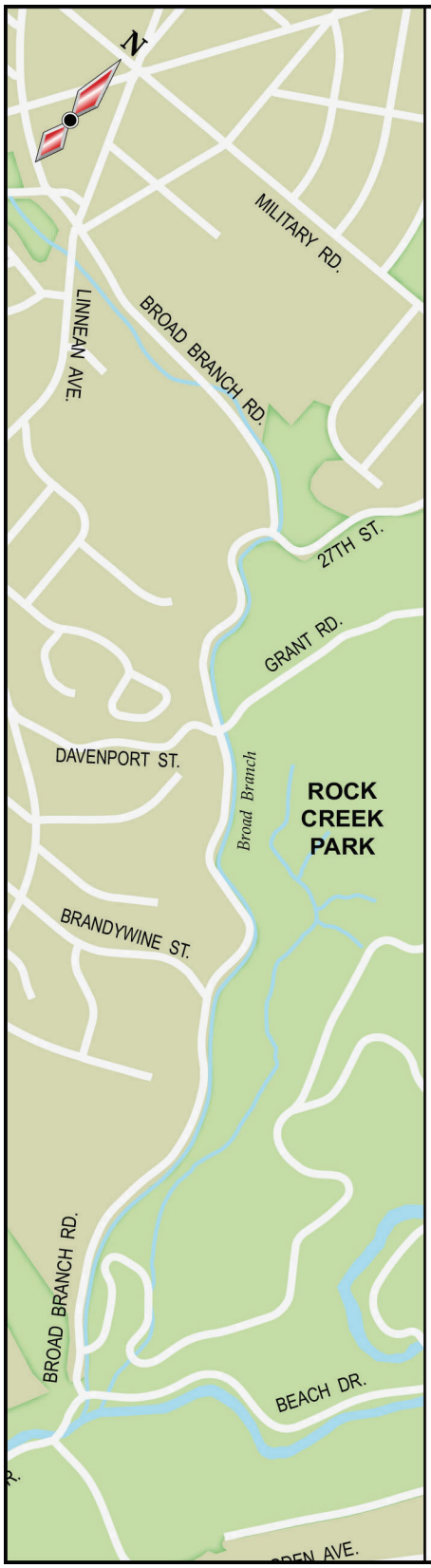
Disturbed areas are also easily colonized by invasive species if not properly seeded with a cover crop after earthwork has been completed.

Rock Creek Park is exposed to continuous threats from aggressive and exotic invasive plant species due to its proximity to urban development. According to park officials, over 30 percent of the approximately 650 species of plants that have been identified in the park are introduced.

Similarly, the forested areas adjacent to the roadway already support several invasive species and are susceptible to additional invasive species as well.

3.1.4.3 Unique Ecosystems, Biosphere Reserves, World Heritage Sites

According to the United Nations online list of World Heritage Sites and Biosphere Reserves and conversations with Rock Creek Park staff, there are no Unique Ecosystems, Biosphere Reserves, or World Heritage Sites located within the project vicinity (UNESCO, 2010; Rock Creek Park, 2010).



Typical Natural Growth

Landscaped Residential Lawns and Gardens

Trail Entrance to Rock Creek Park from Beach Drive

BBR047

Figure 3-2. Landscapes in the Project Area

3.2 CULTURAL AND PALEONTOLOGICAL RESOURCES

Cultural and paleontological resources include four major groups of resources: prehistoric and historic archaeological, architectural, Native American, and paleontological resources. Cultural resources are prehistoric and historic sites, structures, districts, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for traditional, religious, scientific, or any other reason. Paleontological resources are the physical remains, impressions, or traces of plants or animals from a former geologic age and are not associated with human activity. Cultural resources are discussed here in terms of archaeological resources, including both prehistoric and historical occupations; historic structures; cultural landscapes; ethnographic resources; museum collections; and Indian Trust Resources and Native American sacred sites, including Traditional Cultural Properties. Paleontological resources are discussed as a separate category.

Procedures for the identification, evaluation, and treatment of cultural resources are contained in a series of federal and state laws and regulations and agency guidelines. Archaeological, architectural, and Native American resources are protected by a variety of laws and their implementing regulations: the National Historic Preservation Act (NHPA) of 1966, as amended in 2006; the Archeological and Historic Preservation Act of 1974; the Archaeological Resources Protection Act (ARPA) of 1979; the American Indian Religious Freedom Act (AIRFA) of 1978; and the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990. The Advisory Council on Historic Preservation (ACHP) further guides treatment of archaeological and architectural resources through the Protection of Historic Properties (36 CFR 800) regulations.

The improvements for Broad Branch Road involve the use of federal funding, permitting, and licensing (36 CFR 800.16(y)). FHWA is the lead federal agency; therefore, the project is under the purview of Section 106 of the NHPA. Section 106 of the NHPA governs federal actions that could affect historic properties. Historic properties are the subset of cultural resources listed on or eligible for inclusion on the National Register of Historic Places (NRHP). Section 106 requires federal agencies to take into account the effects of their undertakings, including licensing and approvals, on NRHP-eligible resources and to afford the ACHP and other interested parties a reasonable opportunity to comment.

The significance of historic properties is judged by the property's ability to meet the four criteria for inclusion in the NRHP (36 CFR 60.4):

- Association with events that made a significant contribution to the patterns of our history;
- Association with the lives of persons significant in our past;
- Sites that embody characteristics of a type, period, or methods of construction or that represent the work of a master, possess high artistic value, or represent a distinguishable entity; or
- Have yielded, or may be likely to yield, information important to prehistory or history.

Properties may be eligible for the NRHP for contribution at the national, state, or local level. In order for a structure to be listed on the NRHP, it must possess historic integrity of those features necessary to convey its significance in accordance with NRHP guidelines; these include location, design, setting, workmanship, materials, feeling, and association.

3.2.1 Area of Potential Effects

The Area of Potential Effects (APE) was established in coordination with the District of Columbia State Historic Preservation Office (DC SHPO). As defined by 36 CFR 800.16(d) of Section 106 of the NHPA, the APE represents the "…geographic area or areas within which an undertaking could cause changes in the character or use of historic properties, if any such exists."

DDOT in consultation with the DC SHPO (in a meeting on August 16, 2011) defined the APE boundaries as the east bank of Broad Branch between Beach Drive and 27th Street NW; the first row of structures north of Broad Branch Road between 27th Street NW and Nevada Avenue NW; several residences south of Broad Branch Road along Linnean Avenue; and the first row of residences west of Broad Branch Road between 27th Street NW and Beach Drive. This APE is considered sufficient to include all proposed repairs or modifications to Broad Branch Road, to incorporate any possible construction staging areas, to accommodate any modifications and/or replacement of the Soapstone Creek Culvert, and to assess any visual or audible intrusions. A map of the defined APE is presented in **Figure 3-3** and **Appendix D**.

3.2.2 Archaeological Resources

Archaeological resources include both prehistoric and historic resources. Prehistoric resources are physical properties resulting from human activities predating written records. These archaeological sites are the loci of human behavior as indicated by concentrations of artifacts, features, or floral and faunal remains. Prehistoric land use patterns were more closely related to local environmental conditions than are most modern settlements. Historic resources are physical properties that post-date the existence of written records and include features such as trails, roadbeds, building foundations, and refuse concentrations.

No archaeological investigations have been conducted within the project area; however, archaeological studies have been conducted in adjacent Rock Creek Park since W.H. Holmes excavations at Piney Branch Quarry in 1889 (Moran, 1997). Archaeological investigations that have been conducted adjacent to the proposed project area include a Phase I intensive survey for a multi-use trail rehabilitation project in Rock Creek Park (Swain et al., 2017); a Phase IA archaeological survey for the proposed replacement of the 27th Street NW Bridge over Broad Branch (Mikolic and Schopp, 2012); a survey of Soapstone Branch stream valley for rehabilitation of a sanitary sewer line in Soapstone Valley Park by DC Water (Gibb and Michailof, 2017); a survey of 31 erosion control and bank stabilization sites along Rock Creek (Inashima, 1985) and a four-year study of Rock Creek Park covering areas immediately adjacent to the project area (Bedell et al., 2008; Fiedel et al., 2004, 2005, 2006, 2008). The Phase I survey techniques used in the four-year study included reconnaissance survey, metal detector survey, and shovel testing using both judgmental and systematic sampling strategies (Fiedel et al., 2008).

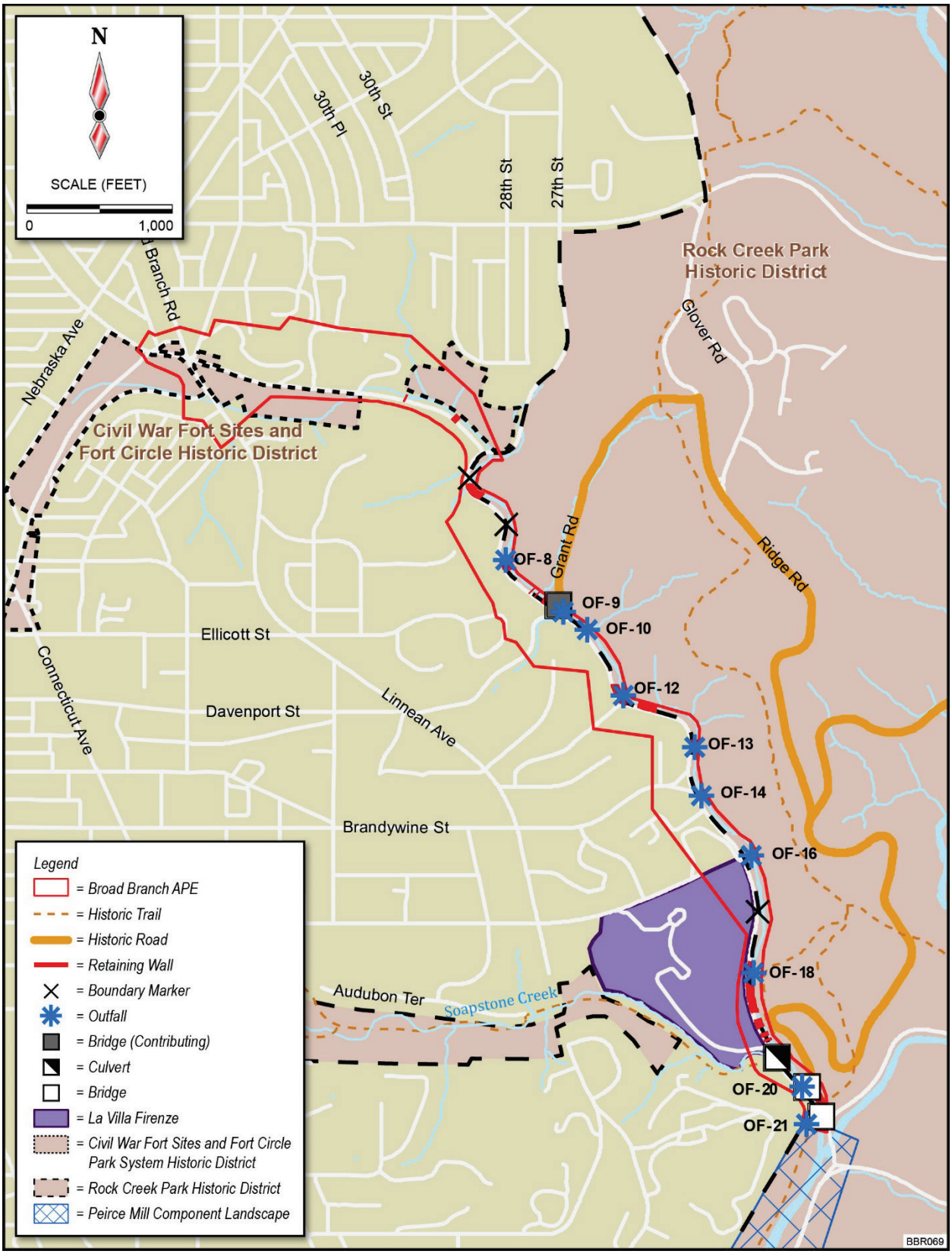


Figure 3-3. Civil War Fort Sites and the Fort Circle Park System and Rock Creek Park Historic Districts with Associated Architectural Resources in the Broad Branch Road APE

Six sites were identified within 500 feet of Broad Branch during previous archaeological investigations: 51NW169, 51NW172, 51NW183, 51NW184, 51NW185, and 51NW194 (**Table 3-2**). Three sites have been determined eligible for listing in the NRHP; three have not been evaluated for NRHP eligibility. One archaeological (site 51NW169), an unnamed Civil War battery, is located within the project area. Archaeological deposits related to the unnamed Civil War battery are not likely to occur beneath Broad Branch Road as the road was constructed in 1839 prior to construction of any Civil War defenses. The remaining archaeological sites are situated on the terraces above Broad Branch and none are located within the DDOT right-of-way.

Table 3-2. Archaeological Resources within 500 feet of the Broad Branch Road Project Area

SITE NUMBER	SITE NAME	SITE TYPE	NRHP ELIGIBILITY
51NW169	Unnamed Battery	Civil War battery	Contributing element to the Civil War Fort Sites and Fort Circle Park System Historic District
51NW172	Broad Branch site	Prehistoric lithic scatter	Not evaluated
51NW183	Jane Dickson Site	19th century tenancy	NRHP-eligible
51NW184	J.W. Willis Site	19th century farmstead	Not evaluated
51NW185	Sara Whitby Site	19th century tenancy	NRHP-eligible
51NW194	Broad Branch Quarry	19th century	Not evaluated

3.2.2.1 Civil War Fort Sites and Fort Circle Park System Historic District

The Civil War Fort Sites and Fort Circle Park System Historic District consists of the locations of forts, batteries, and rifle trenches comprising the Civil War Defenses of Washington constructed between 1861 and 1865 (CEHP, Inc., 2004; Figure 3-3). By 1865, the Defenses of Washington included 68 forts, 93 detached batteries for field guns, 20 miles of rifle pits and covered ways, three wooden blockhouses, 32 miles of military roads, several stockaded bridgeheads, and four picket stations. Along the circumference of the 37-mile circle of fortifications were emplacements for a total of 1,501 field and siege guns (NPS, 2004, 2007). Nineteen contributing elements have been identified and include both architectural remains (earthworks) and archaeological manifestations of seventeen forts and two batteries in DC, Virginia, and Maryland. The Civil War Fort Sites and Fort Circle Park System Historic District was listed on the NRHP in 1974 with an additional amendment in 1978 to enlarge the district boundary (Dillon, 1972, 1976). The NPS is currently working on the update to the NRHP nomination form for the Civil War Fort Sites and Fort Circle Park System Historic District. One contributing element to the Civil War Fort Sites and Fort Circle Park System Historic District is located within the project area: archaeological site 51NW169.

Site 51NW169 is an unnamed Civil War battery location, characterized as an ovoid flattened area measuring 150 feet by 100 feet and encircled by an earthen berm (Fiedel et al., 2008:160; Googins, 2005). A trench is located below the berm on the northwest side (Googins, 2005). The Broad Branch battery was an unarmed auxiliary battery with three vacant gun platforms (Fiedel et al., 2008:160). No artifacts are associated with this site. Although the boundary of site 51NW169 extends into the APE, no features associated with the Civil War battery location occur within DDOT right-of-way.

3.2.3 ARCHAEOLOGICAL POTENTIAL

Archaeological potential in the APE was determined using several methods: a general elevation change analysis based on comparison of vertical contours from historic and modern cartographic sources, an analysis based on comparison of horizontal changes in road and stream bed alignments from those same sources, review of a geoarchaeological study, examination of historic land use, and assessment of geological formations.

Vertical changes in the APE were examined comparing the elevations (based on 5-foot contour intervals) from the 1892 topographic map (United States Coast and Geodetic Survey 1892) with the most current elevation (based on converted 0.6 meter contour intervals) included within the Washington, DC Geographic Information System (GIS) lidar dataset (DC GIS 2009) to demonstrate the extent of cut and fill that has occurred over time. Along the west side of Broad Branch Road south of 27th Street NW, an increase in elevation over time likely resulted from the addition of fill (likely brought in) to fill in drainages and create level areas for the construction of residential homes Other areas of increased elevation, resulting from the addition of fill, occur along both sides of Broad Branch Road between 27th Street, NW and Linnean Avenue, and are associated with both residential development and former road reconstruction and maintenance. Extensive areas showing a decrease in elevation (cut), likely the result of erosion, occur along Broad Branch stream and its east tributaries draining Rock Creek Park and north tributary near 29th Street, NW. One area with decreased elevation corresponds to the location of an historic quarry (site 51NW194). This elevation analysis indicates that the APE has been extensively modified through time with both cut (erosional and manmade excavation) and fill (manmade) activities.

Horizontal changes to features in the study area were analyzed by comparing the 1892 topographic map (United States Coast and Geodetic Survey 1892) with the most current contour intervals (DC GIS 2009) to identify variations in the alignment of Broad Branch Road and the course of Broad Branch stream over time. Broad Branch Road and Broad Branch stream occur in the same general alignments as their current/modern positions with one exception. In 1892, Broad Branch Road crossed over Broad Branch stream north of Brandywine Street, NW, at the confluence with a western tributary; whereas currently the roadway is continuously west of the stream bed.

Although the previous two analyses indicate general changes in elevation and alignments within the APE, a close review was conducted of two locations which are relatively flat: the extreme northern end of the project area and immediately north of the confluence of Soapstone Creek and Broad Branch.

Within the current APE at the extreme northern end of the Broad Branch Road project, a geoarchaeological study was conducted for the Broad Branch stream restoration project (Wagner, 2011). Although the stream restoration area contains both upland and alluvium terrain, both have experienced extreme modification. The uplands near Linnean Avenue have been either deeply graded or filled, and other uplands near Broad Branch Road are too steep for direct occupation; therefore, this area contains no potential for prehistoric resources (Wagner, 2011).

The area north of the confluence of Soapstone Creek and Broad Branch contains a small residence with a sloping yard bounded by stone retaining walls (the Gatehouse at La Villa Firenze). Originally, this area contained steep slopes on either side of Soapstone Creek and along the west edge of Broad Branch as indicated on historic maps (Boschke, 1861; Swinton, 1881; USGS, 1891, 1898) with no level floodplain. Road, park, and building construction activities at the confluence of Soapstone Creek and Broad Branch have altered the topography at this location. Broad Branch Road was constructed in 1839 and was cut from the steep slopes on the west side of Broad Branch including the area near the confluence with Soapstone Creek. By 1861, a small road was established along the north side of Soapstone Creek to access structures on the ridgetop (Boschke, 1861). By 1898, a small structure was located north of the small access road, north of Soapstone Creek (USGS, 1898), and this structure is depicted on subsequent historic maps (Baist, 1903, 1907, 1911, 1913, 1919). The Soapstone Creek stone arch culvert was constructed in 1898 during a period of initial improvements to adjacent Rock Creek Park and the downstream wing walls were most likely added in 1934 when the culvert was extended. Prior to 1925, the small structure north of Soapstone Creek was demolished and the existing Tudor Revival style gatehouse was constructed. Because of the various ground disturbing activities north of the confluence of Soapstone Creek and Broad Branch, particularly the construction of a structure by 1898, its demolition prior to 1925, and construction of the existing gatehouse, this area contains no potential for prehistoric or historic resources.

Based on historical photographs and park history, archaeological sites related to the establishment of Rock Creek Park and the enhancement of the Park with the construction of rural architectural features may occur. For example, a multi-course stone dam was constructed across Broad Branch north of the Soapstone Creek Culvert ca. 1898 to enhance the rural feel by creating a waterfall (**Figure 3-4**). Although evidence of the stone dam is no longer visible due to years of siltation at the confluence of Soapstone Creek and Broad Branch, archaeological remnants of the dam could occur. Fifteen segments of a historic stone retaining wall line the west side of Broad Branch in the stream bed; it is possible that the stone retaining wall may have been continuous and through time, portions have been displaced or destroyed by stormwater. Although surface manifestations of the stone wall are lacking along portions of the stream, archaeological remains of the wall foundations could occur.

Figure 3-4. Pre-1934 Photograph of the Stone Dam across Broad Branch (E. B. Thompson, D.C. Public Library Photo Archives)

Several types of geological formations within the Broad Branch Road project area have the potential to contain intact archaeological sites such as prehistoric or historic quarries. Quarries identified within Rock Creek Park consist of prehistoric lithic quarries (quartzite cobbles for tool manufacture and soapstone for bowl production), and historic stone quarries (stone for walls,

buildings, dams, etc.) (Fiedel et al. 2008). The prehistoric quartzite cobble quarries are associated with the sand and gravel facies of the Potomac Formation (NPS 2009:10). The Potomac Formation is not present within the project area and no quartzite deposits occur within the APE. The soapstone quarry (Rose Hill Quarry) was associated with deposits of metavolcanic and meta-igneous rocks located along the headwaters of Soapstone Creek near Connecticut Avenue, NW (Southworth and Denenny 2006:19). This quarry has since been destroyed by urbanization (Fiedel et al. 2008: 44). No deposits of metavolcanics and meta-igneous rocks occur within the project area and no soapstone deposits occur within the APE.

A historic stone quarry (site 51NW194) which produced Kensington metatonalite, is located on the east slope of Broad Branch stream south of Grant Road, NW along the edge of the APE. The quarry is associated with an igneous intrusion in the Sykesville Formation and occurs within a 1.8-mile shear zone trending north-south (Southworth and Denenny 2006: 20). The Kensington Tonalite intrusive formation occurs along the steep slopes of Broad Branch stream from the quarry location north to the end of the project area at Linnean Drive, NW. The location of this historic quarry corresponded to an area of cut as identified in the elevation analysis. Although the Kensington Tonalite formation occurs on the slopes along the upper reaches of Broad Branch stream, no other areas of intensive excavation suggesting additional quarry locations were defined in the elevation analysis.

3.2.4 Historic Structures

The term "historic structures" encompasses resources purposefully erected to serve some human activity and are typically classified as buildings, structures, objects, or districts. These structures may consist of residential buildings (e.g., farmhouses, plantation manors, and associated outbuildings, including sheds and barns); industrial structures, such as mills and millraces; commercial buildings (e.g., stores, banks, and other business-related office buildings); transportation structures, such as bridges; and resources related to water control and distribution.

Historic structures or architectural resources in the project area include contributing and non-contributing elements to the Rock Creek Park Historic District (RCPHD) (Figure 3-3); a stone pedestrian bridge; roadway and water control features associated with District of Columbia infrastructure; residences; and educational and health facilities.

3.2.4.1 Rock Creek Park Historic District

The RCPHD consists of 1,754 acres of land dominated by picturesque landscapes featuring forested areas, streams, valleys, meadows, and sloping hills. The Park was listed in the NRHP in 1991 based on themes of architecture, community planning and development, conservation, entertainment and recreation, industry, landscape architecture, military, and horticulture. Important persons associated with the history of the Park include Joshua Pierce and landscape architects Frederick Law Olmsted, Jr. and John C. Olmsted. The Park as a whole retains a high degree of integrity of design, workmanship, location, feeling, association, and setting. The RCPHD was originally defined as encompassing Reservation 339 (Rock Creek Park). An effort to expand the RCPHD boundaries to include several adjacent and related public reservations considered part of Rock Creek Park: Reservations 356, 402, 432, 433, 308A, 545, 635, 630 and 563 is underway.

The RCPHD was originally defined as 31 contributing elements and 59 non-contributing elements (Bushong, 1990a and 1990b). An amendment with boundary increases to the RCPHD was prepared in 2014 (Liebertz et al. 2014); additional information for the RCPHD included 60 contributing elements and 18 non-contributing elements. Forty-one of the additional 60 contributing resources were also previously listed on the NRHP (Liebertz et al. 2014). Currently, the RCPHD is defined as 90 contributing elements and 53 non-contributing elements. Five of the 90 contributing elements constitute categories or systems of resources pertinent here- the circulation network (historic roads), historic trails, culverts and retaining walls, vehicular bridges, and connector reservations (Soapstone Creek Valley- Reservation 402). Components of the circulation network which are contributing elements to the RCPHD were delineated in the NRHP registration form and subsequent amendment (Bushong, 1990a, 1990b; Liebertz et al. 2014)); however, most of the individual culverts, outfalls, and retaining walls, scattered throughout the Park, have not been formally surveyed and the physical characteristics of culverts from the period ca. 1900 to 1972 that would contribute to the RCPHD have not been defined (Liebertz et al. 2014). Architectural features associated with the RCPHD located with the project area include: Grant Road Bridge; Broad Branch Bridge; Glover (Ridge) Road Bridge; Grant Road; Ridge (Glover) Road; Western Ridge Foot Trail and White Horse (Bridle) Trail on the north side of Broad Branch; Soapstone Creek culvert; storm water outfalls with stone headwalls; stone retaining walls; and stone boundary markers (**Table 3-3**, Figure 3-3). In addition, the boundaries of the proposed RCPHD expansion include the Soapstone Creek Valley (Reservation 402) and the foot trail within the valley.

Table 3-3. Rock Creek Park Historic District Contributing Elements in the Project Area

RESOURCE	DATE OF CONSTRUCTION	DESCRIPTION	NRHP STATUS
Historic Bridges	1898	Grant Road Bridge (RCP-RPI 3450-7325) (stone arch culvert)	Contributing element to RCPHD
Historic Bridges	1957	Broad Branch Creek Bridge over Rock Creek at Beach Drive (RCP-RPI 3450-7311)	Contributing element to RCPHD
Historic Bridges	1957	Glover (Ridge) Road Bridge over Broad Branch stream (RCP-RPI 3450-7312)	Contributing element to RCPHD
Circulation Network – Historic Roads	1862	Grant Road (RCP-RP 3450-7325)	Contributing element to RCPHD
Circulation Network – Historic Roads	1899-1901	Ridge (Glover) Road	Contributing element to RCPHD
Circulation Network – Historic Trails	1830-1941	Western Ridge Foot Trail on east side of Broad Branch stream	Contributing element to RCPHD
Circulation Network – Historic Trails	1945-1966	White Horse (Bridle)Trail on east side of Broad Branch stream	Contributing element to RCPHD
Circulation Network – Historic Trails	ca. 1913-1950	Soapstone Creek Valley Foot Trail	Contributing element to RCPHD
Culverts	1898	Soapstone Creek Culvert	Contributing element to RCPHD
Stormwater Outfalls	ca. 1900-1941	Ten stormwater outfalls associated with stone headwalls or stone retaining walls	Contributing elements to RCPHD
Retaining Walls	ca. 1900-1941	Fifteen relatively intact segments lining portions of Broad Branch	Contributing element to RCPHD
Boundary Markers	ca. 1890s/1920s	Three stone boundary markers	Not evaluated; Considered contributing elements to the RCPHD by the DC SHPO and NPS

HISTORIC BRIDGES

The Grant Road Bridge spans Broad Branch at the intersection of Broad Branch Road and Grant Road and consists of a stone arch constructed in 1898 during a period of initial improvements to Rock Creek Park (**Figure 3-5**).

The stone culvert headwalls are faced with irregularly coursed granite and the interior of the arch is lined with brick. A keystone is located at the center of the arch ring on each side of the bridge (Bushong, 1990b; Davis, 1996).

The Broad Branch Creek Bridge over Broad Branch near Beach Drive (RCP-RPI 3450-7311) was constructed in 1957 and replaced the old ford that previously crossed Rock Creek. The bridge is a pre-stressed concrete girder bridge over a triple-span concrete box culvert with irregularly coursed stone veneered (gneiss) abutment and steel railing similar in design and materials to the nearby Glover (Ridge) Road Bridge (**Figure 3-6**).

The bridge is considered a contributing element to the RCPHD (Liebertz et al. 2014).

The Glover (Ridge) Road Bridge over Broad Branch Run (RCP-RPI 3450-7312) was also constructed in 1957 and replaced the "Pebble Dash" Bridge that had carried Beach Drive over Broad Branch Run from 1902 to 1956. The bridge is a pre-stressed concrete girder bridge over a triple-span concrete box culvert, with stone-veneered (gneiss) abutments and steel railings similar in design to the Broad Branch Road Bridge (**Figure 3-7**).

The bridge is considered a contributing element to the RCPHD (Liebertz et al. 2014).

Figure 3-5. Grant Road Bridge, looking south

Figure 3-6. Broad Branch Creek Bridge over Broad Branch, looking north

Figure 3-7. Glover (Ridge) Road Bridge over Broad Branch, looking west

CIRCULATION NETWORK – HISTORIC ROADS AND HISTORIC TRAILS (1830-1941)

Grant Road was established in 1862 as part of the military road system for Washington's outer defense during the Civil War. Grant Road was widened, regraded, and surfaced with gravel ca. 1898 (Bushong, 1990b). The old roadway between Ridge Road and Broad Branch Road, now known as Grant Road, was macadamized in fiscal year 1915. Grant Road (1862) intersects the project area at Broad Branch Road. Grant Road is considered a contributing element to the RCPHD (Bushong 1990b; Davis 1996).

Glover Road – also designated in this location as Ridge Road, as shown on park and other modern maps - begins near the intersection of Beach Drive and Broad Branch Road and ends at Military Road. Some segments of the road follow the alignment of old farm roads that predate the creation of Rock Creek Park. Originally known as "Ridge Road" and renamed to honor park promoter and benefactor Charles C. Glover, this was one of the first roads to be developed for recreational driving after Rock Creek Park was created. Most of the current alignment and grading date to 1899-1901 (Bushong, 1990b; Davis, 1996; MacKintosh, 1985). In 1956, the road was shifted to intersect with Broad Branch Road, crossing the narrower stream on a short concrete and steel bridge instead of entering Beach Drive directly just north of the confluence of Rock Creek and Broad Branch (Davis, 1996). Ridge Road or Glover Road is considered a contributing element to the RCPHD (Bushong 1990a, 1990b; Davis 1996).

The Western Ridge foot trail is present along the southern end of the project area beginning at the intersection of Broad Branch Road and Beach Drive. The trail is located north of the confluence of Rock Creek and Broad Branch and crosses Ridge Road. The trail parallels Broad Branch stream on the east side, climbing onto the ridge and diverging from the stream to join the ridge above (Bushong 1990b).

Along with the Western Ridge Trail, two other trails are located in the APE: the Soapstone Creek Valley trail and the White Horse bridle trail. These trails were documented as part of a cultural landscape report and are considered contributing elements to the Rock Creek Park Historic Trails Cultural Landscape (Poss and McMillen 2013).

CULVERTS, STORMWATER OUTFALLS, AND RETAINING WALLS (CA. 1900 -1941)

Soapstone Creek Culvert, a 1957 retaining wall and spillway, ten stormwater outfalls associated with stone headwalls or with stone retaining walls, and fifteen segments of 1890s-1920s stone retaining walls occur within the project area. However, no intensive cultural resources survey has been conducted to record all historic structures within the APE.

Soapstone Creek Culvert. The Soapstone Creek Culvert, located at the confluence of Soapstone Creek and Broad Branch stream, is a six-foot wide, stone arch culvert constructed in 1898 during a period of initial improvements to adjacent Rock Creek Park (**Figure 3-8**). The downstream wing walls were most likely added in 1934 when the culvert was extended (**Figure 3-9**).

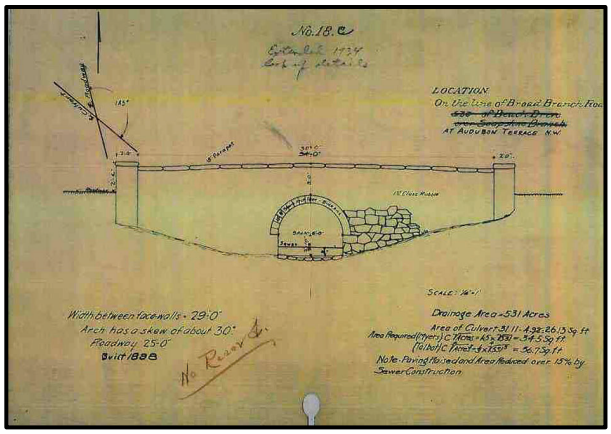


Figure 3-8. Soapstone Creek Culvert (1898 – DDOT Archives)

Figure 3-9. Pre-1934 Photograph of the Soapstone Creek Culvert (downstream side) without the Wing Walls (E. B. Thompson, DC Public Library Photo Archives)

Prominent features of Soapstone Creek Culvert include a downstream headwall with wing walls, an upstream headwall and retaining wall, and a red brick-lined barrel arch. The downstream headwall is faced with irregularly coursed rough-cut granite; the interior of the arch is lined with red brick. The parapet retains some of the flat machine cut capstone slabs. The upstream headwall is irregularly coursed rough-cut granite; the interior of the arch is lined with brick and parged. The parapet on the downstream side was capped with large hand beveled stone slabs.

A determination of eligibility (DOE) form was prepared for Soapstone Creek Culvert and the DC SHPO concurred with the eligibility determination on June 20, 2011.

Stormwater Outfalls. Ten stormwater outfalls associated with stone headwalls or stone retaining walls were observed during the site visits along Broad Branch conducted in July 2008 and April 2011 or were identified from current survey drawings and are considered contributing elements to the RCPHD. (**Table 3-4**; Figure 3-3). These ten outfalls are among the 21 total identified in the entire project area in Appendix B.

Although these outfalls drain stormwater from nearby DC neighborhoods, the stone features are located within Rock Creek Park. The stormwater outfall construction includes corrugated metal pipe 18 inches in diameter embedded within the existing stone retaining wall, reinforced concrete pipe varying in width from 15 inches to 42 inches in diameter with regularly coursed rough cut stone headwalls, and terra cotta pipe varying in width from 18 inches to 24 inches in diameter with stone headwalls with concrete repairs or embedded within the existing stone retaining walls.

Retaining Walls. Sixteen retaining wall segments in Rock Creek Park were identified within the project area during the site visits conducted in July 2008 and April 2011, fifteen of which are considered contributing elements to RCPHD. The general locations of the walls are identified in Figure 3-3 and detailed in Appendix B. Two general types of retaining walls were observed: mortared and dry laid (**Table 3-5**).

Table 3-4. Stormwater Outfalls Associated with Stone Headwalls or Stone Retaining Walls in Rock Creek Park

OUTFALL NUMBER	LOCATION	DESCRIPTION	NRHP STATUS
OF-21	Between Beach Drive and Ridge Road	15” reinforced concrete pipe (RCP) with regularly coursed rough cut stone headwall; three courses	Contributing element to RCPHD
OF-20	West of Ridge Road Bridge, west bank of Broad Branch	15” RCP with regularly coursed rough cut stone headwall; three courses	Contributing element to RCPHD
OF-18	North of Soapstone Creek, west bank of Broad Branch	18” Terra Cotta pipe in regularly coursed rough cut stone retaining wall segment H6; eleven courses	Contributing element to RCPHD
OF-16	South of Brandywine Street, west bank of Broad Branch	24” Terra Cotta pipe with stone headwall	Contributing element to RCPHD
OF-14	South of Brandywine Street, west bank of Broad Branch	24” Terra Cotta pipe sheathed in concrete with stone headwall; seven courses	Contributing element to RCPHD
OF-13	North of Brandywine Street	18” corrugated metal pipe in rough cut stone retaining wall segment H7	Contributing element to RCPHD
OF-12	North of Brandywine Street	24” Terra Cotta pipe in rough cut stone retaining wall segment H8	Contributing element to RCPHD
OF-10	(South of Davenport Street, west bank of Broad Branch)	24” Terra Cotta pipe with irregularly coursed rough cut stone headwall with concrete and tree roots	Contributing element to RCPHD
OF-9	South of Grant Road Bridge	42” RCP with downstream irregularly coursed rough cut stone mortared headwall	Contributing element to RCPHD
OF-8	North of Grant Road Bridge	24" in rough cut stone retaining wall segment H14	Contributing element to RCPHD

Table 3-5. Intact Retaining Wall Segments Along Broad Branch

SEGMENT	RESOURCE	LOCATION	DESCRIPTION	NRHP STATUS
HA	Mortared stone wall with concrete spillway	Station 92+62 to 92+77 (West side of Rock Creek, south of Broad Branch Bridge)	Irregularly coursed stone ashlar wall, with concrete pad or spillway; 58 feet in length; most likely constructed in 1957 with construction of Broad Branch and Ridge Road Bridges	Contributing element to RCPHD
H1	Dry laid stone wall – Segment 1	Station 90+60 to 92+64 (East side of Broad Branch Run, between Broad Branch Road Bridge and Ridge Road Bridge)	Regularly coursed rough cut stone wall; at least eight courses visible; 212 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD
H2	Dry laid stone wall – Segment 2	Station 86+13 to 86+39 (West side of Broad Branch, North of Soapstone Creek)	Regularly coursed rough cut stone wall; at least three courses visible; 21 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD
H3	Dry laid stone wall – Segment 3	Station 85+68 to 85+97 (West side of Broad Branch, North of Soapstone Creek)	Regularly coursed rough cut stone wall; at least two courses visible; 30 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD

► *Continued.*

Table 3-5. Intact Retaining Wall Segments Along Broad Branch

SEGMENT	RESOURCE	LOCATION	DESCRIPTION	NRHP STATUS
H4	Dry laid stone wall – Segment 4	Station 84+61 to 85+31 (West side of Broad Branch, North of Soapstone Creek)	Regularly coursed rough cut stone block wall; at least five courses visible; 66 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD
H5	Dry laid stone wall – Segment 5	Station 82+14 to 84+14 (West side of Broad Branch, North of Soapstone Creek)	Regularly coursed rough cut stone wall; maximum 6 courses visible; 190 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD
H6	Dry laid stone wall – Segment 6	Station 80+52 to 81+79 (West side of Broad Branch, North of Soapstone Creek)	Regularly coursed rough cut stone wall; maximum 14 courses visible; 124 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD
H7	Dry laid stone wall – Segment 7	Station 63+98 to 64+64 (West side of Broad Branch, North of Brandywine Street)	Regularly coursed rough cut stone wall; 71 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD
H8	Dry laid stone wall – Segment 8	Station 59+42 to 60+73 (West side of Broad Branch, South of Grant Road)	Regularly coursed rough cut stone wall; 131 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD
H9	Dry laid stone wall – Segment 9	Station 58+03 to 58+63 (West side of Broad Branch, South of Grant Road)	Regularly coursed rough cut stone wall; 57 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD
H10	Dry laid stone wall – Segment 10	Station 56+78 to 57+89 (West side of Broad Branch, South of Grant Road)	Regularly coursed rough cut stone wall; 89 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD
H11	Dry laid stone wall – Segment 11	Station 49+13 to 49+40 (West side of Broad Branch, North of Grant Road)	27 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD
H12	Dry laid stone wall – Segment 12	Station 48+56 to 48+70 (West side of Broad Branch, North of Grant Road)	10 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD
H13	Dry laid stone wall – Segment 13	Station 48+00 to 48+32 (West side of Broad Branch, North of Grant Road)	10 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD
H14	Dry laid stone wall – Segment 14	Station 45+02 to 46+05 (West side of Broad Branch, North of Grant Road)	Regularly coursed rough cut stone wall; 96 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD
H15	Dry laid stone wall – Segment 15	Station 38+68 to 40+28 (West side of Broad Branch, South of 27th Street)	Regularly coursed rough cut stone wall; 136 feet in length; most likely constructed 1890s-1920s	Contributing element to RCPHD

The only example of a mortared retaining wall occurs south of the Broad Branch Road Bridge. This retaining wall is irregularly coursed with ashlar or square-cut stone located on a concrete pad or spillway (**Figure 3-10**).

Figure 3-10. Mortared Ashlar Stone Wall with Concrete Spillway south of Broad Branch Road Bridge

Based on the stone pattern and location, this mortared retaining wall was most likely constructed in 1957 when the adjacent Broad Branch Road Bridge was erected. As this bridge is currently being re-evaluated as part of the update to the RCPHD nomination, other Mission 66 construction period structures and related infrastructure, such as the associated retaining wall and concrete spillway, are also being re-evaluated.

The fifteen segments of retaining wall that were identified as contributing elements appear to be dry laid with rough cut stone in regular courses (**Figure 3-11**).

Figure 3-11. Dry Laid Rough-cut Stone in Regular Courses (large block) between the Broad Branch Road and Ridge Road Bridges

Observable courses vary by segment with many portions of the wall segments collapsed into Broad Branch stream. No evidence of mortar could be observed on collapsed stones in the stream. These segments may represent the remains of a once continuous stone retaining wall along Broad Branch Road.

Based on documentary research and photographic documentation conducted by the NPS, the stone retaining wall segments were most likely constructed between the 1890s and the 1920s (Monteleone, 2011a).

At the request of the NPS, a DOE form was prepared and submitted to the DC SHPO. On February 15, 2012, the DC SHPO concurred with the finding that the Broad Branch Retaining Walls / Rock Creek Park Retaining Walls located along Broad Branch Road from Beach Drive to 27th Street NW are eligible for listing in the NRHP as a contributing element to the RCPHD.

BOUNDARY MARKERS

At least three stone boundary markers incised with 'R.C.P.', possibly dating to the initial establishment of the Park in the 1890s, mark the border of Rock Creek Park and occur immediately adjacent to the Broad Branch Road project area where the District of Columbia and Rock Creek Park boundaries meet.

Modern metal markers (non-contributing elements to the RCPHD) delineate the official boundary and are co-located with the older boundary markers (**Figure 3-12**).

This resource category was not defined as a contributing element to the RCPHD (Bushong, 1990b; Liebertz et al. 2014) but is considered a contributing element of the RCPHD by the DC SHPO and NPS.

Figure 3-12. Modern Metal Witness Post Co-located with the Older Stone Boundary Marker

3.2.4.2 Stone Pedestrian Bridge

A stone footbridge is located within the DDOT right-of-way past the north end of the Rock Creek Park boundary **(Figure 3-13**) adjacent to the Civil War Fort Sites and Fort Circle Park System Historic District and US Reservation 515. The stone footbridge has irregularly coursed stone headwalls, wing walls, and abutments. The bridge deck is concrete. The parapets are crenellated, and the mortar joints are beaded.

Originally, a wooden bridge crossed Broad Branch at this location (DC WASA, 1983a) which was later replaced with the stone pedestrian bridge and encased a 12-inch diameter sewer pipe. Based on the DC WASA counter map IK-23-24-NW (DC WASA, 1983a), this portion of the sewer line was abandoned in 1966.

Figure 3-13. Stone Pedestrian Bridge over Broad Branch stream

3.2.4.3 DC Roadway/Infrastructure-Related Resources

Architectural features associated with DC roadway and infrastructure include Broad Branch Road, 27th Street, the 27th Street Bridge, roadway guard rails, and water control resources such as storm drain outfalls and inlets, retaining walls, culverts, stone channels, and circular features (**Figure 3-14**).

BROAD BRANCH ROAD

Broad Branch Road was surveyed by county surveyor Lewis Carberry and constructed in 1839 for the convenience of the Peirces who owned the mill located south along Rock Creek (Bushong, 1990a, 1990b; Davis, 1996). Broad Branch followed the south side of the valley formed by that stream and could be reached by a short connection paralleling the mill race for Peirce Mill, which left Rock Creek just south of the confluence with Broad Branch. Peirce Shoemaker deeded the roadway to the federal government in 1854, after which it became an official public highway (Davis, 1996). One of the earliest surveys showing where the alignment of the road is indicated is a September 1864 survey plat for the Levy Court.

Previous alterations have resulted in diminished aspects of integrity to the historic road. The original surface treatment materials and design of the roadway have likely evolved from dirt to gravel and then to pavement. Elements of the rural setting, historic feeling, and association with parkland remain intact because the eastern side of the roadway still bounds an undeveloped, wooded setting that was designated a national park in 1890; however, repeated additions of curb and gutters, the construction of guard rails, and sequential repaving along the alignment as well as the residential development on the northern and western side of the roadway beginning in the 1920s and 1930s have altered the original rural character of the road. As a result of these previous alterations and continued maintenance, the road is not likely to be considered eligible for the NRHP.

27TH STREET

In 1861, 27th Street was originally a local farm road linking Broad Branch Road to Military Road (Boschke, 1861) and it has retained its original alignment. Similar to Broad Branch Road, previous alterations have resulted in diminished aspects of integrity to the historic road; therefore, the road is not likely to be eligible for the NRHP.

27TH STREET NW, BRIDGE

The 27th Street NW Bridge is a concrete deck bridge and parapet with regularly coursed rough cut stone abutments on concrete foundations. An irregularly coursed rough-cut stone retaining wall on a concrete foundation is located on the east bank on the north side of the 27th Street Bridge. A hand beveled capstone is intact on the north end of the wall; a second capstone is on the ground. A square opening, most likely a scupper, similar to ones located in the Soapstone Creek Culvert headwalls, is located at the juncture of the stone wall and concrete foundation. The parapet and stone abutments represent intact elements of the original bridge constructed ca. 1925. The concrete deck bridge was replaced by DDOT in 2015.

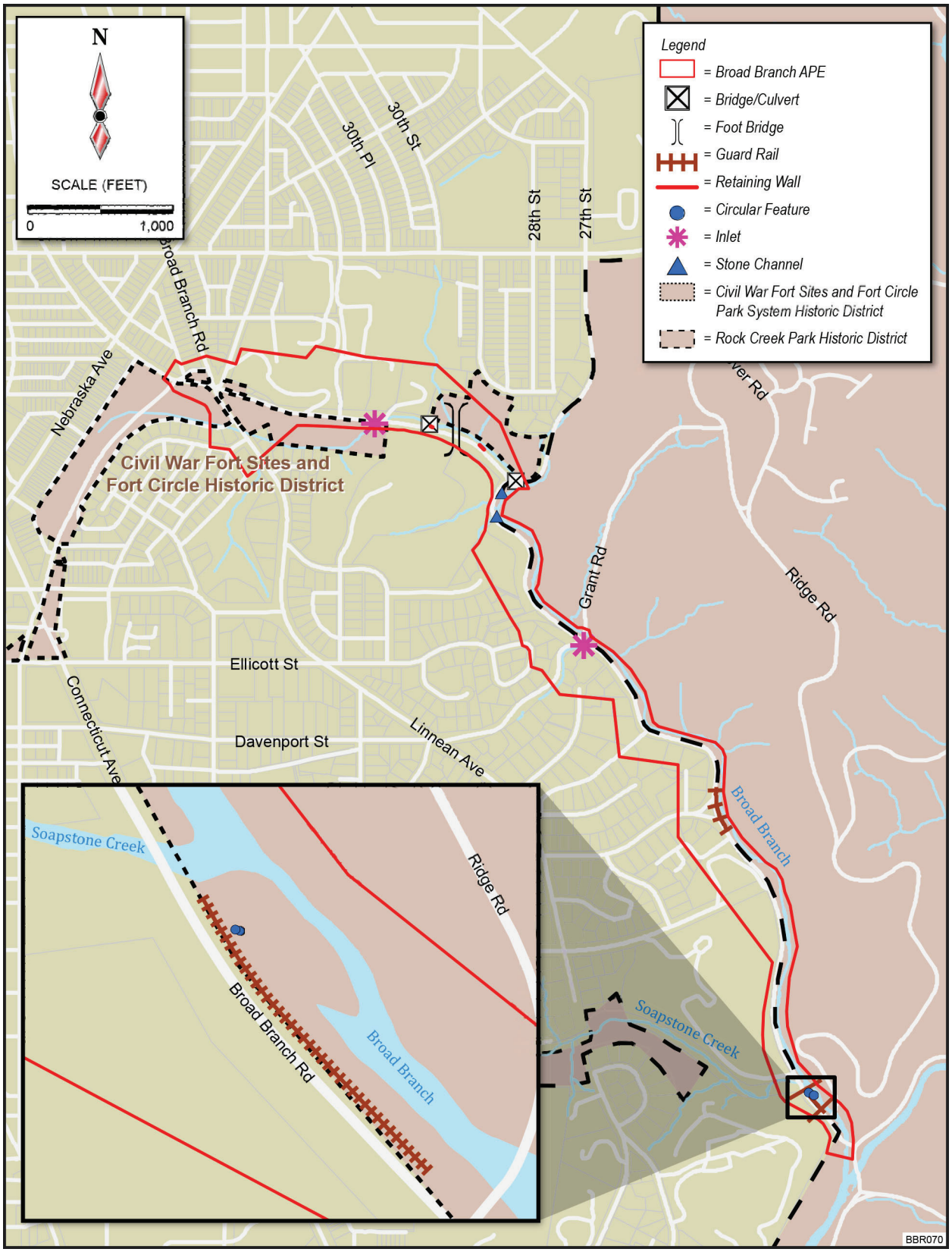


Figure 3-14. DC Roadway/Infrastructure Related Resources in the Broad Branch Road APE

A Determination of Effect (DOE) form was prepared and submitted to the DC SHPO in conjunction with the Preliminary Engineering Report and Categorical Exclusion for the proposed replacement of the 27th Street NW Bridge (AECOM, 2012). The DOE recommended that the 27th Street NW Bridge is not considered individually eligible for listing in the NRHP and is not a contributing resource to the RCPHD. The DC SHPO concurred with this recommendation on June 22, 2012. DDOT replaced the existing one-lane roadway bridge (District of Columbia Bridge #0017) carrying 27th Street NW over Broad Branch stream with a two-lane bridge in 2015.

Roadway Guard Rails

Two discrete areas along Broad Branch Road contain possible guard rails: north of the intersection with Ridge Road and at the T-intersection with Brandywine Street. Two strands of metal cable are hung between concrete posts. Although the roadway guard rails may be older than 50 years, they represent ancillary or support features associated with roadway operations and are not likely to be considered NRHP-eligible as a crucial element of the DC roadway system.

Water Control Features

Water control features identified within the project area along the north and west sides of Broad Branch Road include storm drain outfalls and inlets, retaining walls, culverts, stone channels, and circular features (**Table 3-6**).

Table 3-6. Cultural Resources Associated with Water Control Features in the Project Area

RESOURCE	LOCATION	DESCRIPTION	NRHP STATUS
Storm Drain Outfall	OF-3 (North of Grant Road Bridge)	15” pipe in stone retaining wall	Not eligible
Storm Drain Inlet	South of Grant Road Bridge, west of Broad Branch Road	42” RCP with stone headwall (upstream); 1930s?	Not eligible
Storm Drain Inlet	North end of project area, south side of Broad Branch Road	36” RCP with brick, concrete, and stone headwall and wing wall with crenelated stone; empties into buried concrete box culvert channel; constructed in 1937	Not eligible
Retaining wall (HB)	West of 27th Street, east of stone pedestrian bridge, south side of Broad Branch	42 feet in length	Not eligible
Retaining Wall (HC)	South edge of concrete box culvert	concrete wall; 13 feet in length	Not eligible
Culvert	South side of Broad Branch, opposite Ingleside Manor at the Presbyterian Home	7.75’ x 10’ concrete box culvert with headwall with irregularly coursed stone veneered wing walls with concrete base; chain link fence set in headwall and wing walls; constructed in 1937	Not eligible
Stone Channel	South of 27th Street, east of Broad Branch Road	Large stones are base of channel; smaller stones line edges	Not eligible
Stone Channel	South of 27th Street, east of Broad Branch Road	Large stones are base of channel; smaller stones line southern edge	Not eligible
Circular Feature	South of Soapstone Creek Culvert, east of Broad Branch Road	Tabular stone with mortar; four courses; completely exposed by erosion from Broad Branch	Not eligible
Circular Feature	South of Soapstone Creek Culvert, east of Broad Branch Road	Brick with mortar on concrete base; at least 12 courses; with terra cotta pipe at bottom; completely exposed by erosion from Broad Branch	Not eligible

These water control features likely date to the development or subsequent improvement of the roadway and are not associated with the development of Rock Creek Park (Monteleone, 2011b). While these resources may be older than 50 years, they represent ancillary or support features associated with the DC roadway operations and storm drain system and are not likely to be considered NRHP-eligible as crucial elements of these systems.

3.2.4.4 Residences

Thirty-five residential structures occur along Broad Branch Road in the project area and were constructed from 1920 through 2008. Twenty-five residences are older than 50 years. At the request of the DC SHPO based on their examination of the project area, only one building was identified for preparation of a DOE form: the gatehouse for La Villa Firenze. Based on the DC SHPO assessment, the other houses are not likely to be individually eligible nor are they likely to comprise an historic district that would be eligible for the NRHP for purposes of this undertaking.

The residence located at 4400 Broad Branch Road NW is a Tudor Revival style house constructed between 1925 and 1927 that serves as a gatehouse for La Villa Firenze, currently the Italian Ambassador's residence (**Figure 3-15** and **Figure 3-16**). The gatehouse is a one and a half story building with stucco exterior, half-timbering and two stone chimneys. The original stone retaining walls along Broad Branch Road at the entrance to the driveway and the original stone pillars flanking the driveway are intact (Figure 3-15). The light fixtures on the stone pillars have been replaced and a wrought iron fence has been added (Figure 3-16). Minimal alterations to the exterior design of the gatehouse are apparent and the overall integrity of design remains intact.

Figure 3-15. Gatehouse for La Villa Firenze, looking northwest (pre-1935) (E. B. Thompson, DC Public Library Photo Archives)

Figure 3-16. Gatehouse for La Villa Firenze, looking west (2011)

The gatehouse at La Villa Firenze is considered a contributing element to this residential complex. Access to the entire estate for NRHP evaluation is restricted at this time as the property is owned by the Italian government and as such the buildings are located on foreign soil. However, based on preliminary research, La Villa Firenze and its contributing elements would most likely be considered eligible for listing on the NRHP due to its association with philanthropist and prominent Washington hostess, Rebecca Pollard "Polly" Guggenheim Logan, and as an excellent representative example of the 1920s Tudor-style architecture in Washington, DC. At the request of the DC SHPO, a DOE form was prepared and on February 15,

2012, the DC SHPO concurred that the gatehouse is most likely eligible as a contributing element to the residential complex known as La Villa Firenze.

3.2.4.5 Educational and Health Facilities

Three parcels adjacent to the Broad Branch Road project area contain educational and health facilities including the Carnegie Institution's Broad Branch Campus containing the Department of Terrestrial Magnetism (DTM) and Geophysical Laboratory (education); the Ingleside Manor at the Presbyterian Home (medical facility); and the Hillwood Estate, Museum and Gardens (education).

CARNEGIE INSTITUTION'S BROAD BRANCH CAMPUS

Two buildings associated with the Carnegie Institution's Broad Branch campus are located within the APE: Abelson Hall (ca. 1913-1914) and the Research Building (ca. 1989) (Baist, 1913; Bauer and Fleming, 1915). The DTM building, or Main Building, was designed by Waddy Butler Wood in the Italian Renaissance style and constructed by the Davis Construction Company in 1913-1914 (Bauer and Fleming, 1915; Brown, 2004). With the completion of the new Research Building in 1990, research activities in the DTM building were moved to the new facility. In 1991, the DTM building was renovated, which included reorganization of interior spaces, replacement of windows, the addition of an elevator, the addition of a large glass-enclosed three-story exterior stairway on the north elevation, and the addition of large air handling equipment on the roof extending above the original roof line (Hardy, 2012). The DTM building was renamed Abelson Hall in 1999 after Dr. Philip Hauge Abelson (1913-2004), a biochemist, nuclear physicist, and microbiologist. At the request of the Carnegie Institution, no evaluation to assess NRHP eligibility of Abelson Hall was conducted.

INGLESIDE MANOR AT THE PRESBYTERIAN HOME

The Ingleside Manor was constructed in the 1930s (Ingleside at Rock Creek, 2011). The 1913, 1919, and 1937 Baist maps indicate that this parcel was owned by the Schneider family; the lot appears to have been subdivided and two stone residences were constructed prior to 1937. The east half was owned by Florence Schneider Montfort (1894-1988), daughter of the Washington, DC architect Thomas Franklin Schneider (1858-1938), who designed the Cairo Hotel. In 1960, the Presbyterian Home moved to the Broad Branch location. The Ingleside Manor is currently used for corporate offices, special functions, and Ingleside guests. At the request of the DC SHPO, Ingleside Manor is considered eligible for the purposes of this undertaking.

HILLWOOD ESTATE, MUSEUM AND GARDENS

The Hillwood Estate, Museum and Gardens consists of 25 acres of landscaped gardens and natural woodlands surrounding the mansion, a visitor's center, and several outbuildings. The Georgian-style mansion was originally designed by John Diebert in 1926 (HillwoodMuseum.org, 2011). The mansion was extensively enlarged and redesigned in the mid-1950s by New York architect Alexander McIlvaine and the New York design firms of McMillen, Inc. and French and Company after Mrs. Marjorie Merriweather Post purchased the estate (HillwoodMuseum.org, 2011). Marjorie Merriweather Post was the only child of cereal magnate C.W. Post. She inherited the Postum Company in 1914 and began collecting art -- primarily Sèvres porcelain and French furniture and tapestries -- in the 1920s after her marriage to financier Edward F. Hutton. Mrs.

Post became interested in Russian art when husband Joseph E. Davies served as ambassador to the Soviet Union in the late 1930s. During these years, the Soviet government was selling many of the treasures it had appropriated from the church, the imperial family, and the aristocracy in an effort to finance the new government's industrialization plan. She acquired the nucleus of her Russian holdings at this time, but she continued to collect French and Russian art for the rest of her life, eventually amassing the most comprehensive Russian imperial collection in the West. Mrs. Post died in 1973 and the Hillwood Estate, Museum and Gardens were opened as a public institution in 1977 (HillwoodMuseum.org, 2011). At the request of the DC SHPO, the Hillwood Estate, Museum and Gardens is considered eligible for the purposes of this undertaking.

3.2.5 Cultural Landscapes

Cultural landscapes, as defined by the Secretary of the Interior's *Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*, consist of "a geographic area (including both cultural and natural resources and the wildlife or domestic animals therein) associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values."

Rock Creek Park was established by Congress in 1890 as an open space for the enjoyment of the scenery, bicycle and horseback riding, strolls, picnics, and pleasure driving, and its establishment was an important event in the nineteenth century movement to preserve natural scenic areas in the United States (Bushong, 1990b). RCPHD possesses significance as a historic natural landscape, which was adapted and significantly enhanced as a public park by USACE and NPS between 1890 and 1941. The influential 1916 Olmsted report, prepared by acknowledged master landscape architects Frederick Law Olmsted, Jr., and John C. Olmsted, established methods of landscape practice and a general development plan for the park, which has guided management of the reservation's natural resources to the present day. Implemented in 1919, the plan was a significant early application of park landscape planning and scenic preservation. Cultural landscapes and natural viewsheds associated with the RCPHD are characterized by views within the Historic District and not necessarily by views to the surrounding neighborhoods.

In 1997, a cultural landscape inventory was conducted for Rock Creek Park (NPS, 2003a and 2003b). Based on the preliminary research gathered during this inventory, Linnaean Hill and Pierce Mill were identified as component landscapes of Rock Creek Park (NPS, 2003a, 2003b). As a result, Rock Creek Park met the criteria for significance and integrity for listing on the NRHP as a historic designed landscape. Both Linnaean Hill (including the Peirce-Klingle Mansion) and the Peirce Mill also comprise individually eligible landscape elements (NPS, 2003a, 2003b). The Linnaean Hill Component Landscape consists of 31.8 acres located on a bluff overlooking the west bank of Rock Creek near the confluence with Piney Branch and is not located within the project area.

3.2.5.1 Peirce Mill Component Landscape

The Peirce Mill Component Landscape consists of 24 acres located on the west bank of Rock Creek within the floodplain, south of its confluence with Broad Branch. The Pierce Mill Component Landscape includes the Pierce Mill and is important for illustrating the evolution of land uses through time: a nineteenth century utilitarian landscape associated with a privately owned milling and agricultural use; an early twentieth century picturesque design including a tea house and picnic

grounds; and a mid-twentieth century living history interpretative site (NPS, 2003b). The Pierce Mill Component Landscape is located on the south end of the project area (Figure 3-3); however, no current or lost historic views and vistas, or contributing features of the Pierce Mill Component Landscape, are located within or near the project area (NPS, 2003b).

3.2.5.2 Historic Trails Cultural Landscape

The NPS prepared the Historic Trails of Rock Creek Park Cultural Landscape Report in 2013. Contributing features identified in the report include specific types of trails and trail alignments, topography and natural features (organizational and spatial patterning), structures, vegetation consisting of understory and canopy, views and vistas, and small scale features such as culverts and headwalls, benches, checkdams, signage, and retaining walls (Poss and McMillen 2013).

Portions of three historic trails, as identified in the report (Poss and McMillen, 2013), are present along the southern end of the project area near the intersection of Broad Branch Road and Beach Drive (Figure 3-3): the Western Ridge foot trail, the Soapstone Creek Valley foot trail and the White Horse bridle trail . The Western Ridge Foot Trail is one of two primary north-south trending foot trails in the park which follows the western side of Rock Creek near the project area. Some segments of the trail are NRHP-listed and additional segments are individually eligible; the trail itself was identified as contributing to the historic trails cultural landscape. Scenic views from the trail to Rock Creek, vegetation, and small scale features including concrete culverts and stone headwalls, retaining walls, soil tread, and stepping stones along or visible from the trail are also contributing. The Soapstone Valley foot trail predated the establishment of Rock Creek Park and was originally developed as a carriage road, which was converted to a bridle trail by the USACE in 1916. The trail was abandoned in 1927 but reconstructed in 1979 using portions of the previous alignment (Poss and McMillen, 2013). Portions of the Soapstone Valley foot trail are considered eligible as part of the Historic Trails Cultural Landscape. Historic natural views from the Soapstone Valley foot trail within the APE include the upstream headwall and wingwall of the Soapstone Creek Culvert. The view of the trail extending west from the Soapstone Creek Culvert is obscured by topography and vegetation. The White Horse bridle trail begins north of the confluence of Rock Creek and Broad Branch, crosses Ridge Road, and parallels Broad Branch on the east side, climbing onto the ridge and diverging from the stream to join the Western Ridge Trail. The segment of the bridle trail from the confluence of the streams to Ridge Road was developed as part of the Mission 66 funding (1955-1966); segments of the trail are NRHP-listed and additional segments are considered individually eligible for the NRHP; the entire trail is contributing to the trail system cultural landscape (Poss and McMillen 2013:175). Historic natural views from this segment of the bridle trail consist of open vistas to the northwest and west across Broad Branch and include views of the existing Soapstone Creek Culvert, five segments of the historic retaining walls (segments H2, H3, H4, H5, and H6), and two stormwater outfall stone headwalls (OF-20 and OF-21).

3.2.6 Ethnographic Resources

Ethnographic resources are defined in NPS Director's Order 28 as any "site, structure, object, landscape or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it." Ethnographic resources are not known to exist in the project area.

3.2.7 Museum Collections

The archaeological collections from Rock Creek Park archaeological sites are retained at the Museum Resource Center of the NPS, National Capital Region in Landover, Maryland. The other museum collections associated with Rock Creek Park are located at the Rock Creek Park Nature Center on Glover Road NW and the Old Stone House in Georgetown. No buildings where museum collections are or could be stored, or large scale artifacts displayed, are within the project APE.

3.2.8 Indian Trust Resources and Native American Sacred Sites

Indian trust assets are owned by American Indians but held in trust by the United States. Requirements are included in the Secretary of the Interior's Secretarial Order No. 3206, *"American Indian Tribal Rites, Federal – Tribal Trust Responsibilities, and the Endangered Species Act,"* and Secretarial Order No. 3175, *"Departmental Responsibilities for Indian Trust Resources."*

No Indian trust resources or Native American sacred sites have been identified within the project area.

3.2.9 Paleontological Resources

Paleontological resources include casts, molds, and trace fossils such as burrows and tracks. Fossil localities typically include surface exposures, areas where subsurface deposits are exposed by ground-disturbing activities, and circumstances affording special environments for preservation such as caves, peat bogs, and tar pits. Paleontological resources are important mainly for their potential to provide scientific information on paleoenvironments and the evolutionary history of plants and animals.

Paleontological resources are generally not afforded the same degree of protection as cultural resources and few legal mandates exist for the management of paleontological resources. Unlike cultural resources, paleontological resources are not viewed as nonrenewable. Theoretically, there are finite numbers of fossils, but they are continually being exposed by natural processes of erosion. Fossils are not all considered extremely valuable, and their removal generally does not diminish the research potential of a deposit (National Research Council, 1987:11-13).

Prior to 2009, the treatment of paleontological resources was regulated in some states by state law and both the US Forest Service and the Bureau of Land Management (BLM) implemented internal regulations to protect vertebrate and unique fossils and control the use of this resource type. Additionally, some fossil localities may have qualified for recognition under the National Natural Landmarks Program.

The Paleontological Resources Protection Act (PRPA) of 2009 (part of the Omnibus Public Land Management Act) requires the Secretaries of the Interior and Agriculture to manage and protect paleontological resources on federal lands under the stewardship of the BLM, the NPS, the Bureau of Reclamation (BOR), the USFWS, and the US Forest Service. The PRPA includes provisions for the casual or hobby collecting of common invertebrate and plant fossils without a permit on some federal lands (those managed by the BLM, BOR, and US Forest Service); criminal and civil penalties for unauthorized collection; and the confidentiality of paleontological localities. Casual collecting

is not allowed within the National Parks or other lands managed by the NPS. Paleontological resources are not protected by legislation on private lands.

The BLM has also established the Potential Fossil Yield Classification (PFYC) system for use in broad approach planning efforts and for evaluating specific impacts. The PFYC identifies the fossil potential in geological formations and the associated risks for impacts (BLM, 2010).

The only fossiliferous formation within Rock Creek Park is the Cretaceous Period Potomac Formation, which typically occurs in the higher elevations and deposits include unconsolidated sand, gravel, silt, and clay (NPS, 2009; Southworth and Denenny, 2006). The Potomac Formation is associated with dinosaur and plant fossils, which include some of the oldest known flowering plant fossils, found throughout the National Capital Region (NPS, 2009). Based on the BLM's PFYC system, the Potomac Formation would be designated a Class 3a, moderate potential to contain vertebrate fossils in widely scattered contexts (BLM, 2010).

The Cretaceous Period Potomac Formation has no surface manifestations in the Broad Branch Road project area. Therefore, no known paleontological localities associated with the Potomac Formation occur in the project area (Monteleone, 2011b).

3.3 SOCIOECONOMIC RESOURCES

3.3.1 LAND USE

This project is located in the Rock Creek West Planning Area, which is characterized by stable and well-maintained neighborhoods. Land uses within the project vicinity are predominantly Low Density Residential with one Institutional land area (Carnegie Institution of Washington) and some Park/Recreation/Open Space at the northwestern end of the corridor, which is discussed in Section 3.3.9. The majority of the eastern side of the corridor (Rock Creek Park) is designated Park/Recreation/Open Space (DC Government 2007a, 2007b, 2007c).

The District's comprehensive plan and land use maps were reviewed to determine future land use along Broad Branch Road. Based on the Plan, future land uses in all areas are expected to remain similar to the existing land uses.

3.3.1.1 Sovereign Nations

Five properties along the project right-of-way are owned by foreign countries for use as diplomatic residences for their ambassadors to the United States and are considered foreign soil. Sovereign Nations that own property from north to south along Broad Branch Road include: Tunisia, Ivory Coast, Peru, Malaysia, and Italy, as shown in Figure 2-2. The main entrance to the ambassador's residence for the Ivory Coast is from Broad Branch Road. Ambassadors' residences for Tunisia, Malaysia, and Italy are accessible from Broad Branch Road; however, these entrances appear to be secondary. A gatehouse at the entrance to Italian ambassador's residence occurs along Broad Branch Road. There is no access to the Peruvian ambassador's residence from Broad Branch Road. DDOT coordinated with the US State Department to inform the Sovereign Nations located along the roadway corridor of proposed roadway improvements.

3.3.2 ZONING

The majority of the area to the east of Broad Branch Road is federally-owned park land and, as such, is not zoned. North and west of the corridor is zoned at R-1-A for single-family residential detached dwellings. Residences in this area are zoned for a minimum lot width of 75 feet and maximum lot occupancy of 40 percent, resulting in a more rural feel to the neighborhood compared to more highly urbanized areas within the District (DCOZ, 2016).

3.3.3 DEMOGRAPHICS

The Broad Branch Road corridor traverses the southern part of Census Tract 14.02, the center of Census Tract 13.01, and the northeastern portion of Census Tract 13.02. As shown in **Table 3-7**, this area as a whole has experienced population growth over the past twenty years; however, Census Tract 14.02 has seen large fluctuations in population over this period.

Table 3-7. District of Columbia and Area Population

AREA	1990 POPULATION	2000 POPULATION	2010 POPULATION	% POPULATION CHANGE	
				1990-2000	2000-2010
Washington, DC	606,900	572,059	601,723	-5.7%	5.2%
Census Tract 14.02	2,863	3,925	2,998	37%	-24%
Census Tract 13.01	3,693	3,747	3,955	1.5%	5.6%
Census Tract 13.02	6,459	6,350	6,587	-1.7%	3.7%
Corridor Tracts	13,015	14,022	13,540	7.7%	-3.4%

(NeighborhoodInfoDC, 2011)

3.3.4 ENVIRONMENTAL JUSTICE

EO 12898, *General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* directs federal agencies to identify and address as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. The process to identify potential disproportionate impacts associated with the proposed action was as follows:

- Identification of the potentially affected population in the study area;
- Characterization of the study area with respect to minorities and low-income populations;
- Determination of potentially significant adverse impacts of the proposed action and alternatives; and
- Evaluation of the potential for disproportionately high and adverse impacts on minority populations and low-income populations in proximity of the alternate sites.

The demographic census data along the construction alignment were examined to determine the presence of any potential Title VI, minority, or low-income populations. In total, the block groups crossed by the alignment have a lower percentage of minority and low-income populations

compared to the District of Columbia. Minorities make up approximately 27 percent of the population in the corridor compared with the District, which has a total minority population of approximately 65 percent (US Census Bureau, 2010; NeighborhoodInfoDC, 2011). The percentage of low-income populations along the alignment is approximately 11 percent compared to approximately 18 percent for the District.

3.3.5 Economics and Development

The average family income in Census Tracts 13.01, 13.02, and 14.02 (2005 to 2009, in 2010 dollars) is $279,103, $183,352, and $231,149, respectively, as compared to the District-wide average of $115,016 (NeighborhoodInfoDC, 2011). The poverty rate in the census tracts crossed by the alignment is under 11 percent compared to the District, which has a poverty rate of 18.5 percent (US Census Bureau, 2010).

3.3.6 Joint Development

Joint development projects are commercial, residential, industrial, or mixed-use developments that are undertaken in concert with transit facilities. Currently, there are no proposed or existing joint developments in the vicinity of Broad Branch Road.

3.3.7 Community Resources

Three facilities accessible by the community are located along the project corridor (**Figure 3-17**).

The Carnegie Institution of Washington, located at 5241 Broad Branch Road NW, has an entrance off of Broad Branch Road at the northern end of the project area. The Carnegie Institution of Washington houses the Department of Terrestrial Magnetism (DTM) with the original purpose of mapping the Earth's geomagnetic field. Since the completion of that work in the late 1920s, the facility continues to conduct interdisciplinary scientific research to understand the physical Earth and the universe. The facilities house highly specialized and sensitive equipment. In addition to its primary role as a scientific research facility, the DTM hosts a neighborhood lecture series open to the public.

East of the Carnegie Institution is Ingleside at Rock Creek, a 14-acre non-profit residential retirement community, located at 3050 Military Road NW. The community has a back entrance off the north side of Broad Branch Road between the Tunisian ambassador's residence and the Carnegie Institution of Washington.

Hillwood Estate, Museum and Gardens, located at 4155 Linnean Avenue NW, opened as a public institution in 1977. The facility features a mansion housing an art collection and extensive gardens. The museum is open daily five to six days per week year around with a short break in the winter. The facility charges an admission/recommended donation for visitors.

The Hillwood property is located at the southern terminus of the project area on the west side of Broad Branch Road but is not accessible by Broad Branch Road.

Figure 3-17. Community Facilities in the Project Area

3.3.7.1 Emergency Services

Emergency services in the area are provided by the District Fire and Emergency Medical Services Department. There are three police departments located in the project vicinity allowing for emergency response within the corridor from three different directions: Washington, DC Police Department on 3320 Idaho Avenue NW, Washington DC Police Department on 6001 Georgia Avenue NW, and Metropolitan Police Department on 801 Shepherd Street NW. The corridor is surrounded by five fire departments, the closest two of which are located a few blocks southwest of both the northern and southern terminus of the project at 4930 Connecticut Avenue NW and 3522 Connecticut Avenue NW. The closest medical centers are Washington Hospital Center (110 Irving Street NW) and Howard University Hospital (2041 Georgia Avenue NW), both located to the southeast on the other side of Rock Creek Park.

3.3.7.2 Schools

There are no schools located in the project corridor; however, Howard University Law School, the University of the District of Columbia, and Edmond Burke School are all located several blocks west of the southern end of the project corridor. St. John's College High School is located several blocks north of the project area off 27th Street NW.

3.3.7.3 Parks and Recreational Resources

NATIONAL PARKS

Broad Branch Road provides access to Rock Creek Park (Reservation 339) and Soapstone Valley foot trail. Soapstone Valley Park (Reservation 402), a management unit within Rock Creek Park, is not located in the project alignment; however, it is accessible via Soapstone Valley foot trail, the eastern trailhead of which is located on DDOT right-of-way. Rock Creek Park was established in 1890 by an Act of Congress for scenic and recreational enjoyment. It encompasses federal reservation 339 and is 1,754 acres in size (Bushong 1990b). The Park is a natural reserve within a heavily urbanized area and includes an extensive network of unnamed hiking footpaths and horseback riding trails, scenic roads, the Western Ridge Trail, access to the horse stables and equestrian field, the Nature Center, and the Planetarium.

Five areas at the northern end of the project corridor are part of the NPS Fort Circle Parks system, parks dedicated to preserve the chain of defenses set up to protect Washington during the Civil War. Three of the land parcels comprising the park near the project area occur west of the end of the Broad Branch Road (Figure 3-17). One area occurs south of Broad Branch Road and north of Linnean Avenue. The fifth area occurs on the north side of Broad Branch Road west of 27th Street, ending at the property boundary with the Ivory Coast ambassador's residence. One former parcel in the NPS Fort Circle Parks system was transferred to the District Department of Parks and Recreation (DPR).

The 2004 *Fort Circle Parks Final Management Plan* includes the development of a trail connecting the sites of civil war fortifications and the green corridor of the Fort Circle Parks system. The intention to connect the sites with a trail was first recorded in 1902 when the Fort Circle Drive was proposed in the *McMillan Commission Report*. Although the drive was started, it was never

completed, and in the 1968 *Fort Circle Parks Master Plan,* a bicycle/pedestrian trail was proposed in lieu of the Fort Circle Drive. Only a portion of this trail has been completed –the segment between Fort Mahan and Fort Ricketts in the southeast. The portion of the proposed trail would enter the project area from Rock Creek Park at 27th Street and follow Broad Branch Road to Fort Circle Park at 36th Street.

DISTRICT PARKS

Triangle parks are formed at street intersections across the District. These parks are maintained by the District DPR in partnership with DDOT. The District DPR maintains two triangle parks in the current project area: one at the intersection of Nevada Avenue and Broad Branch Road NW (Reservation DPR2083) and the large, landscaped traffic island at the intersection of Brandywine Street and Broad Branch Road (Reservation DPR0540). The traffic island at the intersection of Brandywine Street is maintained by the District DPR but occurs within DDOT right-of-way. The park consists of maintained grass lawn, a few trees, and some small shrubs. The park is publicly owned and publicly accessible; however, the traffic island/triangle park primarily provides green space and is not used as a recreational area. Any recreational use is incidental, secondary, or occasional.

UTILITIES AND INFRASTRUCTURE

The following inventory of existing utilities and infrastructure was compiled using data supplied by DDOT and supplemented with field observation and additional information gathered from the various utility owners/agencies.

3.3.7.4 Water and Sewer Authority (DC WATER)

Typically in the District of Columbia, waterlines and sewer lines are owned and maintained by DC Water, while the storm drain system is owned by DDOT and maintained by DC Water. Residents have reported leaking sewer lines in the project vicinity. The water mains and sewer lines within the project area are described further below.

Starting from the south end of the corridor, just south of the Broad Branch Road/Beach Drive intersection, a 33-inch sanitary sewer line from Broad Branch Road joins a 5-foot sanitary sewer line from north on Beach Drive to form a 5-foot-6-inch line running south.

A 15-inch storm drain conveys water from the west side of Broad Branch Road to Broad Branch stream south of the intersection with Ridge Road and drains the east side of the street north of this culvert.

Shortly north of Ridge Road, the sanitary sewer splits to form a 21-inch pipe, which reduces to an 18-inch pipe on the west side of Broad Branch Road, and a 27-inch pipe, which reduces to a 21-inch pipe on the east side. A second 18-inch sanitary sewer from north Broad Branch Road connects to both of the previously mentioned lines in this location. A 6-foot box culvert also crosses under Broad Branch Road in this location conveying Soapstone Creek.

Two 18-inch storm drains cross Broad Branch Road draining stormwater from the west side of the road, and a 24-inch storm drain conveys water from Albemarle Street. A 10-inch sanitary sewer

from Albemarle Street also joins the lines in this location. The 18-inch sanitary sewer continues north up the east side of Broad Branch Road, and the 21-inch pipe continues north on the west side.

At the location where the Broad Branch Road neighborhood joins Broad Branch Road, a 10-inch sanitary sewer combines with the main lines. A 24-inch storm culvert drains the neighborhood in this area under Broad Branch Road with an outlet to Broad Branch stream.

A 24-inch storm drain conveys water from Brandywine Street west, just to the south of the intersection with Broad Branch Road. A 12-inch sanitary sewer from Brandywine Street joins the main lines at the intersection. The 18-inch and 21-inch sanitary main lines continue north along Broad Branch Road. Waterlines start just south of Brandywine Street with a 4-inch waterline on the south side of the intersection meeting an 8-inch waterline that travels along the west side of Broad Branch Road.

An 18-inch storm drain conveys water from the west side of the street north of Brandywine Street, and then the 21-inch sanitary sewer narrows to 18 inches. A storm drain conveys water from an alley where Broad Branch Road turns north through a 24-inch outlet to Broad Branch stream. The two 18-inch sanitary sewers continue north on either side of Broad Branch Road. Water mains continue north on the west side of the street.

A tributary to Broad Branch stream is carried through a 42-inch culvert just south of Davenport Street. A 15-inch sanitary sewer form the west joins the main lines at the intersection of Davenport Street and Broad Branch Road. The two 18-inch main sanitary sewer lines continue north.

Approximately 500 feet north of Davenport Street, and then again 100 feet further north, two 10-inch sanitary sewer lines join the main lines from the west. The two 18-inch main lines continue north along Broad Branch Road. Between the two sanitary sewers, two storm drains meet and run under the road via a 24-inch culvert with an outlet to Broad Branch stream.

Additional culverts drain the west side of Broad Branch Road with two 15-inch and one 12-inch culvert under the road conveying stormwater to the stream between Davenport Street and 27th Street. At 27th Street the sanitary sewers split. A 10-inch line travels north on 27th Street, and a 24-inch line follows Broad Branch Road. A 12-inch water main from the north on 27th Street follows Broad Branch Road west.

Two 15-inch culverts drain stormwater from the west side of the road to the stream between 27th Street and 30th Street. At the walkway over Broad Branch stream, south of 30th street, a 12-inch sanitary sewer line joins the main line. At this point, the main line reduces to 18-inch going north. At the intersection with 30th Street, a 15-inch sanitary sewer joins the main line, and further north, the main line increases in size to 21-inch. A 3-inch pipe from the water main supplies an area south of 30th Street. The 12-inch water main continues west along Broad Branch with two 6-inch supply lines to the Carnegie Institution, and shortly after, the 12-inch line turns north.

A 12-inch water main follows Linnean Avenue north up 32nd Street and then turns southwest along Chappell Road.

Broad Branch stream was previously contained within a culvert from just west of 30th Street to its headwaters. However, a daylighting project completed by the DOEE and NPS in 2014 opened 1,600 linear feet of the stream from the stream's crossing of Broad Branch Road (near the Ivory Coast ambassador's residence) to upstream of 36th Street.

The remaining storm sewers drain directly to this waterbody from this point to Linnean Avenue as follows: an unknown sized culvert from the north, an 18-inch culvert from the north, a 36-inch culvert from the south, a 15-inch culvert from the north, a 15-inch culvert from Ingleside to the north, a 42-inch culvert from the south conveying the stream from Linnean Playground, a 36-inch culvert from the south, a 24-inch storm drain from Broad Branch, and a storm inlet from Linnean Avenue. Just east of Linnean Avenue, two large storm sewers meet to form the main line for Broad Branch: a 90-inch culvert draining a 36-inch culvert from 32nd Street and a 33-inch culvert from Broad Branch Road, which join the 90-inch culvert from the west along Nevada Avenue; and a 7-foot-3-inch culvert from the west that reduces to a 7-foot culvert under Linnean Avenue and continues west.

After 30th Street, the sanitary sewer follows the south side of the culvert for Broad Branch stream, with two 5-inch lines running north to the Carnegie Institution. A 12-inch line heads south following the 42-inch stormwater culvert from Linnean Playground. An 18-inch line joins the main line from the east at Linnean Avenue, and the 18-inch line continues north to break into an 18-inch line that follows Nevada Avenue, a 10-inch line that follows Broad Branch Road, and a 10-inch line that follows 32nd Street.

3.3.7.5 Washington Gas

A 6-inch line starts on the west side of Broad Branch Road, just south of the Broad Branch Road community (south of Brandywine Street), with a 2-inch feeder line to the community. The main 6-inch line follows Brandywine Street, with another 3-inch feeder line to the south, and it splits with a 6-inch line following Brandywine Street and a 6-inch line running north along the west side of Broad Branch Road and ending approximately 600 feet to the north.

Gas lines start again with a 6-inch main line on the south side of Broad Branch Road and a 4-inch feeder line to the Carnegie Institution. A second 6-inch line enters the north side of Broad Branch Road from the Carnegie Institution and continues on the south edge of the street west. The line on the north splits to supply Broad Branch Road going north with a 6-inch line, and a 6-inch line following Nevada Avenue out of the project area. The southern line splits to supply Linnean Avenue with a 6-inch line and then splits again to form two 6-inch lines following Nevada Avenue out of the project area.

3.3.7.6 Potomac Electric Power Company (PEPCO)

PEPCO owns and maintains overhead and underground facilities within the project limits. Starting at Beach Drive, overhead lines follow the east side of Broad Branch Road, with lines connecting to a private home and the Broad Branch Road community south of Brandywine Street. A connector from the main line also supplies Brandywine Street. The main line continues up the east side of Broad Branch Road with four lines connecting to residences and one line supplying Davenport Street. Two lines supply residences to the west and the line splits at 27th Street with the main line

remaining on the north/east side of Broad Branch Road. Three more lines supply residences on the north and three to the south before the line splits, following all roads at the intersection of Broad Branch Road, 32nd Street, Linnean Avenue, and Nevada Avenue.

3.3.7.7 Verizon Communication (VERIZON) and Comcast Cable (COMCAST)

VERIZON and COMCAST maintain their overhead facilities on both joint-use PEPCO poles and their own poles. Starting at Beach Drive, lines follow the east side of Broad Branch Road, switch over to the west side shortly north of Ridge Road NW, and then head southwest toward Albemarle Street.

3.3.7.8 Street Lights

Existing street lights are leased, and the arms and the fixtures are installed on PEPCO wood poles. The presence of street lights is sporadic and they are only provided at intersections and along the mainline where existing PEPCO poles permit.

3.3.8 Aesthetics and Visual Quality

The existing aesthetics and visual quality are described below for different sectors of the project area, which represent different viewer perspectives and visual requirements, including the Broad Branch Road Sector, the Rock Creek Park Sector, the Residential Sector, and the Educational/Institutional Sector.

Representative vantage points within these sectors are shown in **Figure 3-18**. The specific roadway station locations noted for each vantage point are shown on the design plans in Appendix B.

3.3.8.1 Broad Branch Road Sector

Broad Branch Road is a relatively low-speed two-lane roadway with a combination of vertical and horizontal curves and both natural and landscaped vegetation that provide a rural feel within the District. The roadway is either bordered on the west by single family residential homes with landscaped lawns or forested on some of the larger lots. The east side of the road consists of the forested lands of Rock Creek Park, much of which is in a relatively natural state.

The narrow pavement, lack of sidewalks and curbs and gutters in many places, and large trees with canopies that reach over the roadway also contribute to the relatively rural visual character of the roadway.

3.3.8.2 Rock Creek Park Sector

Rock Creek Park consists of 1,754 acres of land dominated by picturesque landscapes featuring forested areas, streams, valleys, meadows, and sloping hills. Two vantage point areas overlooking the Broad Branch Road project are the southern portion of Ridge Road/walking trail and the Grant Road/Broad Branch Road intersection. Views from other possible vantage points are obscured by the intervening forest and steep hill slopes.

The view from the unnamed Civil War battery associated with Fort Circle Park along the northern edge of the project area is obscured by the tree canopy, vegetation, and the steep hill slopes.

Figure 3-18. Sectors and Vantage Points
(page 1 of 2)

Figure 3-18. Sectors and Vantage Points
(page 2 of 2)

Vantage Point 1: Ridge Road/Walking Trail. Ridge Road (also known as Glover Road in this location) intersects with Broad Branch Road west of Beach Drive, crosses Broad Branch, and climbs in elevation to meet Glover Road on the ridge top. Portions of the project area visible from Ridge Road occur between stations 92+00 and 82+00. A walking trail in this same area extends farther along Broad Branch before climbing to meet the Western Ridge Trail. Portions of the project area visible from the walking trail occur between stations 92+00 and 79+00 and are dependent upon tree canopy and density of vegetation. The view from this vantage point includes portions of Broad Branch Road, Soapstone Creek Culvert, segments of historic retaining walls 2 through 6, stormwater outfall stone headwalls (OF-20 and OF-21), and the gatehouse associated with La Villa Firenze.

Vantage Point 2: Grant Road. Portions of the project area visible from Grant Road are extremely narrow and occur between stations 50+00 and 51+00. The view from this vantage point includes a tiny portion of Broad Branch Road and the tops of the stone parapets associated with Grant Road Bridge.

3.3.8.3 Residential Sector

The residential sector includes areas on the west and north sides of Broad Branch Road containing private residences and ambassador residences of five Sovereign Nations (Italy, Malaysia, Peru, Ivory Coast, and Tunisia). Four vantage point areas overlooking the Broad Branch Road project area include views from specific residences and roadway intersections. The majority of all other possible vantage points are well above the elevation of Broad Branch Road, and the steep hill slopes covered with dense natural forest obscure views of the road from these locations.

Vantage Point 3: Gatehouse at La Villa Firenze. The one and a half story residence located at 4400 Broad Branch Road NW is a Tudor Revival style house that serves as a gatehouse for La Villa Firenze, currently the Italian Ambassador's residence. The gatehouse is located immediately north of Soapstone Creek. Portions of the project area visible from the gatehouse are extremely narrow and occur between stations 86+00 and 88+00. The view from this vantage point includes portions of Soapstone Creek Culvert, the banks of Broad Branch, and the dense forests of Rock Creek Park.

Vantage Point 4: Brandywine Street. Private residences constructed during the 1930s occur in the vicinity of Brandywine Street and Broad Branch Road and are located up slope from the roadway with lawns, landscaping, and trees and vegetation on the hill slopes. Portions of the project area visible from the residences occur between stations 64+00 to 68+00. The view from this vantage point includes portions of Broad Branch Road and some existing vertical elements of the roadway such as road signs at the intersection. The hill slopes and vegetation partially obscure the view to the roadway.

Vantage Point 5: Ambassador's residences for Ivory Coast and Tunisia. Both ambassador residences are located uphill from Broad Branch Road with lawns, landscaping, and open parkland features on the hill slopes leading down to the road. Portions of the project area visible from these residences occur between stations 23+00 and 30+00. The view from this vantage point includes portions of Broad Branch Road and some existing vertical elements of the roadway such

as road signs at the intersection. The hill slopes and trees partially obscure the view to the roadway.

Vantage Point 6: Linnean Avenue. Private residences constructed during the 1950s occur along Linnean Avenue. This residential area is separated from Broad Branch Road by parklands associated with Fort Circle Parks with open areas and trees. The private residences are located at grade with Broad Branch Road. Portions of the project area visible from the residences on Linnean Avenue occur between stations 15+00 and 20+00. Because this area is located at grade with Broad Branch Road, the view from this vantage point includes only existing vertical elements of the roadway such as road signs at the intersection. Residential and parkland trees partially obscure the view.

3.3.8.4 Educational/Institutional Sector

The educational/institutional sector includes the Carnegie Institution's Broad Branch campus and Ingleside Manor at the Presbyterian Home located on the north side of Broad Branch Road at the northern project terminus and the Hillwood Estate, Museum and Gardens located at the southern terminus. All three facilities are located uphill from Broad Branch Road with lawns, landscaping, and open parkland features on the hill slopes leading down to the road. The view from Ingleside Manor and the Hillwood Estate, Museum and Gardens are completely obscured by trees on the hill slopes.

Vantage Point 7: Carnegie Institution's Broad Branch Campus. Two buildings associated with the Carnegie Institution's Broad Branch campus are located in the project area: Abelson Hall (ca. 1913-1914) and the Research Building (ca. 1989). Portions of the project area visible from the Carnegie Institution's Broad Branch Campus occur between stations 15+00 and 23+50. The view from this vantage point includes portions of Broad Branch Road and some existing vertical elements of the roadway such as road signs at the intersection. The hill slopes and trees partially obscure the view to the roadway.

3.3.9 Health and Safety

Broad Branch Road currently has inadequate facilities for pedestrians and non-motorized vehicle use. There are no sidewalks, marked crossings, or bike lanes currently provided in the roadway corridor. Historically, deteriorated sewer lines along Broad Branch Road have leaked sewage. Uncontrolled runoff from elevated parcels to the west of the roadway has contributed in large part to the deterioration of this two-lane roadway, including the collapse of the culvert that conveys Soapstone Creek beneath Broad Branch Road. Poor sight distances, poor lighting, lack of shoulders, and a tendency for drivers to exceed the 25-mph speed limit provide for unsafe driving conditions.

3.4 TRANSPORTATION

Each of the elements of the transportation system – pedestrian and bicycle facilities, the roadway network, and transit services – is described in the subsections below (**Figure 3-19**).

Figure 3-19. Traffic/Roadway Features

3.4.1 PEDESTRIAN AND BICYCLE NETWORK

Broad Branch Road does not currently have sidewalk facilities, which poses a safety concern for pedestrians.

Pedestrian and bicycle counts were conducted concurrently with the study's traffic turning movement counts during morning and evening peak periods in December 2012. Counts were conducted at intersections along Broad Branch Road, generally in 15-minute intervals. Counts were conducted at five intersections during the morning peak period and at the northern- and southern-most intersections during the evening peak period (limited due to safety concerns for the study team). Peak pedestrian and bicycle counts per intersection were extrapolated to obtain counts per hour and the morning and afternoon counts were combined to develop an average per hour for the project corridor. Broad Branch Road averages 30 pedestrians per hour and 21 cyclists per hour, with most observed at the northern and southern termini of the project area. The data reflect an average that could vary significantly based on seasonality, day of the week, and time of day, i.e., counts could be higher during warmer weather, on weekends, and at times others than morning and evening commutes.

DC legislation (Section 1.2.4) has prompted the need for pedestrian accommodations within the corridor. Furnishing sidewalks along Broad Branch Road would also conform to the District's Complete Streets Program, a policy document that encourages the provision of sidewalks along DC streets.

The entrance to Soapstone Valley foot trail intersects Broad Branch Road on the west side of the road just north of Ridge Road NW (also designated as Glover Road on some maps). The southern terminus of the project area is located at the northern terminus of Rock Creek Multi-Use Trail, an off-street multipurpose trail. The Western Ridge Trail is accessible from the east side of the road just south of Ridge Road and provides access to the rest of the Rock Creek Park trail system. There is no parking located in this area, nor are there sidewalks or marked crossings connecting these trails that are located on this narrow road with short sight distances.

The entire project area is signed as an on-street bike route. In the DC Bicycle Master Plan Proposed Bicycle Facilities Map,[1] the southern portion of Broad Branch Road (south of Brandywine Street) is currently mapped as a bike route; however, there are no on-street bike lanes. The 2011 DC Bike Map lists the road as having poor biking conditions. Generally, the rating of biking conditions is based on the classification of the roadway facility, and collector roadways like Broad Branch Road usually receive a fair rating. The northern terminus of the project is located near an on-street signed bike route running from Nevada Avenue NW to 36th Street NW, mapped as having fair suitability for bikes. The southern terminus of the project area is located near a signed bike route on Beach Drive, an on-street signed route with fair suitability for bikes.

As indicated above, an average of 21 cyclists per hour use Broad Branch Road during the peak commuting periods.

[1] ***Additionally, the 2020 update to moveDC does not designate this section of Broad Branch Road as being on the Bicycle Priority Network (draft).***

3.4.2 ROAD NETWORK

Traffic volumes, function, and character of the roadway vary over the 1.5-mile length of Broad Branch Road. Broad Branch Road is functionally classified as a collector, carrying a daily traffic volume of 3,200 vehicles per day (vpd) from the northernmost intersection with Nevada Avenue/32nd Street/Linnean Avenue to Grant Road/Davenport Street. South of Grant Road/Davenport Street to Brandywine Street, the daily traffic volume is 4,870 vpd. Between Brandywine Street and Beach Drive/Blagden Avenue, daily traffic volume is 6,500 vpd.

The topography also varies along the roadway corridor, with several vertical curves (12 out of 35) and horizontal curves (9 out of 28) that do not meet current design criteria, which can limit sight distance and contribute to roadway safety concerns.

Travel lanes are generally 10 feet wide and the existing roadway cross-sections do not vary significantly in the project corridor.

Traffic control along the roadway is stop-controlled, with stop signs at the intersections of Nevada Avenue/ 32nd Street/Linnean Avenue; 27th Street; and Grant Road/Davenport Street. At its southernmost point, Broad Branch Road terminates at Beach Drive/Blagden Avenue at a stop sign. North of Beach Drive/Blagden Avenue, Ridge Road connects Broad Branch Road to Rock Creek Park.

Brandywine Street and Davenport Street provide the primary access into the Forest Hills neighborhood on the west. Davenport Street continues through Rock Creek Park as Grant Road. Park access is also provided by 27th Street in the northern part of the project area and Ridge Road in the southern part of the project area, both of which terminate at Broad Branch Road.

Traffic counts were collected as part of the study to verify traffic volumes and to provide input to operational and environmental analyses. Turning movement counts were conducted at the following intersections, as summarized in **Table 3-8**:

- Broad Branch Road and Nevada Avenue/32nd Street/Linnean Avenue
- Broad Branch Road and 27th Street
- Broad Branch Road and Grant Road/Davenport Street
- Broad Branch Road and Brandywine Street
- Broad Branch Road and Beach Drive/Blagden Avenue

The purpose of the turning movement counts was to identify the split of traffic at each approach. Fifteen-minute counts were conducted within the morning and evening peak hours to establish these splits. Some intersections were not counted due to safety concerns for the analysts conducting the data collection. These intersection splits were calculated using the available data and commuter-oriented nature of this corridor.

In addition to DDOT traffic count data, 48-hour counts were collected in February 2011 on Broad Branch Road north of 27th Street and south of Grant Road to determine typical hourly traffic flows.

Table 3-8. Intersection Turning Movement Counts

INTERSECTION WITH BROAD BRANCH ROAD	PEAK HOUR*	NORTHBOUND				SOUTHBOUND 1				SOUTHBOUND 2				EASTBOUND				WESTBOUND			
		LEFT	THRU 1	THRU 2	RIGHT	LEFT 1	LEFT 2	THRU	RIGHT	LEFT	THRU	RIGHT 2	RIGHT 2	LEFT 1	LEFT 2	THRU	RIGHT	LEFT	THRU	RIGHT 1	RIGHT 2
Nevada Avenue/ 32nd Street/ Linnean Avenue NW	AM	2	0	0	7	0	0	1	2	3	21	42	0	1	6	18	8	4	0	37	0
	PM	7	1	0	2	0	0	0	1	2	38	0	0	1	3	69	4	9	3	49	0
27th Street NW	AM	17	-	-	13	22	-	-	12	-	-	-	-	-	-	-	-	36	-	49	-
	PM	**	**	-	**	**	-	**	**	-	-	-	-	**	-	**	**	**	**	**	-
Grant Road/ Davenport Street NW	AM	6	24	-	2	1	-	19	4	-	-	-	-	2	-	6	2	26	39	5	-
	PM	**	**	-	**	**	-	**	**	-	-	-	-	**	-	**	**	**	**	**	-
Brandywine Street NW	AM	37	18	-	-	-	-	47	37	-	-	-	-	5	-	-	12	-	-	-	-
	PM	**	**	-	**	**	-	**	**	-	-	-	-	**	-	**	**	**	**	**	-
Beach Drive/ Blagden Avenue NW	AM	100	41	-	27	35	-	124	4	-	-	-	-	24	-	39	105	37	4	22	-
	PM	68	112	-	32	11	-	19	2	-	-	-	-	3	-	38	48	8	132	16	-

* AM Peak Hour is between 7:30 - 8:30 AM and PM Peak Hour is between 5:30 - 6:30 PM.

** These approaches were not counted due to safety concerns for the analysts.

A review of the traffic volumes suggests that there is adequate capacity in the existing roadway network; therefore, capacity improvements are not recommended as part of the Broad Branch Road improvements. As shown in Figure 3-19, existing traffic volumes are more than two times heavier at the southern end of Broad Branch Road because this section of the corridor collects commuter traffic from the adjacent neighborhoods to locations east of Rock Creek Park. The higher traffic volumes on this section, combined with the lack of space or adequate facilities for pedestrians and cyclists, present a growing safety problem in the entire roadway corridor. The Beach Drive/Blagden Avenue intersection operates at level of service (LOS) F in both the morning and evening peak hours due to turning movements associated with commuter traffic traveling to and from downtown Washington, DC.[2] The same holds true for the intersection with Grant Road/Davenport Street in the morning peak period, during which eastbound traffic experiences high levels of delay to turn onto Broad Branch Road.

3.4.3 TRANSIT

Currently there are no bus lines in the project area.

3.5 AIR QUALITY

Air quality in the existing Broad Branch Road project area was assessed by analyzing conformity with regional standards for indicators including carbon monoxide (CO), particulate matter less than or equal to 10 microns and less than or equal to 2.5 microns (PM_{10} and $PM_{2.5}$), mobile source air toxics (MSATs), and ozone precursors (nitrogen oxides [NO_x] and volatile organic compounds

[2] Level of service (LOS) is a measure used by traffic engineers to characterize the operating conditions of a roadway or intersection. LOS is ranked from A to F, where A represents free flow or negligible delay and F represents extensive delay and congestion.

[VOC]) (greenhouse gases). Under the Clean Air Act, EPA establishes air quality standards to protect public health and the environment. EPA has set national air quality standards for six common air pollutants. These include: carbon monoxide, ozone, lead, nitrogen dioxide, particulate matter (also known as particle pollution), and sulfur dioxide.

3.5.1 Regional Conformity

The rehabilitation of Broad Branch Road is included in the Transportation Improvement Program (TIP) for the Metropolitan Washington Region (Fiscal Years 2017 to 2022), and the scope of the project is consistent with the regional analysis included in the TIP. The National Capital Region 2016 Constrained Long-Range Transportation Plan (CLRP) and the 2017-2022 TIP have been determined by the Metropolitan Washington Council of Governments (MWCOG) to conform to the intent of the State Implementation Plan (SIP).

3.5.2 Project-Level Carbon Monoxide (CO) Conformity

The District is currently in maintenance for the CO air quality standard. The region has achieved compliance with (i.e., attained) the 8-hour CO standard for 20 years, since 1995, as required under Section 175A(b) of the Clean Air Act Amendments (CAAA); therefore, in accordance with Section 176(c) of the Clean Air Act (CAA) [see 40 CFR § 93.102(b)], the conformity requirement for CO is no longer applicable or required.

3.5.3 Project-level Fine Particulate Matter ($PM_{2.5}$) Conformity

The project is located in the Washington, DC-MD-VA attainment area for the $PM_{2.5}$ and PM_{10} annual standard and therefore would not be subject to a PM conformity assessment or project-level $PM_{2.5}$ hot-spot analysis.

3.5.4 Mobile Source Air Toxics

In addition to the criteria air pollutants for which there are National Ambient Air Quality Standards (NAAQS), EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries). MSATs are a subset of the 188 air toxics defined by the CAA. MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The FHWA *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents dated October 18, 2016* (FHWA, 2016) defines three levels of analysis based on a tiered approach for analyzing MSAT in environmental documents. The Broad Branch Road project falls into the first category of "Projects with No Meaningful Potential MSAT Effects, or Exempt Projects" based on the fact that this project will have “no meaningful impacts on traffic volumes or vehicle mix.” Therefore, no analysis or discussion of MSAT is needed for the project.

3.5.5 Greenhouse Gas (GHG)

Carbon dioxide is the principle man-made greenhouse gas, representing over 80 percent of all greenhouse gas emissions in the United States (EIA, 2011). Among other sources, approximately

34 percent of the total carbon dioxide is produced by the burning of fossil fuel (gasoline) in internal combustion engines in motor vehicles. The Broad Branch Road project area is currently in marginal nonattainment of the federal NAAQS for ozone.

3.6 NOISE AND VIBRATION

Noise levels are important design parameters in the planning of road and highway improvements and are subject to federal regulations. Noise criteria applicable to the proposed project are set forth in 23 CFR 772 and Section 772 of the Federal-Aid Highway Policy Guide.

3.6.1 NOISE CRITERIA

As stated in the DDOT *Noise Policy* (April 7, 2011, effective July 11, 2011), a "sensitive receptor is a noise-sensitive location registering measurable sound levels as described in 23 CFR 722 – typically a residence or other use that would be negatively affected by noise." Based on this definition, sensitive land uses located within the project area include a mix of residential, park, and institutional land uses, which can be categorized as Activity Category B based on Noise Abatement Criteria (NAC) (see **Table 3-9**).

Table 3-9. FHWA Noise Abatement Criteria

ACTIVITY CATEGORY	$L_{EQ}(H)$ (DBA)*	DESCRIPTION OF ACTIVITY CATEGORY
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Residential
C	67 (Exterior)	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 (Interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	72 (Exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D.

*Hourly Equivalent A-weighted Sound Level

3.6.2 EXISTING CONDITIONS

Existing noise measurements were conducted along Broad Branch Road at seven representative locations during peak traffic periods to determine ambient noise levels within the corridor. Short-term measurements were collected in accordance with the guidelines contained in the FHWA *Highway Traffic Noise: Analysis and Abatement Guidance* (December 2011) and District of Columbia Municipal Regulations (DCMR) Title 20, Chapter 29, Noise Measuring Test Procedures, and as described in Section 6.2.2 of the DDOT *Noise Policy* (April 7, 2011, effective July 11, 2011).

With the exception of the Carnegie Institution of Washington; Hillwood Estate, Museum and Gardens; Rock Creek Park; Soapstone Valley; Fort Circle Parks; and two small District maintained

triangle parks, all land uses adjacent to Broad Branch Road are residential. One facility, Ingleside at Rock Creek, is a multi-family residential facility. Sensitive receptors were selected to cover the Carnegie Institution, the multi-family residential facility (Ingleside at Rock Creek), typical single-family residences, Rock Creek Park, Hillwood, and near the gatehouse on the property of the Italian ambassador's residence, one of the five foreign diplomatic residences in the project area. The single family residences are representative of that land use type along the length of Broad Branch Road. The receptor locations are depicted on **Figure 3-20**.

The predominant noise sources in the project area are birds and insects, flowing water in the adjacent Broad Branch stream, street activities normal to suburban environment, airplanes, building heating, ventilation, and air conditioning (HVAC) units, landscaping tools, and traffic on nearby roadways. As shown in **Table 3-10**, existing measured noise levels in the project area range from 55 to 62 decibels (dBA), which do not approach or exceed the FHWA NAC of 67 dBA.

Table 3-10. Noise Sensitive Receptor Measurement Levels

SITE	LOCATIONS	15-MIN L_{EQ} (dBA)
1	Carnegie Institution of Washington	55
2	Ingleside at Rock Creek (multi-family residence)	58
3	Gatehouse at Villa Firenze (Residence of the Italian Ambassador)	62
4	Single-family residence (north end)	58
5	Single-family residence (near Brandywine Street)	58
6	Hillwood Estate Museum and Gardens	58
7	Rock Creek Park	58

Table 3-11 provides a description of common noise levels. As noted above, the activity level along Broad Branch Road is considered Activity Category B, which includes picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals. If traffic were to cause noise levels above 67 dBA in a Category B area, noise abatement would be required.

Table 3-11. Common Noise Levels

NOISE SOURCE	SOUND LEVEL (dBA)	SUBJECT IMPRESSION
Jet aircraft taking off	120	Uncomfortably Loud
Heavy truck / motorcycle	90	Very Loud
Food blender	90	Very Loud
Lawn mower / vacuum cleaner	70	Moderately Loud
Light auto traffic / dishwasher	50	Quiet
Quiet urban (night/library)	30	Very Quiet
Acoustic test chamber	10	Just Audible
– –	0	Threshold of Hearing

Figure 3-20. Noise Sensitive Receptor Locations

3.7 HAZARDOUS WASTE/MATERIALS

A review of previous studies, the EPA online website, and DOEE information indicates that there are no areas of concern for hazardous waste/materials within the project vicinity. In addition, none of the sites located within the vicinity of the project pose any special risks or concern. Field reviews were conducted to confirm that there are no additional sites within the vicinity of the project corridor nor signs of previous spills.

The EPA Resource Conservation and Recovery Act Information (RCRAInfo), a national program management and inventory system for hazardous waste handlers, lists the Carnegie Institution of Washington as a Conditionally Exempt Small Quantity Generator site (**Table 3-12**). Through the RCRAInfo program, all generators, transporters, treaters, storers, and disposers of hazardous waste are required to provide information about their activities to state environmental agencies. In addition, the DOEE lists one underground storage tank located at the Hillwood Estates Museum and Garden Facility within the project area (also listed in Table 3-12).

Table 3-12. Listed Hazardous Waste Sites

NAME	ADDRESS	ENVIRONMENTAL CONCERN	DATE LAST UPDATED
Carnegie Institution of Washington (EPA, 2010a)	5241 Broad Branch Rd, NW Washington, DC	CESQC (Active)[1]	4/15/2010
		Hazardous Waste Biennial Reporter (Active)[2]	12/31/2001
Hillwood Estate, Museum and Gardens Facility #3000536 (DOEE, 2010a and b)	4155 Linnean Ave, NW Washington, DC	Active Underground Storage Tank	3/2010

[1] CESQG - Conditionally Exempt Small Quantity Generators generate 100 kilograms or less per month of hazardous waste, or 1 kilogram or less per month of acutely hazardous waste.

[2] Hazardous Waste Biennial Reporter - RCRA Sections 3002 and 3004, as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA), require reporting to EPA or to authorized States at least every two years. Hazardous waste Large Quantity Generator (LQGs) and Transportation, Storage, Disposal Facilities (TSDFs) must report information on the type, source, form, quantities, and management of hazardous wastes generated on site and on the type, quantities, and management of hazardous wastes received from off site. - https://www.ess-home.com/regs/rcra-waste-report.aspx.

3.8 ENERGY CONSERVATION

There are currently no known energy conservation measures being implemented in the project corridor.