

4 ENVIRONMENTAL CONSEQUENCES

According to the Council on Environmental Quality (CEQ) guidelines (40 CFR Section 1500-1508), “the determination of the significant impact is a function of both context and intensity.” Significance of an action is analyzed within the setting of an action, or context, including regional, local, or site-specific. Intensity refers to severity of an impact, which is analyzed in terms of type, quality, and sensitivity of a particular resource. The appropriate class of environmental documentation is determined by level of significance, which is established through impact analysis of each resource. This “Environmental Consequences” chapter addresses the potential impacts associated with the implementation and construction of the proposed action to each of the resource areas (i.e., impact topics) discussed under the “Affected Environment” chapter for the No Action, Build Alternatives, and the Preferred Alternative.

As stated in 40 CFR 1508.27(a), the analysis of significance as used in the National Environmental Policy Act (NEPA) requires both the context and intensity of an action.

- a) **Context.** This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both temporary and permanent effects are relevant.
- b) **Intensity.** This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:
 - 1. Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect would be beneficial.
 - 2. The degree to which the proposed action affects public health or safety.
 - 3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
 - 4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.
 - 5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
 - 6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
 - 7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively

significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places (NRHP) or may cause loss or destruction of significant scientific, cultural, or historical resources.
9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.
10. Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment.

Impacts to all resources have been avoided to the extent possible as part of the project development process and preliminary designs of the Build Alternatives. An ordered approach to mitigating unavoidable impacts has been followed that includes the following sequencing:

Minimization -> Repair or Restore -> Reduce over time -> Compensate

Proposed mitigation for unavoidable impacts is presented at the end of each of the following resource sections, and is summarized at the end of this chapter in tabular format (see Section 4.15). *While the project would result in some minor impacts to the natural, cultural, socioeconomic, and transportation environments, subsequent to the implementation to the required mitigation as appropriate, none of these impacts rise to a level of significance as defined by CEQ.*

4.1 NATURAL RESOURCES

4.1.1 GEOLOGY, SOILS, AND TOPOGRAPHY

Alternative 1 – No Action Alternative

Under the No Action Alternative, the improvements to Broad Branch Road would be limited to maintenance, such as the removal of fallen trees and other debris caused by the deterioration of the roadway, and the resurfacing of the roadway. This maintenance work would not impact the topography, geology, or soils, unless roadbed stabilization is necessary to maintain the site conditions or provide access for construction vehicles. Uncontrolled runoff from the roadway and adjacent parcels would continue to result in pavement deterioration, and the topography in Rock Creek Park would continue to be altered through erosion without proper stormwater management. Runoff would continue unabated and alter the natural environment; therefore, the No Action Alternative would have a permanent impact to geology, soils, and topography.

Alternatives 2, 3, 4 and Preferred Alternative

For all Build Alternatives and the Preferred Alternative, construction would extend beyond the existing roadway footprint to either side. The majority of land within the limits-of-disturbance has been previously graded and paved over from the construction and maintenance of the existing Broad Branch Road. The northern end is previously disturbed fill, the east side consists mainly of steep slopes to Broad Branch stream, and the west side immediately beyond the road cut is mostly undisturbed forested slopes leading to residential lots.

Much of the project area is currently experiencing moderate to severe erosion. Given the topographic and geologic conditions within the project area, roadway construction limitations such as moderate to high erosion potential, steep slopes, frost action, low strength, depth to bedrock, depth to saturation, and flooding would need to be taken into account for this project.

Areas of disturbance associated with each alternative are presented in **Table 4-1**.

Table 4-1. Areas of Disturbance (in square feet)

ALTERNATIVE	EXISTING PAVED FOOTPRINT	ALTERNATIVE PAVED FOOTPRINT	ADDITIONAL IMPERVIOUS SURFACE	LIMITS OF DISTURBANCE	AREA OF DISTURBANCE OUTSIDE OF EXISTING PAVED FOOTPRINT	UNPAVED AREA OF DISTURBANCE WHICH WOULD RENATURALIZE
No Action	170,738	170,738	0	0	0	0
Alternative 2	170,738	204,148	33,4107	285,592	143,692	82,444
Alternative 3	170,738	270,753	100,015	382,411	211,673	132,651
Alternative 3 Modified	170,738	268,143	97,405	345,158	174,420	98,088
Alternative 4	170,738	312,923	142,185	389,914	219,176	98,801

Alternative 2

This alternative would result in permanent impacts to geology, soils, and topography as it would disturb approximately 143,692 square feet (3.30 acres) that have not been previously graded for facility construction. The majority of this disturbance occurs within District Department of Transportation (DDOT) right-of-way with the exception of small areas (249 square feet total) associated with grading only that would occur outside the existing right-of-way. Alternative 2 would include the addition of stormwater management, which would alleviate future erosion and damage due to impervious surfaces and runoff, resulting in permanent beneficial impacts to geology, soils, and topography.

Alternative 3

This alternative would result in permanent impacts to geology, soils, and topography as it would disturb approximately 211,673 square feet (4.86 acres) that have not been previously graded for facility construction. The majority of this disturbance occurs within DDOT right-of-way with the exception of limited areas (28,827 square feet total) associated with grading and construction that would occur outside the existing right-of-way. Alternative 3 would include the addition of stormwater management, which would alleviate future erosion and damage due to impervious surfaces and runoff, resulting in permanent beneficial impacts to geology, soils, and topography.

Alternative 4

This alternative would result in permanent impacts to geology, soils, and topography as it would disturb approximately 219,176 square feet (5.03 acres) that have not been previously graded for facility construction. The majority of this disturbance occurs within DDOT right-of-way with the exception of areas (41,823 square feet total) associated with grading and construction that would

occur outside the existing right-of-way. Alternative 4 would include the addition of stormwater management, which would alleviate future erosion and damage due to impervious surfaces and runoff, resulting in permanent beneficial impacts to geology, soils, and topography.

Preferred Alternative

The Preferred Alternative is a modified Alternative 3, as described in Section 2.3.1, and would result in permanent impacts to geology, soils, and topography as it would disturb approximately 174,420 square feet (4.0 acres) that have not been previously graded for facility construction. The majority of this disturbance occurs within DDOT right-of-way with the exception of areas (4,556 square feet total) associated with grading and construction that would occur outside the existing right-of-way. The revised designs for Preferred Alternative reduced the total disturbed areas compared to the original Alternative 3 by incorporating reduced sidewalk widths in the segments adjacent to properties of Sovereign Nations and minor alignment refinements. The Preferred Alternative would include the addition of stormwater management, which would alleviate future erosion and damage due to impervious surfaces and runoff, resulting in permanent beneficial impacts to geology, soils, and topography.

Mitigation

In the District, land disturbing activities are regulated and require a construction permit from the District prior to engaging in any such activities. In accordance with the District of Columbia Municipal Regulations (DCMR) Title 21-Chapter 5 Water Quality and Pollution, an erosion and sediment control plan is required for 50 square feet or more of land disturbance and a stormwater management plan is required for 5,000 square feet or more of land disturbance. All construction activities would be performed in compliance with the required plan and would be monitored for compliance.

Additional mitigation of construction impacts are presented in Section 4.9.

4.1.1.1 Agricultural Lands, Prime, and Unique Farmland Soils

Alternatives 1, 2, 3, 4, and Preferred Alternative

There are no prime farmlands within the project area; therefore, there would be no impact to farmland from any of the alternatives.

Mitigation

In the absence of any prime or unique farmlands, no mitigation is required.

4.1.2 WATER RESOURCES

4.1.2.1 Drinking Water and Groundwater

No drinking water resources occur in the project vicinity; therefore, none of the alternatives would have an impact on this resource.

Alternative 1 – No Action Alternative

No addition of impervious surfaces and no improvements to the existing stormwater sewers would occur under this alternative. No changes to groundwater volume or quality would be expected under the No Action Alternative. No drinking water resources occur in the project vicinity; therefore, this alternative would not have an impact.

Alternatives 2, 3, 4, and Preferred Alternative

All of the alternatives would result in beneficial impacts. All alternatives include a stormwater sewer with perforations that would allow for some of the stormwater to naturally infiltrate as it travels through the culverts. This type of system would compensate for some of the impervious surfaces in the area and allow for groundwater regeneration closer to historic volumes. A stormwater swale/linear rain garden would be included in the northern segment and additional rain gardens in the new Brandywine Street intersection would serve to compensate for additional impervious surfaces. These facilities would allow for additional recharge and filtration of pollutants that currently drain directly into the local surface water system. These stormwater facilities are known to filter 50 to 65 percent of unwanted contaminants, resulting in permanent beneficial impacts to groundwater.

No drinking water resources occur in the project vicinity; therefore, this alternative would not have an impact.

Mitigation

No drinking water resources occur in the project vicinity; therefore, no mitigation is required.

4.1.2.2 Surface Water

Actions potentially affecting surface waters are regulated at the federal and state (including the District) levels in accordance with Section 404 of the Clean Water Act. General impacts to water resources from roadway construction, as shown in **Table 4-2**, would increase with the expansion of areas to the east of the existing roadways needed for construction.

Table 4-2. Stream Limits of Disturbance (in linear feet)

STREAMS IN THE PROJECT AREA	ALTERNATIVE			
	2	3	3 MODIFIED	4
Unnamed Tributary to Broad Branch	0	10	10	14
Broad Branch	244	284	417	509
Soapstone Creek	52	73	60	76
Total	296	367	487	599

The slight eastward shift of the roadway alignment for the Preferred Alternative causes additional encroachments on Broad Branch (as compared to the original Alternative 3). In-stream work for this project would include replacement of the crossing at Soapstone Creek, reconstruction of culvert outfalls to Broad Branch, restoration or construction of new retaining walls along Broad Branch, and installation of water quality catch basins to screen debris and filter sediment before discharging runoff to the existing outfalls. Such in-stream work would require

permits with the US Army Corps of Engineers (USACE) and District Department of Energy & Environment (DOEE) in accordance with Sections 402 and 404 of the Clean Water Act.

Alternative 1 – No Action Alternative

Surface waters in the area are currently receiving increased sediment, nutrients, and chemicals that are washed directly from Broad Branch Road and the upstream neighborhoods to the north and west. In addition, the lack of stormwater infiltration results in increased water volume and velocity, causing scouring of slopes and channels and degradation of water quality and roadway infrastructure. Under the No Action Alternative, these impacts would not be corrected and would continue to affect local streams and surface waters.

Alternatives 2, 3, 4, and Preferred Alternative

The Build Alternatives and Preferred Alternative would result in beneficial permanent impacts to surface waters. General impacts to water resources from roadway construction would be similar among the alternatives, the primary difference being the amount of impervious surface that would occupy the project area (see Table 4-1), and the length of retaining wall required along the edge of Broad Branch.

Although these alternatives would result in an increase of impervious surfaces, they all incorporate stormwater systems that would accommodate the infiltration of the first 1.2 inches of stormwater from the project area (provided that studies during design confirm that soils are adequately pervious, and the water table is low). Stormwater treatment measures would be incorporated into project designs to allow for infiltration of stormwater to more closely match pre-urbanization conditions for the area and reduce the amount of additional sediment, chemicals, nutrients, and heat in runoff that comes from impervious surfaces, resulting in permanent benefits to surface water.

Mitigation

A more detailed analysis of stream impacts based on proposed limits of grading for the Preferred Alternative would be conducted during project design. As a part of the design, an erosion and sediment control plan, stormwater management plan, and a “treatment train”¹ of best management practice (BMP) techniques would be developed. Mitigation for any unavoidable stream impacts would be developed in coordination with the USACE and DOEE during the permitting process. If stream mitigation is required for the Preferred Alternative, purchase of credits from an approved mitigation bank is the anticipated form of stream mitigation. *Disturbed portions of the stream bed and shores will be restored to original conditions following construction of stormwater outfalls and the restoration of adjacent retaining walls. The*

¹ A treatment train is a sequence of multiple stormwater measures (or treatments) which are designed to meet the needs of a particular environment, in order to minimize the detrimental effects of high energy stormwater flows on receiving waters. In the case of this project, the incorporation of rain gardens and bio-swales will intercept runoff and increase infiltration before stormwaters enter the open or closed drainage system. Within the open or closed system, the energy of stormwater flow can be dissipated by the increased resistance of such elements as rough pipe surfaces, broken slope flow lines and tumbling flow dissipators within the pipes themselves. And finally, at the system's exit, energy is further dissipated by outfall elements such as baffled-exit aprons and riprap aprons. Any combination of these treatments can be implemented solely or in combination depending on the projected stormwater flow predictions.

proposed stormwater management system, such as new culvert outfalls, will include a series of BMPs to reduce the flow of stormwaters and minimize scour and plunge pool creation to lessen effects to downstream/receiving waters. Additional mitigation measures for construction impacts are presented in Section 4.9.

4.1.2.3 Floodplains

Alternative 1 – No Action Alternative

A portion of the existing Broad Branch Road lies within the 10-year floodplain for Broad Branch stream which has resulted in severe erosion damage to the roadway. The No Action Alternative would not introduce new development within the floodplain; however, scouring of stream beds and sedimentation in the floodplain and greater stormwater volumes and velocities than accommodated previous to urbanization in this area due to impervious surfaces and lack of stormwater infrastructure would continue. Floodplain values and functions would continue to be affected and local erosion would continue due to lack of stormwater management structures. The No Action Alternative would result in permanent impacts to the floodplain's ability to handle existing water levels as well as continued structural degradation to existing culverts.

Alternatives 2, 3, 4, and Preferred Alternative

In accordance with Executive Order (EO) 11988, *Floodplain Management*, and corresponding National Park Service (NPS) Floodplain Management Director's Order (DO) 77-2, *Floodplain Management*, floodplain encroachments should be avoided or minimized to the maximum extent practicable. Federal agencies are required to reduce the risk of flood loss; minimize flood impacts to human safety, health, and welfare; and restore and preserve beneficial floodplain values and functions.

All of the Build Alternatives and the Preferred Alternative would have temporary impacts and permanent beneficial impacts to local floodplains associated with Broad Branch stream. Each of these alternatives would require temporary work within the floodplain for stabilizing or reconstructing retaining walls and outfall headwalls along Broad Branch and for the replacement of the Soapstone Creek Culvert. Due to roadway elevation, the project area at the confluence of Soapstone Creek and Broad Branch stream would remain within the 10-year floodplain. This means that during a flood event that happens with the frequency of approximately every 10 years, the waters would overtop the road at the location of the replacement culvert at Soapstone Creek. Although the new culvert would not solve the current flooding problems, it would help alleviate them with a larger opening that would convey more water during regular rain events. The wider opening would reduce the frequency of water backup at the culvert and allow for more natural flow to Broad Branch stream, which would reduce erosion and damage to infrastructure.

The effective sizing of new culverts and stabilization of outfall sites would reduce erosion, and the addition of rain gardens would bring stormwater levels closer to predevelopment levels. In addition, the reconfiguring of the existing Y-intersection at Brandywine Street to a T-intersection would decrease the amount of impervious surface and increase the volume of stormwater able to be treated by incorporating rain gardens on each side of the intersection. The resulting improvements to geomorphology, reestablishment of riparian buffers, and improved floodplain functions would result in permanent beneficial impacts to the Soapstone Creek and Broad Branch floodplains. The area of impervious surfaces within the floodplain would increase due to the

addition of new pavement, curbs, gutters and other various roadway elements in each of the alternatives (see **Table 4-3**); however, these increases would have no major impacts on the functional values of the associated floodplain. Design refinements incorporated in the Preferred Alternative resulted in 4,813 square feet less of floodplain encroachment than the original Alternative 3.

Table 4-3. Floodplain Encroachments (impervious area in square feet)

ALTERNATIVE	EXISTING IMPERVIOUS AREA WITHIN FLOODPLAIN ¹	PROPOSED IMPERVIOUS AREA WITHIN FLOODPLAIN	ADDITIONAL FLOODPLAIN ENCROACHMENT
No Action	39,120	0	0
2	39,120	54,636	15,516
3	39,120	63,637	24,247
3 Modified	39,120	58,554	19,434
4	39,120	66,549	27,429

¹ The initial EA reported 58,300 square feet of impervious area within the existing floodplain; updated mapping has shown the area to be less as shown in this column.

Mitigation

Expanded capacity of the Soapstone Culvert and repair/extension to the existing culverts entering Broad Branch would mitigate the flooding issues that are currently prevalent in the project area. Improved drainage systems and rain gardens incorporated as part of the roadway rehabilitation would compensate for additional impervious areas and better serve overland waters during storm events and minimize erosion downslope of the existing roadway. Erosion and sedimentation plans (in accordance with DDOT standards and DOEE permit requirements) would be developed for all areas of land disturbance during construction to minimize erosion and sediment transport to nearby receiving waters.

Additional mitigation measures for construction impacts are presented in Section 4.9.

4.1.2.4 Water Quality

Alternative 1 – No Action Alternative

Under this alternative, Broad Branch Road would not be rehabilitated to include any additional stormwater management systems and as a result, erosion and chemical and nutrient loading would continue. Although roadbed erosion would continue to occur, there would be no discernable change in the existing impervious surface within the study area. The stormwater volumes and channel velocities would continue unabated, resulting in continued erosion of the stream channel, sedimentation from overland erosion, and loss of riparian vegetation. Therefore, the No Action Alternative would continue to have permanent impacts to water resources quality due to continued erosion and sedimentation.

Alternatives 2, 3, 4, and Preferred Alternative

All Build Alternatives and the Preferred Alternative would result in permanent beneficial impacts to local water quality as well as benefits downstream. Although these alternatives would result in an increase of impervious surfaces (Table 4-3), the rehabilitation of Broad Branch Road would incorporate low impact development (LID) techniques that include infiltration of up to the first

1.2 inches of stormwater to meet the required stormwater retention volume (SWRv) for the project, approximately 15,443 cubic feet of water.

One of the goals of the proposed project is to improve water quality and stormwater management in this area to alleviate drainage issues and prevent further damage from uncontrolled runoff. As such, a 1,000-foot linear rain garden has been included as a part of all alternatives. This garden is anticipated to treat approximately 3,119 cubic feet of runoff and would filter sediment and pollutants from the roadway. Temporary (during construction) and permanent stormwater management, erosion and sediment controls, upgraded stormwater conveyance and outfalls, and water quality catch basins would be used, wherever feasible, to screen debris and filter sediment before discharging runoff to the existing outfalls.

Reconfiguring the existing Y-intersection at Brandywine Street to a T-intersection would decrease the amount of impervious surface and increase the volume of stormwater able to be treated by incorporating two additional rain gardens on each side of the intersection. The addition of these rain gardens would enhance other stormwater treatment measures being proposed under the Build Alternatives and the Preferred Alternative by increasing the volume of stormwater runoff able to be treated to 5,434 cubic feet and filtering additional sediment and pollutants from the roadway and result in improved stormwater treatment facilities with permanent beneficial impacts to water quality.

The selection of an open bottomed culvert crossing for Soapstone Creek would improve water quality by reducing sediment that would have accumulated with the traditional concrete-bottomed box culvert. Closed bottomed culverts can cause floodwaters to pick up velocity, resulting in increased erosion and introduction of sediment on the downstream side of the culvert during a storm event. The natural stream bottom would be beneficial to aquatic organisms within the stream and floodplain by allowing easier access upstream and downstream of the crossing. BMPs would be used and any work completed as part of this project would improve stormwater management and is anticipated to improve water quality downstream of the project area. Improved facilities would result in permanent beneficial impacts to water quality. Work in this area is not expected to have an impact past the confluence with Rock Creek, a tributary to the Potomac River.

Mitigation

Stormwater management designs have been incorporated into the proposed action to offset increases in runoff due to increased impervious areas. Rain gardens and other Low Impact Development (LID) measures as noted above would further reduce storm event runoff. Proposed designs for the reconstructed Soapstone Culvert and reconstruction/extension of the smaller culverts along the roadway would better facilitate conveyance of normal and storm event level waters and minimize the downstream effects to Broad Branch stream.

Implementation of erosion and sediment control practices, such as installation of silt fence, sediment trapping or filtering, and other BMPs, would help to avoid temporary impacts to water quality during construction. Additional mitigation measures for construction impacts are presented in Section 4.9.

4.1.2.5 Wetlands

There are no wetlands within the project area; therefore, there would be no impact to wetlands from any of the alternatives.

Mitigation

There are no impacts to wetlands and therefore no mitigation is required.

4.1.2.6 Navigable Waters

Alternative 1 – No Action Alternative

Under this alternative, inadequate stormwater management for this area would result in continued erosion of the roadbed and stream channels, sedimentation from overland erosion, chemical and nutrient loading from untreated stormwater, and loss of riparian vegetation. Therefore, the No Action Alternative would have negligible impacts to downstream water resources including navigable waters due to continued degraded water quality.

Alternatives 2, 3, 4, and Preferred Alternative

There are no navigable waters in the project area; however, all of these alternatives would have negligible beneficial impacts to downstream water resources, including navigable waters. The project would support preservation of downstream waters and their resources by implementing stormwater management practices that would reduce pollutants, sediment, and velocity, thereby alleviating damage from water during rain events, which would improve downstream water quality. Due to the significant distance to the Potomac River (the nearest navigable water), none of these alternatives would result in any significant impacts to navigable waters.

Mitigation

Neither Broad Branch or Soapstone Creek are considered navigable waters under Section 10 of the Rivers and Harbors Act. However, they are by definition considered Waters of the U.S. and therefore, if any stream stabilization is needed, further consultation would be completed with the USACE under Section 404 of the Clean Water Act prior to the initiation of project activities. Based on the consultation with the USACE, the stream restoration/stabilization aspect of the project would likely be authorized under Nationwide Permit 27.

4.1.2.7 Wild and Scenic Rivers

Alternatives 1, 2, 3, 4, and Preferred Alternative

There are no Wild or Scenic Rivers in the immediate project area. Therefore, none of the alternatives would have an impact to such resources.

Mitigation

In the absence of designated Wild and Scenic Rivers, no mitigation is required.

4.1.2.8 Coastal Zone

Alternatives 1, 2, 3, 4, and Preferred Alternative

The project area is located in the District of Columbia, which is not within a designated coastal zone. Therefore, none of the alternatives would have an impact on the management of coastal zone resources.

Mitigation

The project is not located within a designated coastal zone; therefore, no additional coordination or mitigation is required.

4.1.2.9 Chesapeake Bay Protection

Alternative 1 – No Action Alternative

Under this alternative, inadequate stormwater management for this area would continue resulting in continued erosion of the roadbed and stream channels, sedimentation from overland erosion, chemical and nutrient loading from untreated stormwater, and loss of riparian vegetation. Therefore, the No Action Alternative would have permanent impacts to downstream water resources, including the Chesapeake Bay, due to continued degraded water quality.

Alternatives 2, 3, 4, and Preferred Alternative

By implementing stormwater management practices that would reduce pollutants and alleviate damage from water during rain events, the Build Alternatives and Preferred Alternative would support the Chesapeake Bay and its resources by improving downstream water quality. Thus, beneficial impacts to the local water system from the Build Alternatives, Preferred Alternative, are anticipated.

Mitigation

There are no negative impacts as defined in the Chesapeake Bay Watershed Agreement and no mitigation is required beyond the BMP's currently included in the project's preliminary designs.

4.1.2.10 Marine and Estuarine Resources

Alternative 1 – No Action Alternative

Under this alternative, inadequate stormwater management for this area would continue resulting in continued erosion of the roadbed and stream channels, sedimentation from overland erosion, chemical and nutrient loading from untreated stormwater, and loss of riparian vegetation. Therefore, the No Action Alternative would have permanent impacts to downstream water resources, including marine and estuarine resources, due to continued degraded water quality.

Alternatives 2, 3, 4, and Preferred Alternative

No marine or estuarine resources are located in the immediate vicinity of this project; however, each of the Build Alternatives would either not impact or would support preservation of downstream resources by implementing stormwater management practices that would reduce pollutants and alleviate damage from water during rain events.

Mitigation

There are no identified impacts to marine or estuarine resources and therefore no mitigation is required beyond the BMP's currently included in the project's preliminary designs.

4.1.3 WILDLIFE INCLUDING THREATENED AND ENDANGERED SPECIES

Alternative 1 – No Action Alternative

Under the No Action Alternative, inadequate stormwater management within the project vicinity would continue to impact aquatic and riparian habitats from the erosion of the roadbed and stream channels, sedimentation from overland erosion, chemical and nutrient loading from untreated stormwater, and loss of riparian vegetation.

Degradation of the riparian habitats through erosion and sedimentation could result in potential displacement of terrestrial populations. Habitats located downstream of the project would continue to receive contaminated stormwater, degrading the quality of that habitat. Therefore, the No Action Alternative would have permanent impacts to local riparian habitat and downstream water resources, including aquatic habitat, due to continued degraded water quality.

Alternatives 2, 3, 4, and Preferred Alternative

Impacts to terrestrial and aquatic organisms and their habitat would occur during construction, while permanent beneficial impacts would occur upon completion of the project. Species likely to be found in the area are adapted to urban habitats and the more protected wooded park habitats. Construction associated with the Build Alternatives and the Preferred Alternative would be primarily in previously disturbed areas and edges of fragmented urban forest, which provide marginal habitat for terrestrial animals.

Construction activities and operation of machinery would be disruptive to wildlife, which would likely retreat to deeper parts of the forest, and repopulate the site when construction is complete. The potential remains, however, for unintentional take of migratory birds and their nests. Avoidance and minimization measures for this project could include restricting vegetation removal to outside the nesting season or conducting nest surveys to avoid removal of active nests. Disturbed areas would be replanted with a native seed mix and trees in consultation with NPS.

In accordance with the 4(d) Rule for the Northern Long-Eared Bat (81 FR 1900), incidental take of this federally-protected species resulting from tree removal is prohibited if it: (1) Occurs within a 0.25-mile radius of known hibernacula; or (2) cuts or destroys trees within a 150-foot buffer of any known occupied maternity roosts during the pup season (June 1 through July 31). 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 ft radius around roost trees) that occur within the project area. The USFWS further determined that as long as no trees are destroyed or cut within the 150 foot radius around a maternity roost tree between June 1 to July 31, this project is considered "not likely to adversely affect" the Northern long-eared bat under the 4(d) rule.

Although there are no aquatic species of concern near the project area, habitats downstream would benefit from increased stormwater management. Erosion and sediment control plans, stormwater management plans, and BMPs would be used during construction to protect water quality and habitat integrity. The Build Alternatives and Preferred Alternative would support preservation of downstream resources, including aquatic habitat, by implementing stormwater management practices that would reduce pollutants and alleviate damage from water during rain events including erosion. These actions would improve the water quality and allow for riparian habitat to reestablish.

The new Soapstone Creek Culvert would accommodate larger stormwater events compared to the existing culvert, resulting in permanent, localized, beneficial impacts on downstream aquatic habitat. In addition, the culvert would provide a continuous natural stream bottom that would further reduce velocities and erosion potential, as well as benefit both aquatic and terrestrial organisms by allowing for better wildlife passage under Broad Branch Road.

The Build Alternatives and Preferred Alternative include the construction of retaining walls to decrease the amount of land disturbance necessary and for roadside stabilization (see **Table 4-4**).

Table 4-4. Retaining Walls (in linear feet) – Potential Impediments to Wildlife Movements

RETAINING WALLS	ALT 1 NO ACTION	ALT 2	ALT 3	ALT 3 MOD	ALT 4
Length of retaining walls over 3 feet high along the alignment	<i>20 existing walls of varying height for a total of approximately 1,405 feet</i>	5,068	5,282	6,080	6,140
Number of retaining walls over 3 feet high and longer than 50 feet		17	22	20	26
Length of retaining walls over 5 feet high along the alignment		3,417	4,960	5,190	6,078
Number of retaining walls over 5 feet high and longer than 100 feet		6	15	19	18

These walls can impede wildlife passage. Small and medium animals, such as mice, squirrels, foxes, opossums, and raccoons, are able to surmount 3-foot walls or would be likely to go around a length of 50 feet. Larger animals such as deer can jump over walls from 5 to 8 feet high and would likely walk around obstructions of 100 feet in length. These criteria were used in discussions with park natural resources specialists to assess impacts from the types of impediments animals would encounter while moving in and out of the park. The eastward shift of the roadway alignment for the Preferred Alternative resulted in an increase in the number of walls greater than 5-feet in height as compared to the original Alternative 3, however as most occur on steep-grade slopes, no demonstrable difference in wildlife movements is expected.

4.1.3.1 Wildlife and Waterfowl Refuges

Alternatives 1, 2, 3, 4, Preferred Alternative

No wildlife or waterfowl refuges are located in the vicinity of this project; however, the Build Alternatives and Preferred Alternative would support preservation of downstream resources by implementing stormwater management practices that would reduce pollutants and alleviate

damage from water during rain events, which would improve downstream water quality. As such, the addition of stormwater management systems as part of the project may result in potential beneficial impacts to wildlife and waterfowl refuges linked to but outside the project area.

4.1.3.2 Anadromous Fish, Trout Waters, and Shellfish

Habitats supporting anadromous fish are located directly downstream of the project area. NPS has future plans to remove the existing impediments to their passage at the culvert beneath Beach Drive. None of the waters in the project area or immediately downstream support populations of trout or shellfish (Yeaman, 2011).

Alternative 1 – No Action Alternative

The area would continue to receive contaminated stormwater degrading the quality of downstream habitat supporting anadromous fish. Therefore, the No Action Alternative would have permanent impacts to local aquatic habitat and downstream water resources, including aquatic habitat, due to continued degraded water quality.

Alternatives 2, 3, 4, and Preferred Alternative

Potential permanent beneficial impacts may occur from implementation of any of the Build Alternatives or the Preferred Alternative, which would support preservation of downstream resources by implementing stormwater management practices that would reduce pollutants and alleviate damage from water during rain events. Improved stormwater management would allow riparian and in-stream habitats downstream to reestablish, which would improve fish habitat. Erosion and sediment control plans, stormwater management plans, and BMPs would be used during construction to protect water quality and habitat integrity.

Mitigation

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. The USFWS further determined that as long as no trees are destroyed or cut within the 150 foot radius around a maternity roost tree between June 1 to July 31, this project is considered "not likely to adversely affect" the Northern long-eared bat under the 4(d) rule. DDOT will follow the Time-of-Year (TOY) restriction as specified by the USFWS for tree cutting during construction. Detailed tree inventory would be prepared during final design. If any additional nests, hibernacula trees, or buffers around maternity roosts are identified, necessary consultation with the USFWS and DOEE would be completed pursuant to the requirements of the Migratory Bird Act, Endangered Species Act, and the Fish and Wildlife Coordination Act.

All disturbed areas would be replanted with a native seed mix and trees in accordance with DDOT standard specifications. Replanting of any disturbed lands within Rock Creek Park would be coordinated with NPS.

Erosion and sediment control plans, stormwater management plans, and BMPs would be used during construction to protect water quality and habitat integrity.

Additional mitigation measures for construction impacts are presented in Section 4.9.

4.1.4 VEGETATION

Alternative 1 – No Action Alternative

Although no rehabilitation would take place, this alternative would have local permanent impacts to vegetation due to continued erosion. Excess stormwater from the upland areas surrounding Broad Branch Road currently flows unchecked into Rock Creek Park causing erosion, damaging vegetation, and making it difficult for new vegetation to take hold.

Alternatives 2, 3, 4, and Preferred Alternative

This project would expand the width of the existing Broad Branch Road footprint, decrease vegetated areas, and result in permanent impact to vegetation. The footprint would be expanded in areas directly adjacent the existing pavement. Work conducted subsurface may damage trees located beyond the limits of disturbance if their root systems stretch into areas where groundbreaking occurs.

All vegetation occurring within the limits of disturbance is considered to be impacted. Trees surveyed for which 30 percent or more of the critical root zone is located within the limits-of-disturbance are also considered to be impacted. **Table 4-5** shows how many trees, four inches or larger in diameter at breast height (DBH), that each Build Alternative and the Preferred Alternative would disturb by construction.

Table 4-5. Trees Impacted (4 Inches in DBH or greater)

RESOURCE	ALT 1 NO ACTION	ALT 2	ALT 3	ALT 3 MOD	ALT 4
Number of trees impacted	0	249	465	382	463

Mitigation

Design plans would include measures for tree protection and would be developed in coordination with DDOT's Urban Forestry Division (UFD). UFD's recommended measures would be implemented to the extent practical, to avoid impacts to larger tree specimens during construction. Such protection techniques generally include installation of tree protection fencing and staging construction equipment to avoid damaging trees and their root systems in accordance with DDOT's Standard Specifications for Highways and Structures - Section 608 Trees, Shrubs, Vines and Ground Cover *and in coordination with DDOT's Urban Forestry Division. The identification of mature Special Trees would be performed in accordance with the District's Tree Canopy Protection Amendment Act of 2016. Removal of certain trees from DDOT property would require a DDOT Special Tree Removal Permit.*

Removal of trees from NPS land would be authorized by NPS Special Use Permit for construction. A tree inventory will be conducted and submitted to NPS, as necessary, to account for trees that will be impacted and removed during project construction, including work conducted outside Rock Creek Park property that may cause damage to species within park property (e.g., root damage). If required, a pre-determined value for tree species type and/or size inclusive of values for tree types will be assessed for the tree removal within the NPS property. All issues related to trees will be assessed in the design phase in coordination with NPS, prior to

moving into construction. Site restoration and revegetation would be included in the conditions of the permit. Before a permit is approved, all conditions of the permit will be agreed upon by both agencies. These conditions will relay into the construction documents so that the contractor is aware of the requirements associated with the inadvertent tree or vegetation damage.

In order to prevent the introduction of new invasive species and to prevent the spread of existing populations in compliance with EO 13112, BMPs would be implemented, including washing machinery before it enters the area, minimizing ground disturbance, and reseeded of disturbed areas. Rock Creek Park staff would be consulted for preferred seed mixes for use in disturbed areas within the park. Additional measures may be included in the Special Use Permit for temporary activities on NPS property.

Additional mitigation measures for construction impacts are presented in Section 4.9.

4.2 CULTURAL AND PALEONTOLOGICAL RESOURCES

In this Final EA, impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with CEQ regulations that implement NEPA. These impact analyses are intended, however, to comply with the requirements of both NEPA and Section 106 of the National Historic Preservation Act (NHPA). In accordance with the Advisory Council on Historic Preservation (ACHP) regulations implementing Section 106 (36 CFR Part 800, Protection of Historic Properties), impacts to cultural resources were identified and evaluated by (1) determining the Area of Potential Effects (APE); (2) identifying cultural resources present in the APE that are either listed on or eligible to be listed on the NRHP; (3) applying the criteria of adverse effect to affected cultural resources either listed on or eligible to be listed on the NRHP; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the ACHP's regulations, a determination of either adverse effect or no adverse effect must be made for affected NRHP listed or eligible cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion on the NRHP (e.g., diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the build alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, Assessment of Adverse Effects). Adverse effects on historic properties would include, but not be limited to:

1. Physical destruction, damage, or alteration of all or part of the property;
2. Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the NRHP;
3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
4. Neglect of a property resulting in its deterioration or destruction; and
5. Transfer, lease, or sale of the property (36 CFR 800.9[b]).

A determination of no adverse effect means that historic properties are present, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion on the NRHP.

For the purposes of this Final EA, a significant impact under NEPA is defined as an “unresolvable” adverse effect under Section 106 of the NHPA. “Unresolvable” adverse effects may occur when the terms of mitigation cannot be agreed upon, or if the NHPA Section 106 process is foreclosed due to an inability to reach agreement. The following subsections are intended to meet the requirements of Section 106 and provide an assessment of the effect of the undertaking (implementation of the alternatives) on cultural resources, based upon the criteria of adverse effect found in the ACHP’s regulations.

4.2.1 ARCHAEOLOGICAL RESOURCES

Project effects to archaeological sites include physical disturbance through road rehabilitation (i.e., cut-and-fill activities), trenching for utility lines, excavation of retaining wall piers and Soapstone Creek Culvert subsurface, surface modification for rain gardens, use of staging areas for heavy equipment and supplies, and vandalism of archaeological materials from temporary or permanent increased access to sites. Any ground-disturbing action in the area of an NRHP-eligible or potentially eligible archaeological site, or modification to such a site, can affect the physical integrity of that cultural resource, resulting in alteration or destruction of those characteristics or qualities that make it potentially eligible for inclusion on the NRHP.

Alternative 1 – No Action Alternative

Continued erosion and natural degradation of areas within Rock Creek Park that contain archaeological resources would continue to occur as a result of uncontrolled stormwater runoff. Archaeological resources would continue to be managed in accordance with Sections 106 and 110 of the NHPA and NPS’s *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director’s Order #12). Implementation of the No Action Alternative (repaving and general maintenance) would result in no adverse impacts to archaeological resources.

Alternative 2

No archaeological sites occur within the DDOT right-of-way. Based on changes in elevation and alignments through time, the APE has been extensively modified with both cut (erosional and manmade excavation) and fill (manmade) activities. The area along Broad Branch Road between Linnean Avenue and 27th Street has been previously disturbed; 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. This area contains no potential for archaeological resources (Wagner, 2011). The area along Broad Branch Road from 27th Street to Beach Drive is characterized by steep uplands on the west side and Broad Branch on the east side. The original topography was modified in 1839 when Broad Branch Road was constructed and no archaeological sites prior to 1839 would have been located on the hill slopes. The original Brandywine Street/Broad Branch Road intersection was constructed as a Y-intersection and the entire area has been previously disturbed by topographic recontouring and road construction. The original topography along Brandywine Street was modified during construction of the street prior to 1945 (USGS, 1945) and no archaeological sites prior to 1945 would have been located on the hill slopes. 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). Road, park, and building construction activities at the confluence of Soapstone Creek and Broad Branch have

altered the topography at this location, particularly the construction of a structure by 1898, its demolition prior to 1925, and construction of the existing Gatehouse; the DDOT right-of-way in this area contains no potential for prehistoric or historic resources. Replacement of the Soapstone Creek Culvert involves lengthening the headwalls along Broad Branch Road beyond the original ca. 1898 footprint. Alternative 2 may result in an adverse impact to historic archaeological resources if remnants of the stone dam across Broad Branch are encountered and disturbed during the replacement of the Soapstone Creek Culvert. Although an historic quarry occurs adjacent to the APE and the Kensington Tonalite intrusive formation occurs within the study area, the elevation change analysis did not identify any additional areas with decreased elevations over time suggesting other quarry locations.

The original topography in the area designated for the new 561-foot retaining wall in the northern segment of the roadway was modified in 1839 when Broad Branch Road was constructed and no archaeological sites prior to 1839 would have been located on the hill slopes. No archaeological sites would be impacted by implementation of the proposed wall for Alternative 2.

No archaeological sites occur within DDOT right-of-way or within NPS land on the southern segment in the area designated for the connecting sidewalk from the NPS parking lot at Beach Drive and Broad Branch Road to the Soapstone Valley Trail. The original topography was modified in 1839 when Broad Branch Road was constructed and no archaeological sites prior to 1839 would have been located on the hill slopes.

Alternatives 3, 4, and Preferred Alternative

Similar to Alternative 2, no archaeological sites occur within the existing DDOT right-of-way or the proposed additional rights-of-way to be obtained from NPS, private landowners, and Sovereign Nations. Based on changes in elevation and alignments through time, the APE has been extensively modified with both cut (erosional and manmade excavation) and fill (manmade) activities. The area along Broad Branch Road between Linnean Avenue and 27th Street has been previously disturbed; 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. This area contains no potential for archaeological resources (Wagner, 2011). The area along Broad Branch Road from 27th Street to Beach Drive is characterized by steep uplands on the west side and Broad Branch on the east side. The original topography was modified in 1839 when Broad Branch Road was constructed and no archaeological sites prior to 1839 would have been located on the hill slopes. The original Brandywine Street/Broad Branch Road intersection was constructed as a Y-intersection and the entire area has been previously disturbed by topographic recontouring and road construction. The original topography along Brandywine Street was modified during construction of the street prior to 1945 (USGS, 1945) and no archaeological sites prior to 1945 would have been located within the intersection area or on the adjacent hill slopes. 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). Road, park, and building construction activities at the confluence of Soapstone Creek and Broad Branch have altered the topography at this location, 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. Replacement of the Soapstone Creek Culvert

involves lengthening the headwalls along Broad Branch Road beyond the original ca. 1898 footprint. Alternatives 3, 4 and the Preferred Alternative may result in an adverse impact to historic archaeological resources if remnants of the stone dam across Broad Branch are encountered and disturbed during the replacement of the Soapstone Creek Culvert. Although an historic quarry occurs adjacent to the APE and the Kensington Tonalite intrusive formation occurs within the study area, the elevation change analysis did not identify any additional areas with decreased elevations over time suggesting other quarry locations.

4.2.2 HISTORIC STRUCTURES

Project effects to architectural resources include demolition, alteration of architectural traits, structural instability through vibration, temporary audio intrusions during construction, and visual intrusions to historic settings. Any visual or audio intrusions to the setting or demolition or alteration of architectural traits, can affect the physical integrity of an NRHP-eligible or potentially eligible architectural resource, resulting in alteration or destruction of those characteristics or qualities that make it potentially eligible for inclusion on the NRHP.

Alternative 1 – No Action Alternative

Deterioration of historic structures, such as the culverts and retaining walls, along Broad Branch Road would continue to occur as a result of uncontrolled stormwater runoff. Historic resources in Rock Creek Park would continue to be managed in accordance with Sections 106 and 110 of the NHPA and the NPS's *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order #12).

Alternative 2

Soapstone Creek Culvert, stormwater outfalls, segments of retaining walls, and boundary markers that are considered contributing elements to the Rock Creek Park Historic District (RCPHD) and the stone retaining walls associated with the Gatehouse at La Villa Firenze would be impacted by implementation of Alternative 2. The historic setting of the RCPHD along Broad Branch would be affected by visual intrusions related to rehabilitation of roadway and drainage elements.

The Soapstone Creek Culvert would be demolished and replaced with a larger arch culvert. Headwalls above the culvert on both upstream and downstream sides would be constructed of concrete panels clad in stone that could be a mix of usable existing stone and new stone using context sensitive design. Demolition of the Soapstone Creek Culvert would have an adverse impact on this NRHP-eligible resource.

Even though most of the historic stone retaining wall segments are located beyond the cut-and-fill lines for the roadway and would not be directly affected by surface and subsurface grading activities, portions of historic retaining wall segments H9, H10, H11, H14, and H15 are located within the DDOT right-of-way. Use of heavy grading equipment may cause ground vibration, which could potentially damage or topple adjacent historic retaining wall segments during construction and would have an adverse impact on these NRHP-listed resources.

New retaining walls have been proposed near historic stone retaining wall segments H2, H3, H4, H5, H6, H11, H12, H13, H14, and H15. These historic retaining wall segments would be restored

and stabilized or removed and replaced with architecturally compatible designs and materials. The use of architecturally compatible designs and materials may result in no adverse impact on these NRHP-listed resources.

Ten of the twenty-one outfall locations are associated with either stone headwalls or the historic stone retaining wall segments. Portions of existing stone retaining wall segments H6, H7, H8, and H14 (OF-8, OF-12, OF-13, and OF-18) and six existing stormwater outfall stone headwalls (OF-9, OF-10, OF-14, OF-16, OF-20, and OF-21) would be removed and replaced during excavation and replacement of the outfall pipes. Replacement of these resources would have an adverse impact on these NRHP-listed resources.

No architectural resources occur within the DDOT right-of-way in the northern segment of the roadway in the area designated for the new 561-foot retaining wall. This area was modified in 1839 when Broad Branch Road was constructed and no architectural resources prior to 1839 would have been located on the hill slopes.

Three Rock Creek Park stone and metal boundary markers may be disturbed through roadway cut-and-fill activities. These markers may be inadvertently moved during roadbed preparation near the DDOT right-of-way or covered with fill. The stone and metal boundary markers would be temporarily re-located during construction and re-installed in the original location in coordination with the NPS. Relocation of the stone and metal boundary markers would result in an adverse impact on these potentially NRHP-eligible resources.

Portions of the original stone retaining walls at the entrance to the driveway to the Gatehouse at La Villa Firenze located within DDOT right-of-way would be relocated and the construction of new retaining walls on the west side of Broad Branch Road would use restored original stones to the extent possible. Demolition of the stone retaining walls would result in an adverse impact on the NRHP-eligible Gatehouse.

The original Brandywine Street/Broad Branch Road intersection was constructed as a Y-intersection and the entire area has been previously disturbed by topographic recontouring and road construction. The original topography along Brandywine Street was modified during construction of the street prior to 1945 (USGS, 1945) and no architectural resources prior to 1945 would have been located on the hill slopes.

Visual intrusions to the historic setting of RCPHD would be minimized with the use of architecturally compatible designs and materials for the replacement of Soapstone Creek Culvert, new retaining walls, new outfall headwalls, and repair of historic stone retaining walls during outfall replacement. With the use of architecturally compatible designs and materials, no adverse impact would be anticipated to the historic setting and viewshed of the RCPHD.

Alternatives 3, 4, and Preferred Alternative

Soapstone Creek Culvert, stormwater outfalls, segments of retaining walls, and boundary markers that are considered contributing elements to the RCPHD would be impacted by implementation of Alternatives 3, 4, and the Preferred Alternative. The stone retaining walls associated with the Gatehouse at La Villa Firenze would also be impacted by Alternatives 3 and 4 but not by the Preferred Alternative; the roadway widening at this location has been shifted to the east side of the road in the Preferred Alternative to avoid impacts to this resource. The historic

setting of the RCPHD along Broad Branch would be impacted by visual intrusions related to rehabilitation of roadway and drainage elements.

The Soapstone Creek Culvert would be demolished and replaced with a larger arch culvert. Headwalls above the culvert on both upstream and downstream sides would be constructed of concrete panels clad in stone that could be a mix of usable existing stone and new stone using context sensitive design. Demolition of the Soapstone Creek Culvert would have an adverse impact on this NRHP-eligible resource.

No architectural resources occur within DDOT right-of-way at the Brandywine Street intersection. The original topography in the area designated for the reconfigured T-intersection at Brandywine Street and Broad Branch Road was modified in 1839 when Broad Branch Road was constructed and no architectural resources prior to 1839 would have been located on the hill slopes.

Even though most of the historic stone retaining wall segments are located beyond the cut-and-fill lines for the roadway and would not be directly affected by surface and subsurface grading activities, portions of historic retaining wall segments H9, H10, H11, H14, and H15 are located within DDOT right-of-way. Use of heavy grading equipment would cause ground vibration, which could potentially damage or topple adjacent historic retaining walls and would have an adverse impact on these NRHP-listed resources.

New retaining walls have been proposed near historic stone retaining wall segments H2, H3, H4, H5, H6, H11, H12, H13, H14, and H15. These historic retaining wall segments would be removed and replaced with architecturally compatible designs and materials. The use of architecturally compatible designs and materials may result in no adverse impact on these NRHP-listed resources.

Ten of the twenty-one outfall locations are associated with either stone headwalls or historic stone retaining wall segments. Portions of existing stone retaining wall segments H6, H7, H8, and H14 (OF-8, OF-12, OF-13, and OF-18) and six existing stormwater outfall stone headwalls (OF-9, OF-10, OF-14, OF-15, OF-20, and OF-21) would be removed and replaced during excavation and replacement of the outfall pipes. Replacement of these resources would have an adverse impact on these NRHP-listed resources.

Three Rock Creek Park stone and metal boundary markers may be disturbed through roadway cut-and-fill activities. These markers may be inadvertently moved during roadbed preparation near the DDOT right-of-way or covered with fill. The stone and metal boundary markers would be temporarily re-located during construction and re-installed in the original location in coordination with the NPS. Relocation of the stone and metal boundary markers would result in an adverse impact on these potentially NRHP-eligible resources.

Portions of the original stone retaining walls at the entrance to the driveway to the Gatehouse at La Villa Firenze located on the Government of Italy property and within DDOT right-of-way would be relocated under Alternatives 3 and 4 with the expansion of the right-of-way and the construction of new retaining walls on the west side of Broad Branch Road would use restored original stones to the extent possible. The Preferred Alternative would also require relocation of portions of the original stone retaining walls at the entrance to the driveway to the Gatehouse at

La Villa Firenze but only wall segments located within DDOT right-of-way. Construction of new retaining walls on the west side of Broad Branch Road would use restored original stones to the extent possible. Relocation of the stone retaining walls would result in an adverse impact on the NRHP-eligible Gatehouse.

Visual intrusions to the historic setting of RCPHD would be minimized with the use of architecturally compatible designs and materials for the replacement of Soapstone Creek Culvert, new retaining walls, new outfall headwalls, and repair of historic stone retaining walls during outfall replacement. With the use of architecturally compatible designs and materials, no adverse impact would be anticipated to the historic setting and viewshed of the RCPHD.

4.2.3 CULTURAL LANDSCAPES

Project effects to cultural landscapes include alteration of character defining features, temporary audio intrusions during construction, and visual intrusions to established viewsheds. Any visual or audio intrusions to the cultural landscape or alteration of character defining features, can affect the physical integrity of an NRHP-eligible or potentially eligible cultural landscape, resulting in alteration or destruction of those characteristics or qualities that make it potentially eligible for inclusion on the NRHP.

Alternative 1 – No Action Alternative

Deterioration of historic structures, such as the bridges, culverts, and retaining walls, along Broad Branch Road would continue to occur as a result of uncontrolled stormwater runoff. This deterioration of rustic architectural features diminishes the overall feeling of the Rock Creek Park cultural landscape. Historic resources in Rock Creek Park would continue to be managed in accordance with Sections 106 and 110 of the NHPA and the NPS's *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order #12).

Alternative 2

Segments of three historic trails that are considered contributing elements of the Historic Trails Cultural Landscape (Poss and McMillen 2013) are present along the southern end of the project area near the intersection of Broad Branch Road and Beach Drive: the Western Ridge foot trail, the Soapstone Creek Valley Trail, and the White Horse bridle trail from the intersection of Broad Branch and Beach Drive. Three trees with a diameter greater than 4 inches would be impacted on NPS property within the viewshed of the three historic trails. Visual intrusions to the viewshed of this cultural landscape of RCPHD would be minimized with the use of architecturally compatible designs and materials for the replacement of Soapstone Creek Culvert, new retaining walls, new outfall headwalls, and repair of historic stone retaining walls during outfall replacement.

Temporary visual and audible intrusions to the three trails associated with the Rock Creek Park cultural landscape would likely occur during the period of construction for this alternative for rehabilitation of Broad Branch Road. Visual intrusions may include the presence of large machinery, excavated roadway and earth, spoil and fill piles, stockpiling of new construction material, and road blocks and detours. Temporary audible intrusions may include increased noise from construction activity such as excavation; large vehicle movement, braking, and back-

up signals; and construction crews. Permanent visual intrusions from the roadway improvements are not expected to occur because the roadway would be rehabilitated in its existing corridor. Permanent audible intrusions are not anticipated because rehabilitation of Broad Branch Road is not a capacity-building project; no increased noise from additional vehicular traffic is expected to occur.

Alternatives 3, 4, and Preferred Alternative

Segments of three historic trails that are considered contributing elements of the Historic Trails Cultural Landscape (Poss and McMillen 2013) are present along the southern end of the project area near the intersection of Broad Branch Road and Beach Drive: the Western Ridge Trail, the Soapstone Valley Trail and the bridle trail from the intersection of Broad Branch and Beach Drive to White Horse Trail. Four trees in Alternative 3, 21 trees in Alternative 4, and 40 trees in the Preferred Alternative with diameters greater than 4 inches would be impacted on NPS property over the length of the entire corridor; however, only three trees in Alternative 3, eight trees in Alternative 4, and eight trees in the Preferred Alternative would be impacted on NPS property within the viewshed of the three historic trails. The removal of these trees and associated understory would not diminish the overall perception of a tree-covered hillside within the viewshed of the two historic trails.

Visual intrusions to the viewshed of this cultural landscape of RCPHD would be minimized with the use of architecturally compatible designs and materials for the replacement of Soapstone Creek Culvert, new retaining walls, new outfall headwalls, and repair of historic stone retaining walls during outfall replacement. The Brandywine Street intersection is not located within the viewshed of the three historic trails associated with the Historic Trails Cultural Landscape.

Temporary visual and audible intrusions to the three trails associated with the Rock Creek Park cultural landscape would likely occur during the period of construction for any of these alternatives for rehabilitation of Broad Branch Road. Visual intrusions may include the presence of large machinery, excavated roadway and earth, spoil and fill piles, stockpiling of new construction material, and road blocks and detours. Temporary audible intrusions may include increased noise from construction activity such as excavation; large vehicle movement, braking, and back-up signals; and construction crews. Permanent visual intrusions from the roadway improvements are not expected to occur because the roadway would be rehabilitated in its existing corridor. Permanent audible intrusions are not anticipated because rehabilitation of Broad Branch Road is not a capacity-building project; no increased noise from additional vehicular traffic is expected to occur.

4.2.4 ETHNOGRAPHIC RESOURCES

Alternatives 1, 2, 3, 4, and Preferred Alternative

Ethnographic resources are not known to exist in the proposed project area. No impacts to ethnographic resources are anticipated as a result of implementing the No Action, Build Alternatives, or the Preferred Alternative.

4.2.5 MUSEUM COLLECTIONS

Alternatives 1, 2, 3, 4, and Preferred Alternative

Although artifacts from previous archaeological surveys conducted in Rock Creek Park have been collected, none are housed in the Broad Branch Road project area. No impacts to museum collections are anticipated as a result of implementing the No Action, Build Alternatives, or the Preferred Alternative.

4.2.6 INDIAN TRUST RESOURCES AND NATIVE AMERICAN SACRED SITES

Alternatives 1, 2, 3, 4, and Preferred Alternative

No Indian Trust Resources are known to exist within the proposed project area and the lands are not held in trust by the Secretary of Interior for the benefit of American Indians or Alaska Native Tribes. No sites sacred to Native Americans are known to exist in the project area. No impacts to Indian Trust Resources and Native American sacred sites are anticipated from the No Action, Build Alternatives, or the Preferred Alternative.

4.2.7 PALEONTOLOGICAL RESOURCES

Alternatives 1, 2, 3, 4, and Preferred Alternative

No surface outcrops of the fossiliferous Potomac Formation occur in the project area. Because no known resources exist within the project area, no impact to paleontological resources are anticipated from the No Action, Build Alternatives, or the Preferred Alternative.

4.2.8 CULTURAL AND PALEONTOLOGICAL RESOURCES SUMMARY & MITIGATION

The No Action Alternative would result in no impacts to archaeological resources. Alternatives 2, 3, 4, and the Preferred Alternative could potentially result impacts to historic archaeological resources (ca. 1898 stone dam across Broad Branch stream).

Implementation of the No Action Alternative would result in no impacts to historic structures. Alternatives 2, 3, 4, and the Preferred Alternative would result in permanent impacts to contributing elements to the RCPHD: the demolition of Soapstone Creek Culvert and segments of retaining walls and stormwater outfall headwalls; and the relocation of portions of the original stone retaining walls associated with the Gatehouse at La Villa Firenze. In addition, Alternatives 2, 3, 4, and the Preferred Alternative would result in visual and audible impacts to historic structures during construction.

Implementation of the No Action Alternative would result in no impacts to the defining features of the cultural landscapes. Alternatives 2, 3, 4, and the Preferred Alternative would result in no permanent impacts to cultural landscapes with the use of architecturally compatible designs and materials for the replacement of Soapstone Creek Culvert, new retaining walls, new outfall headwalls, and repair of historic stone retaining walls during outfall replacement. Some trees with a diameter greater than 4 inches would be impacted on NPS property within the viewshed of the three historic trails. In Alternatives 2 and 3, three trees would be removed. In both Alternative 4 and the Preferred Alternative, eight trees would be removed in each alternative; however, removal would not diminish the overall perception of tree-covered hillsides within the

viewshed of the three trails. In addition, Alternatives 2, 3, 4, and the Preferred Alternative would result in visual and audible impacts to cultural landscapes during construction.

Implementation of the No Action and all four alternatives would result in no impact to ethnographic resources, museum collections, Indian Trust Resources and Native American sacred sites, and paleontological resources.

Mitigation

A Section 106 Memorandum of Agreement (MOA) has been prepared and executed by FHWA and DDOT in consultation with NPS, DC SHPO, and other consulting parties, to resolve and mitigate the adverse effects to historic properties in accordance with Section 106 of the NHPA (see Appendix O). Restoration, replacement, and stabilization of all architectural elements of historic properties would be in accordance with the stipulations set forth in the executed Section 106 MOA, as concurred upon by the DC SHPO. If any archaeological resources are encountered during construction, they would be treated in accordance with the inadvertent discoveries stipulation in the Section 106 MOA. Additionally, Section 4.9 presents details of mitigation measures to resolve potential construction impacts.

4.3 SOCIOECONOMIC RESOURCES

4.3.1 RIGHT-OF-WAY

Alternative 1 – No Action Alternative

Under the No Action Alternative, Broad Branch Road would not be rehabilitated but only repaved within the existing roadway alignment, which occurs almost entirely in DDOT right-of-way, with a few minor exceptions. These exceptions may be due to inconsistencies in survey bounds when the road was originally constructed or possibly the result of previous paving projects. DDOT may undertake future actions to correct these right-of-way exceptions, which may include an easement or land transfer. Encroachments outside the DDOT right-of-way occur on the east side of the roadway only.

Alternative 2

The majority of Alternative 2 improvements would be limited to the rehabilitation of Broad Branch Road following the existing paved footprint. The longer retaining wall proposed for the northern segment reduces the amount of cut required for roadway slopes, but not in areas where the cut would occur outside the existing right-of-way. The sidewalk added to the southern end of the corridor to connect the Soapstone Creek Trail with the parking lot near Beach Drive would require an additional area of 3,737 square feet in the Hillwood Estate, Museum and Gardens property (see Table 4-6). *The design, construction, and maintenance of the continuation of sidewalk to the parking lot entrance would be coordinated with the NPS.*

Alternatives 3, 4, and Preferred Alternative

Under Build Alternatives 3 and 4 and the Preferred Alternative, additional right-of-way would be required to expand the roadway cross-section to include sidewalks, curbing, drainage, and a bike lane (in Alternative 4 only). As shown in Table 4-6, design modifications to the Preferred Alternative resulted in a major reduction in additional right-of-way required compared to the

original Alternative 3 (4,556 square feet for the Preferred Alternative versus 28,827 square feet for Alternative 3). In addition, the Preferred Alternative would not encroach upon land of any of the Sovereign Nations. Alternative 4 is the widest of the proposed build alternatives and would require 41,823 square feet of additional right-of-way. Both Alternatives 3 and 4 would encroach upon land of Sovereign Nations. None of the additional parcels or parts of parcels would require relocation of a residence, business, or other structures. For each of the build alternatives, limited right-of-way may be required along the east side of the roadway on NPS land to accommodate the reconstruction of retaining walls; however, the final locations of retaining walls and need for additional right-of-way would be determined after completion of engineering studies to assess the condition of existing walls and the need for new walls (see Table 4-8 in Section 4.3.11.5 for more details).

The impacts associated with the sidewalk added to the southern end of the corridor to connect the Soapstone Creek Trail with the parking lot near Beach Drive would be identical to that described for Alternative 2 and require the same amount of additional land from the Hillwood Estate, Museum and Gardens property. *The design, construction, and maintenance of the continuation of sidewalk to the parking lot entrance would be coordinated with the NPS.*

DDOT conducted coordination sessions with each of the major property stakeholders (e.g., Hillwood Estates, Sovereign Nations/U.S. Department of State, and NPS) along the roadway corridor. As part of these efforts, each stakeholder was provided with technical memorandums which described the potential effects to each specific property (see Appendix P).

The traffic island at the existing Y-intersection with Brandywine Street occurs within DDOT right-of-way and is maintained by the District Department of Parks and Recreation (DPR). No additional right-of-way would be required to eliminate the traffic island as part of the reconfiguration of the intersection at Brandywine Street.

Table 4-6. Additional Right-of-Way Requirements (square feet)

RESOURCE	ALT 1 NO ACTION	ALT 2	ALT 3	ALT 3 MOD	ALT 4
Area Outside Existing Right-of-Way	0	3,737	28,827	4,556	41,823

Mitigation

The acquisition of right-of-way from private property owners, including the Hillwood Estate, would be conducted in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. *The alignment plans, and associated potential impacts, presented in this Final EA are conceptual in nature, as appropriate to support the decisions to be made at this time. Efforts to further minimize potential impacts identified in the EA will occur for all resources, including right-of-way impacts to properties, during future phases of final design. All property access (i.e., driveways and alleys) or property structures (i.e., fences, light posts, or other permanent features) that are impacted by the project will be restored and/or replaced in kind.*

Permanent acquisition of additional right-of-way from the NPS will be processed through a Transfer of Jurisdiction (TOJ) between DDOT and NPS as there is no other feasible alternative to

implement this project. DDOT will obtain a Special Use Permit from NPS for temporary activities related to the rehabilitation of existing structures that support DDOT infrastructure on NPS property, including access, construction, and site restoration.

4.3.2 LAND USE

According to DC Policy UD-1.2.1: *Respecting Natural Features in Development*, it is an important goal of the District to maintain and protect Washington’s unique landscape and natural features. The District’s comprehensive plan states that natural features should be preserved in low-density, wooded, or hilly areas and new construction should accommodate these resources rather than altering them. Designs for this project should take into consideration the bucolic setting of the project area and strive to maintain the existing neighborhood setting (DC Government 2007a, 2007b, 2007c).

The methodology used to determine the environmental consequences to land use was derived from the potential for changes to land use as a result of the implementation of any of the alternatives.

Alternatives 1, 2, 3, 4, and Preferred Alternative

Land use within the project area is not anticipated to change from either the maintenance or improvement of this road. The land is zoned as single family residential and is currently at capacity. Zoning would not be changed in this area and is not expected to change in the near future.

Mitigation

The proposed action is rehabilitation of an existing roadway and would not induce development nor require any changes to local land uses. No further mitigation is required.

4.3.3 SOVEREIGN NATIONS

Alternative 1 – No Action Alternative

Under the No Action Alternative, Broad Branch Road would not be rehabilitated, but only repaved within the DDOT right-of-way, and existing conditions would remain unchanged. There would be no impact to land belonging to Sovereign Nations.

Alternatives 2, 3, 4, and Preferred Alternative

Under Build Alternative 2, grading for construction would require land belonging to a Sovereign Nation (Malaysia), resulting in negligible impacts to foreign property. No permanent structures would be constructed outside existing DDOT right-of-way. Under Build Alternatives 3 and 4, additional right-of-way would need to be acquired within lands belonging to Sovereign Nations (Italy and Malaysia) for permanent construction of retaining walls, resulting in permanent impacts to foreign property (see **Table 4-7**). Negotiation with these nations would be coordinated by the US Department of State per request from DDOT. The area needed would not alter the ability of the foreign ambassador’s residences to function as intended. The Preferred Alternative would not encroach upon land of any of the Sovereign Nations; the roadway widening has been shifted to the east side of the road to avoid impacts to properties of Sovereign Nations along

Broad Branch Road. Details of coordination efforts with each of the Sovereign Nations involved are presented in Section 5.1.5.

Table 4-7. Areas of Disturbance – Foreign Ambassador’s Residences (Square Feet)

ALTERNATIVE	MALAYSIAN AMBASSADOR’S RESIDENCE	ITALIAN AMBASSADOR’S RESIDENCE
1	0	0
2	60 (grading only)	0
3	3,458	13,821
3 Modified	0	0
4	4,321	17,272

Mitigation

The primary purpose of design modifications to the Preferred Alternative 3 Modified was to remove encroachment upon land of any of the Sovereign Nations. DDOT would continue to coordinate with the US Department of State and the Sovereign Nations during the final design and construction phases of the project.

4.3.4 ZONING

Alternatives 1, 2, 3, 4, and Preferred Alternative

Context sensitive solutions took into account the adjoining land uses that consist of residential; Sovereign Nation properties; institutional developments; and wooded areas, including Rock Creek Park.

None of the project alternatives would require changes in zoning within or surrounding the project area; therefore, there would be no impact to zoning.

Mitigation

No changes to local zoning requirements would be required and no further mitigation is required.

4.3.5 DEMOGRAPHICS

Alternative 1 – No Action Alternative

Under the No Action Alternative, Broad Branch Road would not be rehabilitated and existing conditions would remain unchanged. There would be no impact to demographics under the No Action Alternative.

Alternatives 2, 3, 4, and Preferred Alternative

Each of the Build Alternatives and the Preferred Alternative requires grading and/or additional right-of-way, with Alternative 4 requiring the most. The area needed would be adjacent to the existing paved surface and would not result in any residential relocations, nor would it directly affect populations in the project area. The Build Alternatives and the Preferred Alternative would have no impact on population distribution within the project area.

Mitigation

There would be no changes caused to area demographics by the proposed action and no further mitigation is required.

4.3.6 ENVIRONMENTAL JUSTICE

Alternative 1 – No Action Alternative

Under the No Action Alternative, Broad Branch Road would not be rehabilitated, only repaved and maintenance activities would occur as with existing conditions. No impacts to low income or minority populations would occur under the No Action Alternative.

Alternatives 2, 3, 4, and Preferred Alternative

Based on the low levels of minority and low-income populations in the area surrounding the proposed project, there are not anticipated to be any disproportionately high or adverse impacts on these populations. To ensure minority populations were afforded the opportunity to participate during the public scoping and alternatives development periods as well as attend the public hearing, advertisements were placed in several area newspapers, including The Current Newspaper and El Tiempo Latino Spanish newspaper, and postings were made to the surrounding communities' and Advisory Neighborhood Commission (ANC) listserves and the project website. A contact was provided with each advertisement for individuals to request special assistance or translation services during the meetings, and English and Spanish versions of meeting handouts were available at each public meeting or upon request (see Chapter 5).

Mitigation

There are no disproportionately high or adverse impacts to Environmental Justice communities and no further mitigation is required.

4.3.7 ECONOMICS AND DEVELOPMENT

Alternative 1 – No Action Alternative

Under the No Action Alternative, Broad Branch Road would not be rehabilitated, only repaved, and it would have no impact on local economics or development.

Alternatives 2, 3, 4, and Preferred Alternative

The Build Alternatives and Preferred Alternative would not change employment or development in the project area. Minimal employment opportunities and some related revenues would result from construction of the proposed project. While construction activities have the potential to be beneficial, the relatively small scope of the project makes economic impacts negligible and limited in duration.

Mitigation

The proposed action is a rehabilitation project and would not result in any induced growth and development in the project area. Therefore, no mitigation is required.

4.3.8 JOINT DEVELOPMENT

Alternatives 1, 2, 3, 4, and Preferred Alternative

None of the alternatives would have any impact on joint development, since there are no proposed or existing joint developments within or surrounding the project area.

Mitigation

The proposed rehabilitation of the existing roadway does not promote or limit joint development in the corridor. No mitigation is required.

4.3.9 AESTHETICS AND VISUAL QUALITY

Effects to aesthetics and visual quality in the project area include alteration of existing cultural and natural features and introduction of vertical elements that could obscure existing views.

Temporary visual intrusions would likely occur during the period of construction for all of the Build Alternatives and the Preferred Alternative. Visual intrusions may include the presence of large machinery, excavated roadway and earth, spoil and fill piles, stockpiling of new construction material, and road blocks and detours. Potential permanent visual intrusions are expected to occur and are discussed by alternative.

Alternative 1 – No Action Alternative

Alternative 1 would not result in any changes to the existing visual quality associated with the deteriorated condition of the project area. Uncontrolled stormwater has damaged existing culverts and retaining walls, undercut portions of Broad Branch Road, created instability of guard rails, and resulted in extensive erosion along Broad Branch and sedimentation in the vicinity of the Soapstone Creek Culvert.

Alternative 2

Broad Branch Road Sector. Proposed retaining walls located on the west side of Broad Branch Road between Linnean Avenue and 27th Street and the west side of Broad Branch Road between 27th Street and Beach Drive are associated with steep hill slopes. The visual quality would change from natural or landscaped vegetation on the hill slopes to discontinuous retaining walls varying in height from 3 feet to 12 feet and ranging in length from 56 feet to 561 feet.

Proposed retaining walls located on the east side of Broad Branch Road between 27th Street and Beach Drive are associated with Broad Branch and Rock Creek Park. The visual quality would change from natural trees and vegetation along the stream banks to discontinuous retaining walls with a visible height of 3.5 feet and ranging in length from 15 feet to 815 feet. With all of the retaining walls on the east side measuring 3.5 feet in visible height, views into Rock Creek Park and Fort Circle Park from the roadway would be visible over the retaining walls for vehicle occupants, cyclists, and pedestrians.

Mitigation

Use of context sensitive design and architecturally compatible materials for construction of the new retaining walls would maintain the aesthetic quality associated with the rural feel of the

roadway along the edge of Rock Creek Park and match with the rural architectural elements, such as Grant Road Bridge, that are characteristic of the Park.

Rock Creek Park Sector. Proposed retaining walls on the east side of Broad Branch Road (foreground) would most likely be viewed in their entirety from the top of the wall to the stream bottom within the Rock Creek Park sector. From the White Horse Trail, the retaining walls are 8.75 feet and 10.5 feet high; and from Grant Road, the retaining wall is 14.75 feet high. Only portions of the retaining walls on the west side of Broad Branch Road (background) would be visible above the foreground retaining walls from the White Horse Trail vantage point. Other visual changes include replacement of Soapstone Creek Culvert with a concrete arch culvert and the headwalls of three outfalls.

The installation of a connecting sidewalk from the NPS parking lot at Beach Drive and Broad Branch Road to the Soapstone Valley Trail and an associated retaining wall with increased heights of 6.8 feet and 12 feet on the west side of Broad Branch Road would introduce new visual elements to the project corridor when viewed from the Park.

Mitigation

Each retaining wall has been evaluated through extensive coordination with the DC SHPO and NPS. Use of context sensitive designs and architecturally compatible materials would be used in the construction of the new walls to maintain the existing aesthetic quality and context of the area. Similarly, context sensitive designs and architecturally compatible materials would be used for construction of the new Soapstone Creek Culvert and associated retaining walls, and outfall headwalls.

Residential Sector. Views to the project area from the Gatehouse at La Villa Firenze would be partially obstructed by the construction of a 7-foot-high retaining wall on the north side of the entrance driveway and by a 5-foot-high retaining wall associated with the new concrete arch culvert to replace the existing Soapstone Creek Culvert south of the entrance driveway. The construction of these two vertical elements would narrow the view to the project area and Rock Creek Park beyond. A 4-foot-high retaining wall would be constructed on the east side of Broad Branch Road and would not obstruct the view to Rock Creek Park. A 129-foot-long, 3.5-foot-high retaining wall would be constructed north of the Brandywine Street and Broad Branch intersection. This vertical element represents minimal intrusion on the visual quality of the project area as viewed from the private residences' vantage point; only the top of the retaining wall could be partially visible through the trees and vegetation.

Views to the project area from the foreign ambassador's residences (Ivory Coast and Tunisia) would include construction of an 18-inch coping wall. This vertical element represents minimal intrusion on the visual quality of the project area as viewed from the foreign ambassador's residences hilltop vantage point.

Alternative 2 includes the construction of a 30-foot-long, 12-inch-high coping wall. This vertical element represents minimal intrusion on the visual quality of the project area as viewed from private residences located on Linnean Avenue that are located across from a portion of Fort Circle Parks.

Mitigation

Architecturally compatible designs and materials would be used for the construction of the new concrete arch culvert over Soapstone Creek, retaining walls, and outfall headwalls to maintain the aesthetic quality and the rural context of views from nearby residences.

Educational/Institutional Sector. Alternative 2 includes the construction of a 30-foot-long, 12-inch-high coping wall. This vertical element represents minimal intrusion on the visual quality of the project area as viewed from the Carnegie Institution hilltop vantage point.

Alternative 3 and Preferred Alternative

Broad Branch Road Sector. Similar to Alternative 2, the visual quality of Broad Branch Road between Linnean Avenue and 27th Street and on the west side of Broad Branch Road between 27th Street and Beach Drive would change from natural or landscaped vegetation on the hill slopes to discontinuous retaining walls. Under Alternative 3 and the Preferred Alternative, the visible height of proposed retaining walls would vary from 3.0 feet to 8.5 feet and range in length from 90 feet to 220 feet. In addition, a sidewalk and bio-swale (rain garden) would be introduced along the west side of Broad Branch Road.

Retaining walls located on the east side of Broad Branch Road between 27th Street and Beach Drive are associated with Broad Branch and Rock Creek Park. The visual quality would change from natural trees and vegetation along the stream banks to discontinuous retaining walls with a visible height of 3.25 feet to 10.9 feet and ranging in length from 20 feet to 495 feet. With all of the retaining walls on the east side measuring 3.5 feet in visible height above the curb, views into Rock Creek Park and Fort Circle Parks from the roadway would be visible over the retaining walls for vehicle occupants, cyclists, and pedestrians.

Mitigation

Each retaining wall has been evaluated through extensive coordination with the DC SHPO and NPS. Use of context sensitive designs and architecturally compatible materials (which are included as stipulations for the proposed action in the executed Section 106 MOA, see Appendix O) would be used for construction of the new sidewalks and retaining walls to maintain the aesthetic quality associated with the rural context of the roadway along the edge of Rock Creek Park and match the rural architectural elements, such as Grant Road Bridge, that are characteristic of the corridor communities.

Rock Creek Park Sector. Proposed retaining walls on the east side of Broad Branch Road (foreground) would most likely be viewed in their entirety from the top of the wall to the stream bottom within the Rock Creek Park sector. From White Horse Trail, the visible height of the retaining walls are 7.4 feet, 9.4 feet, and 10.9 feet high; and from Grant Road, the visible height of the retaining wall is 8.25 feet. Only portions of the retaining walls on the west side of Broad Branch Road (background) would be visible above the foreground retaining walls from the White Horse Trail vantage point.

Other vertical elements include replacement of the Soapstone Creek Culvert with a concrete arch culvert and the headwalls of three outfalls.

Mitigation

Reconstruction of the Soapstone Creek Culvert and each retaining wall have been evaluated through extensive coordination with the DC SHPO and NPS. Use of context sensitive designs and architecturally compatible materials (which are included as stipulations for the proposed action in the executed Section 106 MOA, see Appendix O) would be used for the construction of the new concrete arch culvert over Soapstone Creek, retaining walls, and outfall headwalls to maintain the aesthetic quality associated with the rural context of the trail and roadway along the edge of Rock Creek Park and match the rural architectural elements such as the existing Soapstone Creek Culvert that are characteristic of the Park.

Residential Sector. With Alternative 3, views to the project area from the Gatehouse at La Villa Firenze would be partially obstructed by the construction of an 8.25-foot-high retaining wall on the north side of the entrance driveway. This retaining wall would be reduced in height to 5.0 feet as part of the Preferred Alternative to match the height of the existing wall at the property gate; the roadway widening at this location has been shifted to the east side of the road in the Preferred Alternative to avoid impacts to this resource.

Both Alternatives 3 and the Preferred Alternative include a 3.5-foot-high retaining wall associated with the new concrete arch culvert to replace the existing Soapstone Creek Culvert south of the entrance driveway. The construction of both of these two vertical elements would narrow the view to the project area and Rock Creek Park beyond. A 5.75-foot-high retaining wall would be constructed on the east side of Broad Branch Road and would not obstruct the view to Rock Creek Park. A sidewalk would also be installed but this horizontal element would not affect the visual quality.

A 105-foot-long, 6.25-foot-high retaining wall would be constructed north of the Brandywine Street and Broad Branch intersection; a 105-foot-long 7.0-foot-high retaining wall would be constructed south of the intersection. These retaining walls provide hill slope stability and protection for the new sidewalk. These vertical elements represent minimal intrusion on the visual quality of the project area as viewed from the private residences' vantage point; only the top of the retaining walls could be partially visible through the trees and vegetation.

Views to the project area from the foreign ambassador's residences (Ivory Coast and Tunisia) would include construction of 90-foot-long, 6.25-foot-high retaining wall on the east side of Broad Branch Road, and a 135-foot-long, 5.5-foot-high retaining wall and a 220-foot-long, 8.5-foot-high retaining wall along the hill slopes west of Broad Branch Road to provide hill slope stability and protection for the new sidewalk. These vertical elements represent a visual intrusion of the project area as viewed from the foreign ambassador's residences hilltop vantage point.

Alternative 3 and the Preferred Alternative include the construction of a 20-foot-long, 12-inch-high coping wall on the east side and installation of an at-grade sidewalk on the west side. These horizontal and vertical elements represent minimal visual intrusions to the project area as viewed from private residences located on Linnean Avenue that are located across from a portion of Fort Circle Parks.

Mitigation

Reconstruction of the Soapstone Creek Culvert and each retaining wall have been evaluated through extensive coordination with the DC SHPO and NPS. Context sensitive designs and architecturally compatible materials would be used for construction of the new concrete arch culvert over Soapstone Creek, retaining walls, and outfall headwalls, according to the stipulations of the executed Section 106 MOA (see Appendix O), to maintain the aesthetic quality associated with the rural context of the views from nearby residences.

Educational/Institutional Sector. Alternative 3 and the Preferred Alternative include the construction of a 20-foot-long, 12-inch-high coping wall and installation of an at-grade sidewalk. These horizontal and vertical elements represent minimal visual intrusion to the project area as viewed from the Carnegie Institution hilltop vantage point.

Alternative 4

Broad Branch Road Sector. As with Alternatives 2, 3, and the Preferred Alternative, the visual quality of Broad Branch Road between Linnean Avenue and 27th Street and on the west side of Broad Branch Road between 27th Street and Beach Drive would change from natural or landscaped vegetation on the hill slopes to discontinuous retaining walls. The proposed walls vary in height from 2.5 feet to 15.75 feet and range in length from 15 feet to 519 feet. Similar to Alternative 3 and the Preferred Alternative, a sidewalk would be installed along the west side of Broad Branch Road.

Retaining walls located on the east side of Broad Branch Road between 27th Street and Beach Drive are associated with Broad Branch and Rock Creek Park. The visual quality would change from natural trees and vegetation along the stream banks to discontinuous retaining walls with a visible height measuring 3.5 feet and ranging in length from 31 feet to 317 feet. With all of the retaining walls on the east side measuring 3.5 feet in visible height above the curb, views into Rock Creek Park and Fort Circle Parks from the roadway would be visible over the retaining walls for vehicle occupants, cyclists, and pedestrians.

Mitigation

Each retaining wall has been evaluated through extensive coordination with the DC SHPO and NPS. Use of context sensitive designs and architecturally compatible materials would be used for construction of the new retaining walls to maintain the aesthetic quality associated with the rural context of the roadway along the edge of Rock Creek Park and match the rural architectural elements such as Grant Road Bridge that are characteristic of the Park.

Rock Creek Park Sector. Proposed retaining walls on the east side of Broad Branch Road (foreground) would most likely be viewed in their entirety from the top of the wall to the stream bottom. From White Horse Trail, the retaining walls are 7.5 feet, 8.75 feet, 9.5 feet, and 13.75 feet high; and from Grant Road, the retaining wall is 16.25 feet high. Only portions of the retaining walls on the west side of Broad Branch Road (background) would be visible above the foreground retaining walls from the White Horse Trail vantage point. Other vertical elements include replacement of the Soapstone Creek Culvert and the headwalls of three outfalls.

Mitigation

Reconstruction of the Soapstone Creek Culvert and headwalls as well as each retaining wall through extensive coordination with the DC SHPO and NPS. Use of context sensitive designs and architecturally compatible materials would be used for construction of the new concrete arch culvert over Soapstone Creek, retaining walls, and outfall headwalls to maintain the aesthetic quality associated with the rural context of the roadway along the edge of Rock Creek Park and to match the rural characteristics of the Park.

Residential Sector. Views to the project area from the Gatehouse at La Villa Firenze would be partially obstructed by the construction of a 6.25-foot-high retaining wall on the north side of the entrance driveway and by a 5-foot-high retaining wall associated with the new concrete arch culvert to replace the existing Soapstone Creek Culvert south of the entrance driveway. A 5.75-foot-high retaining wall would be constructed on the east side of Broad Branch Road and the combination of these three vertical elements would obstruct the view to the project area and Rock Creek Park beyond. A sidewalk would also be installed but this horizontal element would not affect the visual quality.

A 519-foot-long, 6.5-foot-high retaining wall would be constructed north of the Brandywine Street and Broad Branch intersection; a 96-foot-long, 7.25-foot-high retaining wall would be constructed south of the intersection. These retaining walls provide hill slope stability and protection for the new sidewalk. These vertical elements represent minimal visual intrusion of the project area as viewed from the private residences' vantage point; only the top of the retaining walls could be partially visible through the trees and vegetation.

Views to the project area from the foreign ambassador's residences (Ivory Coast and Tunisia) would include construction of 101-foot-long, 13-foot-high retaining wall on the north side of Broad Branch Road and four retaining walls (15 feet long, 6.25 feet high; 56 feet long, 8 feet high; 87 feet long, 11.75 feet high; and 78 feet long, 6.25 feet high) along the hill slopes south of Broad Branch Road to provide hill slope stability and protection for the new sidewalk. These vertical elements represent visual intrusion of the project area as viewed from the foreign ambassador's residences hilltop vantage point.

Alternative 4 includes the construction of a 105-foot-long, 2.5-foot-high retaining wall and installation of an at-grade sidewalk. These horizontal and vertical elements represent minimal intrusion on the visual quality of the project area as viewed from private residences located on Linnean Avenue that are located across from a portion of Fort Circle Parks.

Mitigation

Reconstruction of the Soapstone Creek Culvert and each retaining wall have been evaluated through extensive coordination with the DC SHPO and NPS. Use of context sensitive designs and architecturally compatible materials would be used for construction of the new concrete arch culvert over Soapstone Creek, retaining walls, and outfall headwalls to maintain the aesthetic quality associated with the rural context of the views from nearby residences and land of Sovereign Nations.

Educational/Institutional Sector. Alternative 4 includes the construction of a 105-foot-long, 2.5-foot-high retaining wall and installation of an at-grade sidewalk. These horizontal and vertical elements represent minimal intrusion on the visual quality of the project area as viewed from the Carnegie Institution hilltop vantage point.

4.3.9.1 Scenic Easements

Alternatives 1, 2, 3, 4, and Preferred Alternative

There are no easements located within the project vicinity; therefore, there would be no impact to scenic easements.

Mitigation

The absence of scenic easements requires that no further mitigation be considered.

4.3.10 HEALTH AND SAFETY

Alternative 1 – No Action Alternative

Under this alternative, no improvements would be made and Broad Branch Road would continue to have inadequate facilities for pedestrian and non-motorized vehicle use. Lack of appropriate lighting, sidewalks, and marked crossings; speeding vehicles; and a narrow winding roadway with poor sight distances would remain, generating unsafe passage for pedestrians and bicyclists. Drainage issues would remain, degrading infrastructure.

Under the No Action Alternative, the project area facilities would remain inadequate, posing a continued risk to public safety and resulting in localized permanent adverse impacts.

Alternative 2

Alternative 2 would include a new culvert carrying Broad Branch Road over Soapstone Creek. The new structure would accommodate increased flow volumes in order to mitigate hydraulic issues to the extent practicable.

This alternative would have localized permanent beneficial effects as public safety would improve over existing conditions with the repair of degraded facilities, improved lighting, and improved stormwater facilities.

Alternatives 3, 4, and Preferred Alternative

Under these alternatives, this project would have permanent local beneficial impacts as public safety would improve over existing conditions with the addition of designated non-motorized infrastructure (sidewalk, crosswalks, and/or bike lane), repair of degraded facilities, improved lighting, and stormwater facilities. Alternatives 3, 4, and the Preferred Alternative would include a new culvert carrying Broad Branch Road over Soapstone Creek. The new structure would accommodate increased flow volumes in order to mitigate hydraulic issues to the extent practicable.

Reconfiguring the intersection at Brandywine Street to a T-intersection would minimize crash risk for northbound drivers on Broad Branch Road turning left onto Brandywine Street, reduce speeds at the intersection, improve sight distances for southbound traffic on Broad Branch, and enhance stormwater management in the project area, resulting in permanent impacts to health and safety.

Mitigation

The design and construction of the proposed action would improve both vehicular and pedestrian safety along the project corridor. Safety features such as pavement markings and lighting would be incorporated into project designs in accordance with DDOT standard specifications. To mitigate impacts during construction, DDOT would issue appropriate public announcements and erect signage and fencing at the project site to alert the public. After construction, the road would be continuously maintained through general activities like sealing cracks and filling potholes that may be hazardous to the motorists.

4.3.11 COMMUNITY RESOURCES

4.3.11.1 Community Facilities

Alternative 1 – No Action Alternative

The No Action Alternative would have no impact on community facilities in the general project vicinity.

Alternatives 2, 3, 4, and Preferred Alternative

The Build Alternatives and the Preferred Alternative would provide improved and maintained access to the Carnegie Institution of Washington and Ingleside at Rock Creek – the two community facilities located on Broad Branch Road. The third major community facility, Hillwood Estate, Museum and Gardens, is not accessible from Broad Branch Road and its access would not be directly affected. Inconveniences in accessing community facilities during construction may be experienced. Maintenance of traffic plans included in Appendix E and further refined as part of the project's final design should minimize such disruptions and would provide detour arrangements during events of road closures.

Temporary noise and vibration impacts to sensitive scientific equipment housed at the Carnegie Institution Department of Terrestrial Magnetism (DTM) may occur during roadway construction.

Mitigation

Consultation would be performed with the Carnegie Institution to establish appropriate protocols to minimize potential noise and vibration impacts and define scheduling during construction. See Section 4.9 for details on mitigation during construction.

4.3.11.2 Emergency Services

Alternative 1 – No Action Alternative

The No Action Alternative would have no impact on emergency services in the general project vicinity.

Alternatives 2, 3, 4, and Preferred Alternative

Although there are many alternative routes that could be used, access via Broad Branch Road during construction would be limited, resulting in minor local impacts to emergency services.

Access for motorized vehicles would improve post-construction with the upgrade of facilities and improved safety resulting from stormwater management and improved roadway engineering.

Mitigation

DDOT would continue coordination with emergency service providers during design and construction phases. All construction plans would include maintenance of traffic (MOT) plans to minimize disruptions to emergency service vehicles.

4.3.11.3 Schools

Alternatives 1, 2, 3, 4, and Preferred Alternative

No schools are located in the project vicinity; therefore, none of the alternatives would have an impact on schools.

Mitigation

The absence of schools in the project vicinity requires no further mitigation.

4.3.11.4 Parks and Recreation Areas

Alternative 1 – No Action Alternative

The No Action Alternative would have no direct impact on park land. However, continued lack of maintenance of the project area would induce indirect impacts on the natural and biological resources of NPS lands. Erosion and sedimentation would gradually worsen as the road structure deteriorates, causing continued sedimentation and debris to enter NPS park lands. The No Action Alternative would result in permanent indirect impacts to NPS land, natural and biological resources, and the water quality of waterways if the roadway is left in its current state and not rehabilitated.

4.3.11.5 NPS Park Lands

Alternative 2

Despite alternative routes that could be used to access NPS park lands, including Rock Creek Park, Soapstone Valley Park, and Fort Circle Parks, access to these parks via Broad Branch Road during construction would be limited, resulting in localized impacts to NPS park land under Alternative 2. Construction of Alternative 2 would require temporary disturbance on Rock Creek Park property, as indicated in **Table 4-8**.

Other than temporary limited accessibility during construction, no disturbance, land use, or tree removal would occur in either Soapstone Valley or Fort Circle Park under Alternative 2. Project work would be planned and scheduled to allow for the least disruption of road and park use and coordinated with park staff to identify any concerns. Such plans would ensure no social groups visiting the park (i.e., bicyclists and pedestrians) would be disproportionately affected.

Table 4-8. Park Property Impacts

RESOURCE	ALT 1 NO ACTION	ALT 2	ALT 3	ALT 3 MOD	ALT 4
Rock Creek Park NPS Lands					
Number of trees impacted on park property	–	3	4	40	21
Area of temporary park impact from cut-and-fill/grading	–	1,797	324	6,284	4,182
Area of permanent park impact from ROW acquisition	896	–	39	236	2,252
Area of permanent park impact from construction without ROW acquisition (e.g., sidewalk to parking lot at Beach Drive) ¹	–	1,192	1,719	1,455	1,772
District DPR Triangle Park at Brandywine Street					
Number of trees impacted on park property	–	3	3	3	–
Area of temporary park impact from cut-and-fill/grading	–	–	–	0	–
Area of permanent park impact from ROW acquisition	–	5,899	5,899	3,502	3,502

¹ The design, construction, and maintenance of the continuation of sidewalk outside of the DDOT right-of-way to the parking lot entrance would be coordinated with the NPS.

This alternative would have permanent beneficial impacts to all NPS land. Access for motorized vehicles would improve post-construction with the upgrade of facilities and the improved safety resulting from stormwater management and upgraded roadway engineering. Maintenance and operational activities would remain essentially unchanged.

Alternative 2 includes a sidewalk and retaining wall on the west side of roadway in the southern part of the project corridor to connect the Soapstone Valley Trailhead to an NPS parking lot on Beach Drive. The sidewalk and retaining wall would extend from the end of the DDOT right-of-way into Rock Creek Park. The construction of the sidewalk would include temporary impacts during construction (approximately 1,797 square feet) and permanent impacts with the removal of three trees and addition of impervious surface but would only require a construction easement and/or Special Use Permit (for NPS property) and no right-of-way would be acquired. The new sidewalk would have the beneficial impact of improving linkages between two NPS park resources (Rock Creek Park and Soapstone Valley Park) and would provide for safer access to park resources with the addition of a new pedestrian facility in this segment of the project corridor.

Alternatives 3, 4, and Preferred Alternative

Alternatives 3, 4, and the Preferred Alternative also include a sidewalk and retaining wall on the west side of roadway in the southern part of the project area to connect the Soapstone Valley Trailhead to a NPS parking lot on Beach Drive. The sidewalk would extend from the end of DDOT right-of-way into Rock Creek Park. The construction of the sidewalk would include temporary impacts during construction and permanent impacts with the removal of trees and addition of impervious surface but would have the beneficial impact of improving linkages between two NPS park resources (Rock Creek Park and Soapstone Valley Park). Alternatives 3, 4, and the Preferred Alternative would provide for safer access to park resources by the addition of

non-motorized facilities. In addition to sidewalks, Alternatives 3, 4, and the Preferred Alternative would include crosswalks and improved lane arrangements that would allow for safer access to the existing multi-use trail and park facilities than provided by existing facilities.

Alternatives 3, 4, and the Preferred Alternative would also require temporary disturbance in Rock Creek Park near existing retaining walls for the construction of new walls. Some of the proposed new retaining walls in Alternatives 3, 4 and the Preferred Alternative traverse both DDOT and Rock Creek Park property. This area would not alter the ability of the park to function as intended and would enhance safe access to park facilities for both motorized and non-motorized users.

Like Alternatives 2, other than temporary limited accessibility during construction, no disturbance, land use, or tree removal would occur in either Soapstone Valley Park or Fort Circle Parks under Alternatives 3, 4, and the Preferred Alternative.

Mitigation

Permanent activities outside the existing right-of-way (beyond the area of existing pavement) will be accomplished through Transfer of Jurisdiction (for NPS property) as there is no other feasible alternative to implement this project. Temporary activities would be accomplished through a Special Use Permit (for NPS property) including access, construction, and site restoration. Details are provided in Section 4.1.4.

All project work would be planned and scheduled to allow for the least disruption of road and park use and coordinated with NPS park staff. To provide advance notification to the park visitors and commuters of construction-related delays or changes in traffic patterns, DDOT would use public notification techniques such as posting information on DDOT's project website. Advance notifications related to construction may also be posted on NPS website.

4.3.11.6 District DPR Triangle Park at Brandywine Street

Alternatives 2, 3, 4, and Preferred Alternative

A triangle park/traffic island maintained by the District DPR is located at the center of the existing Broad Branch Road intersection with Brandywine Street. Each of the Build Alternatives and the Preferred Alternative includes the reconfiguration of the intersection at Brandywine Street and Broad Branch Road. The triangle park/traffic island at the center of the existing Y-intersection would be changed to create a new T-intersection resulting in permanent change to this park resource. The triangle park primarily provides green space as opposed to a recreational area; the inclusion of rain gardens at the interior corners of the new T-intersection would increase the amount of green space at this intersection by 1,898 square feet, resulting in permanent beneficial impacts to park-provided green space. The existing curbing around the park would be altered to allow for wheelchair ramps/aprons at roadway crosswalks.

Mitigation

Coordination with the District DPR would be conducted to determine if District agency management/oversight of this resource would change after roadway rehabilitation and if the rain gardens would be managed by District DPR.

4.3.12 UTILITIES AND INFRASTRUCTURE

Alternative 1 – No Action Alternative

Under the No Action Alternative, existing utilities, including water and sewer lines, Washington Gas lines, Potomac Electric Power Company (PEPCO) overhead and underground electric lines, DC Street lighting, Verizon overhead and underground communication lines, Comcast overhead and underground cable lines, and their house service connections, would not be impacted as the roadway work would be limited to routine maintenance. This work would include milling and resurfacing of pavement areas with minor base repair depending upon the subsurface condition encountered.

Alternatives 2, 3, 4, and Preferred Alternative

During construction of the Build Alternatives and the Preferred Alternative, existing utilities on Broad Branch Road, such as those that run under roadway pavement and parallel to or across the roadway, would have to be considered. The potential extent of utility relocations for each of the alternatives is presented in **Table 4-9**. The majority of utilities are located on the east side of the roadway and the eastern shift of the Preferred Alternative (to avoid encroachment on land of any of the Sovereign Nations) resulted in increased impacts to existing utility lines.

Table 4-9. Potential Utility Relocations (Linear Feet within Limits-of-Disturbance)

ALTERNATIVE	WATERMAIN	SANITARY SEWER	ELECTRICITY AND COMMUNICATIONS	GAS
2	2,450	11,851	1,784	1,582
3	2,749	12,187	1,840	1,715
3 Modified	4,900	3,250	22,500	2,800
4	2,870	12,299	1,837	1,672

Mitigation

DDOT would continue coordination with utility companies, including monthly meetings during design, to identify detailed location of utilities within the project corridor. To further avoid utilities conflicts during construction, the contractor would be required to contact Miss Utility to identify and mark all utilities prior to earth disturbance activities. Further discussion of mitigation of construction impacts are described in Section 4.9 – Construction Impacts.

4.4 TRANSPORTATION

Potential impacts on the transportation system elements – bicycle and pedestrian facilities, the roadway network, and transit services – are discussed in the subsections below.

4.4.1 BICYCLE AND PEDESTRIAN NETWORK

Alternative 1 – No Action Alternative

Under the No Action Alternative, DDOT would not rehabilitate Broad Branch Road. The roadway would be repaved, but infrastructure would remain deteriorated and damage from stormwater runoff would continue unabated. The No Action Alternative would not provide any improvements to the regional pedestrian and bicycle network because of the lack of facilities to

serve those modes along the existing roadway. Lack of facilities, degraded infrastructure, poor sight lines, and poor lighting would perpetuate existing unsafe conditions and inadequate access for pedestrians and bicyclists to Broad Branch and surrounding areas.

Alternative 2

Under Build Alternative 2, DDOT would rehabilitate Broad Branch Road, improving infrastructure and stormwater management. The upgraded roadway would improve driving and biking conditions; however, separate pedestrian and bicycle facilities would not be included. The sidewalk linking Soapstone Creek Trail to the parking lot near Beach Drive would provide improved pedestrian access between the two points. During construction, temporary impacts to cyclists and pedestrians could occur due to the inaccessibility of segments of Broad Branch Road. Beneficial impacts to the bicycle and pedestrian network would result from the upgrade in roadway conditions. Improvements in sight lines and horizontal curves would improve the existing unsafe conditions and provide improved access for these modes to Broad Branch Road and surrounding areas.

Alternatives 3, 4, and Preferred Alternative

Under Build Alternatives 3 and 4 and the Preferred Alternative, continuous sidewalks along the length of the rehabilitated roadway would provide an improved pedestrian facility, including the sidewalk linking Soapstone Creek Trail to the parking lot near Beach Drive. Pedestrians would no longer be required to travel on the roadway or the limited adjoining areas. Alternatives 3 and 4 include sidewalks and crosswalks as part of the improved intersection of Broad Branch Road and Brandywine Street to connect to the continuous sidewalks on the west side of the roadway and to existing sidewalks on Brandywine Street.

Under Alternative 3 and the Preferred Alternative, bicyclists would be required to share the travel lanes with motorized vehicles and would contend with the same travel conflicts encountered today. *Based on comments received on the Revised Draft EA (see Appendix R), the Preferred Alternative provides an option for a shared use path for both bicyclists and pedestrians, in lieu of the sidewalk and with a reduced-width rain garden, between Linnean Avenue and 27th Street. The shared use path option would remain within the same footprint and would remain in the DDOT right-of-way.* Alternative 4 would provide a dedicated bike lane and remove the conflict, providing for a safer travel way for both modes. These alternatives would have beneficial impacts to the pedestrian and bicycle network. During construction, temporary disruption could occur to pedestrians and cyclists using Broad Branch Road.

Reconfiguring the intersection at Brandywine Street to a T-intersection would minimize crash risk for northbound drivers on Broad Branch Road turning left onto Brandywine Street, reduce speeds at the intersection, improve sight distances for southbound traffic on Broad Branch, and enhance stormwater management in the project area. These improvements to safety would result in permanent beneficial impacts to pedestrians and cyclists using this area of Broad Branch Road.

Mitigation

The proposed action would improve pedestrian and bicycle mobility within the roadway corridor and no further mitigation is required. Mitigation of construction impacts are described in Section 4.9 – Construction Impacts.

4.4.2 ROAD NETWORK

Alternative 1 – No Action Alternative

The No Action Alternative would have some beneficial impacts to the local roadway. DDOT would not rehabilitate Broad Branch Road; however, the roadway would be resurfaced, resulting in minor improvements to the driving surface. Improvements from a resurfacing project would be expected to last about two years. Without rehabilitation of the sub-grade, it is anticipated that the driving surface would deteriorate again within a short time frame.

Alternatives 2, 3, 4, and Preferred Alternative

Under Alternatives 2, 3, 4, and the Preferred Alternative, DDOT would rehabilitate and improve the roadway. The roadway would be excavated to a depth of approximately three feet and then reconstructed with appropriate material. Minor changes to the alignment and profile would be made to improve sight distances. It is anticipated that an alignment that meets the minimum design requirements of a collector facility can be achieved throughout the full length of the corridor with grading changes to adjacent properties and the installation of retaining walls.

During rehabilitation of the road and stormwater management infrastructure, temporary impacts would occur on the local streets due to truck traffic generated by construction activities. Specifically, the contractor would have to remove and haul the existing concrete, asphalt, and other materials by dump truck and would be required to deliver clean fill, asphalt or concrete, and other construction materials. It is anticipated that construction access would be provided from public roadways at the northern end of the corridor. Construction vehicles would be prohibited from traveling on roadways through Rock Creek Park (i.e., Blagden Avenue or Beach Drive) due to limited capacity and concerns for park visitor safety.

Due to the limited right-of-way and narrow roadway, portions of Broad Branch Road would be limited to one lane of traffic during certain periods of construction. This would ensure that local and emergency vehicle traffic would have access along the entire roadway during construction.

Although Alternatives 2, 3, 4, and the Preferred Alternative would have impacts due to temporary traffic delays and congestion during the transport and delivery of construction materials, no permanent impacts are expected on the roadway network with the rehabilitation of Broad Branch Road. Once rehabilitated, Broad Branch Road would have a superior travel surface and would function as it has in the past. In addition, improved turn movements at the intersections with 27th Street and Brandywine Street would result in permanent beneficial impacts to the level of service along the roadway.

Year 2030 forecasts show that traffic volumes are expected to remain at current levels with the exception of increased commuter traffic during the peak periods. With this increase in traffic, the level of service at the Broad Branch Road five-way intersection at Nevada Avenue, 32nd Street, and Linnean Avenue would drop from level of service (LOS) B to C in the AM Peak hour but remain at LOS C in the PM peak hour (**Table 4-10**). Level of service is expected to remain constant for both peaks between existing and future conditions at the Broad Branch Road intersections with 27th Street (LOS B) and Beach Drive NW (LOS F). LOS at both the Grant

Road/Davenport Street NW and Brandywine Street intersections is expected to decline - during the PM peak at Grant Road and during both AM and PM peaks at Brandywine Street.

Table 4-10. Existing and Year 2030 Intersection Levels of Service (LOS)

INTERSECTION WITH BROAD BRANCH ROAD	PEAK HOUR ¹	EXISTING	2030
Nevada Avenue NW / 32 nd Street NW / Linnean Avenue NW ²	AM	B	C
	PM	C	C
27 th Street NW	AM	B	B
	PM	B	B
Grant Road NW / Davenport Street NW	AM	F	F
	PM	C	F
Brandywine Street NW	AM	B	D
	PM	C	D
Beach Drive NW / Blagden Avenue NW	AM	F	F
	PM	F	F

¹ AM Peak Hour between 7:30 and 8:30 AM; PM Peak Hour between 5:30 and 6:30 PM.

² This intersection has five approaches and LOS was analyzed in intersection capacity utilization (ICU) methodology.

After construction, the addition of a dedicated left-turn lane from southbound Broad Branch Road to 27th Street (under Alternative 2) and from northbound Broad Branch Road to Brandywine Street (under Alternatives 2, 3, 4, and the Preferred Alternative) would raise the LOS at both intersections. The use of traffic calming techniques under all of the Build Alternatives, and the Preferred Alternative is recommended to control speeds.

Mitigation

As part of the final design process, DDOT would prepare a maintenance of traffic (MOT) plan that would identify routes to be used by the contractor to minimize traffic impacts and disruption to residential areas and park land. It is recommended that rehabilitation occur in phases with identification of potential detour plans during each phase of construction. The preliminary detour plans are presented in Appendix E.

4.4.3 TRANSIT

Alternatives 1, 2, 3, 4, and Preferred Alternative

No bus or other transit facilities are located in the project corridor; therefore, the alternatives would have no impact on transit operations or the public's ability to use transit in the area.

Mitigation

The proposed action would have no impact on transit operations and no mitigation is required.

4.5 AIR QUALITY

Impacts to air quality can generally occur in three ways: 1) by raising the vehicle emission levels near a project site through an increase in vehicular traffic; 2) by introducing new stationary sources, such as the case with development; and 3) through the generation of airborne dust from

construction activities. The Broad Branch Road project is not anticipated to impact air quality with respect to either of the first two ways and as noted below, and explained in detail in Section 4.9, air quality impacts due to construction would be temporary.

Alternative 1 – No Action Alternative

Under the No Action Alternative, Broad Branch Road would remain in its current state. Therefore, this alternative would have no impact to air quality.

Alternatives 2, 3, 4, and Preferred Alternative

Project-Level Carbon Monoxide (CO) Conformity. The District is currently in maintenance for the CO air quality standard. 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.

Project-level Fine Particulate Matter (PM_{2.5}) Conformity. As indicated in Section 3.5.3, the project is located in the Washington, DC-MD-VA attainment area for the PM_{2.5} and PM₁₀ annual standard and therefore would not be subject to a PM conformity assessment or project-level PM_{2.5} hot-spot analysis.

Mobile Source Air Toxics (MSATs). As noted in Section 3.5.4, the Broad Branch Road project falls into the first category of "Projects with No Meaningful Potential MSATs Effects, or Exempt Projects" based on the fact that this project would have "no meaningful impacts on traffic volumes or vehicle mix." Therefore, no analysis or discussion of MSATs is needed for the project.

Greenhouse Gas (GHG) Impacts. The Broad Branch Road project would not increase roadway capacity and would not increase vehicle emissions or vehicle miles traveled. Therefore, the project would not contribute to an increase in greenhouse gases.

In terms of all of the pollutant categories noted above, it is important to note that implementation of any of the Build Alternatives or the Preferred Alternative would not contribute additional air emissions when compared to the No Action Alternative. This is because traffic volumes, vehicle mix, speeds, and traffic controls would be the same between the No Action Alternative and the Build Alternatives or Preferred Alternative. There would, therefore, be no impact to air quality for any of the alternatives.

Mitigation

The proposed action is not expected to increase vehicular volumes (and associated emissions) nor introduce any new stationary sources. Therefore, no mitigation is required for permanent operational impacts associated with the project. Controls and mitigation measures for construction impacts are presented in Section 4.9.

4.6 NOISE AND VIBRATION

As described in the DDOT Noise Policy (April 7, 2011, effective July 11, 2011), "the Federal Highway Administration (FHWA) Noise Standard requires that noise abatement measures be considered when traffic noise impacts are identified for Type I Federal projects." The definitions of project types for purposes of noise analysis and abatement, as indicated by FHWA's *Highway Traffic Noise: Analysis and Abatement Guidance* (FHWA, 2011), is provided below.

Type I Project: The following projects are considered Type 1 projects:

1. The construction of a highway on new location; or,
2. The physical alteration of an existing highway where there is either:
 - i. Substantial Horizontal Alteration. A project that halves the distance between the traffic noise source and the closest receptor between the existing condition to the future build condition; or,
 - ii. Substantial Vertical Alteration. A project that removes shielding, therefore exposing the line-of-sight between the receptor and the traffic noise source. This is done by either altering the vertical alignment of the highway or by altering the topography between the highway traffic noise source and the receptor; or,
3. The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a High-Occupancy Vehicle (HOV) lane, High-Occupancy Toll (HOT) lane, bus lane, or truck climbing lane; or,
4. The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane; or,
5. The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or,
6. Restriping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; or,
7. The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot, or toll plaza.

Type II Project: A Federal or Federal-aid highway project for noise abatement on an existing highway. For a Type II project to be eligible for Federal-aid funding, the highway agency must develop and implement a Type II program in accordance with section 772.7(e). *[Note: DDOT does not currently have a Type II program.]*

Type III Project: A Federal or Federal-aid highway project that does not meet the classifications of a Type I or Type II project. Type III projects do not require a noise analysis.

The proposed improvements to Broad Branch Road would take place along the existing alignment of the road and would not add lanes or increase capacity. Alterations to the horizontal and vertical alignment of the roadway would not be substantial based on the definitions included for a Type I project. Therefore, the Broad Branch Road project is classified as a Type III project that does not require a quantitative noise analysis.

As noted in Chapter 3, the Broad Branch Road project is located in an area with sensitive land uses, including a mix of residential, park, and education (institutional) land uses, which can be categorized as Activity Category B based on Noise Abatement Criteria (NAC). Current 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. None of the Build Alternatives or the Preferred Alternative are

anticipated to change traffic volumes, speeds, or vehicle mix as compared to the No Action Alternative.

Alternative 1 – No Action Alternative

No new noise sources would be created in the Broad Branch Road project area as a result of the No Action Alternative; therefore, impacts to the existing noise and vibration levels are not expected to occur.

Alternatives 2, 3, 4, and Preferred Alternative

No appreciable impacts to noise and vibration would occur from implementation of the Build Alternatives or the Preferred Alternative because, as noted above, they would not increase traffic or change the vehicle mix, speeds, or traffic controls. Insertion of low-level retaining walls and coping walls are not intended to provide any attenuation of traffic-generated noise levels (as provided by noise walls), nor would they result in detectable levels of noise attributed to reverberations from these structures.

All of the Build Alternatives would have impacts to noise and vibration levels in the study area during the construction phase. The length and degree of noise impacts associated with construction activities would vary and would be caused by activities associated with removal of the existing infrastructure and rehabilitation of the roadway and stormwater management facilities. However, these noise impacts would be temporary and could be minimized by implementing BMPs, such as time restrictions, during construction.

Mitigation

There are no anticipated traffic noise or vibration impacts associated with the permanent operation of the rehabilitated roadway. Therefore, no mitigation is required.

Controls and mitigation measures for construction impacts are presented in Sections 4.9.

4.7 HAZARDOUS WASTE AND MATERIALS

Alternative 1 – No Action Alternative

Based on a review of available data and site inspection, no evidence of recognized environmental concerns was identified within the project area. Therefore, there would be no impact from hazardous wastes/materials under the No Action Alternative.

Alternatives 2, 3, 4, and Preferred Alternative

Based on a review of available data and site inspection, no evidence of recognized environmental concerns was identified within the project area. Construction of the Build Alternatives or the Preferred Alternative would have no impact on hazardous waste and materials. Although it is unlikely, undocumented hazardous materials could be uncovered during construction. If contaminated soils, water, or other hazardous materials are discovered, construction should stop and the situation assessed by the contract officer. The notification of appropriate authorities, including coordination with the DOEE, and proper removal, disposal, treatment, and/or remediation of the material would be evaluated and suitable measures taken, as necessary.

Mitigation

Prior to construction, DDOT would develop and implement a spill and pollution prevention plan for hazardous waste and materials to document materials that may be on-site during project construction and measures to avoid and minimize release of potential pollutants into the environment. To further avoid any potential risk to public safety, the contractor for the proposed construction would prepare and implement a plan for the management and disposal of controlled hazardous materials and contaminated soil and groundwater that may be encountered during construction activities, as defined in the DDOT Design and Engineering Manual.

4.8 ENERGY CONSERVATION

Alternative 1 – No Action Alternative

Currently there are no energy conservation measures being conducted along the alignment. Under this alternative, no changes would be made to the project area; however, routine pavement maintenance would continue. Therefore, there would be no impact on energy conservation.

Alternatives 2, 3, 4, and Preferred Alternative

One of the largest energy consumers for urbanized areas is water treatment. Utilizing natural stormwater management through various BMPs possible under these alternatives would reduce the load to water treatment facilities. Adding or upgrading stormwater facilities to an area that previously lacked adequate resources would reduce the need for maintenance and therefore energy consumption. Lighting options to improve the safety of this corridor are being considered. Using energy efficient lighting would reduce energy consumption in the corridor while improving safety.

Mitigation

The proposed action would provide reduced energy consumption in the form of reduced water treatment and the use of energy efficient lighting. No further mitigation is required.

4.9 CONSTRUCTION IMPACTS

The proposed rehabilitation of the 1.5 miles of roadway is estimated to take between 24 and 36 months (see Section 2.3). In addition to standard roadway elements the proposed rehabilitation would also include replacement of the Soapstone Creek crossing, culvert extensions and outfalls, retaining walls and water quality catch basins. Construction of these elements could have temporary impacts related to land use, community access, changes in traffic patterns, utility conflicts, water resources, wildlife, cultural resources, air quality, noise and vibration, and hazardous materials. Potential impacts would be similar for each of the Build Alternatives and the Preferred Alternative and are described in the following sections. Methods to avoid or minimize the impacts are included in each section as well. A public information program would be used to inform the public of the duration of construction phasing, construction methods, possible effects, quality control measures, and communication available to them.

Based on the analysis summarized in the following sections, construction impacts resulting from Build Alternatives 2, 3 and 4 and the Preferred Alternative are not considered significant in either

context or intensity in accordance with the CEQ definition. Temporary impacts would be minimized as discussed and would be offset by the beneficial permanent effects of the project.

4.9.1 LAND USE

Rehabilitation of the existing two-lane roadway would be limited to the existing alignment. No major changes in access or its location are proposed that would promote or prohibit additional development. As such, no changes in local land use are anticipated as a result of the roadway construction.

Mitigation

No mitigation is proposed.

4.9.2 TRANSPORTATION AND ACCESS

During construction of the roadway itself, a single travel lane would be maintained to ensure local and emergency vehicle traffic. Protected work zones would be established for the safe passage of bicyclists and pedestrians; however, each may be interrupted during some periods of construction for safety purposes. These brief disruptions to vehicles, cyclists and pedestrians are unavoidable and would be minimized to the extent possible with construction phasing, traffic management, and detour plans. Replacement of the Soapstone Crossing would require complete closure of this section of roadway to all travelers for a two-week period. Construction for each of the Build Alternatives and the Preferred Alternative would be conducted in four phases – each with specific detour plans. Preliminary detour plans are presented in Appendix E and provide continuous access to all points during construction – although some lengthened trips could be required. Final detour plans would be incorporated into the final design in accordance with DDOT’s Standard Specifications for Highways and Structures – 612 Traffic Control.

Construction of the elements beyond the road’s travel surface such as culverts, retaining walls and catch basins, would not impact access to any properties.

Mitigation

Interruptions to local traffic and access would be minimized through the phased construction and MOT plans implemented during construction. Work schedules associated with construction sequencing would be adjusted to minimize impacts during peak hours of traffic. DDOT would issue appropriate public announcements and erect signage and fencing at the project site to alert the public. *Temporary activities or access during construction outside of DDOT right-of-way will be accomplished through easement (for private right-of-way) or Special Use Permit (for NPS property).* Protected work zones and travel passages would be established for cyclists and pedestrians.

4.9.3 UTILITIES AND INFRASTRUCTURE

All utilities (electrical power, water and sewer, telephone, and cable) would be maintained throughout construction, although unforeseen brief, temporary outages may occur during connections. These would be maintained to a minimum and the affected properties would be provided advance notice of any planned outages in accordance with established notification procedures of DDOT and each utility provider.

Mitigation

DDOT would maintain continuous coordination and monthly meetings with utility companies during design and construction to ensure utility conflicts are avoided to the extent possible. The contractor would be required to contact Miss Utility to identify and mark all utilities prior to earth disturbance activities. DDOT and utility providers will provide advance notice to all service customers in advance of any planned outage. In the event of an unplanned interruption, emergency procedures established by each of the utility providers will be implemented.

4.9.4 WATER RESOURCES

Water quality impacts may result from required in-stream work and erosion following ground disturbance and earthmoving operations particularly for the replacement of the Soapstone Creek culvert and the series of culvert outfalls and retaining walls adjacent Broad Branch. Excessive turbidity caused by suspended soils and other solids can harm aquatic animals and plants. Deposition of the suspended solids may alter streambeds, interfere with plant production and fish spawning, smother bottom-dwelling fauna, and reduce substrate utilization. Eroded material may also contain organic material and nutrients, which may result in algae increases and reduction in dissolved oxygen.

Mitigation

As a part of this project, erosion and sediment control plans, stormwater management plans, and a “treatment train” of BMP techniques would be developed to minimize direct waterway disturbance and sediment from construction areas. Measures may include berms, dikes, watertight enclosures, silt barriers, netting, mulch, temporary and permanent seeding, avoidance of stream crossings, crossings of waterways at right angles when necessary, sediment basins, and other methods. The construction contractor would be required to comply with the conditions and pollution control measures specified in DDOT’s Standard Specifications for Highways and Structures – 618 Erosion and Sediment Control. In-stream work would require permits from USACE and DOEE in accordance with Sections 402 and 404 of the Clean Water Act. Additional mitigation measures could be included as stipulations to these permits.

4.9.5 WILDLIFE AND HABITAT

Impacts to terrestrial and aquatic organisms and their habitat would occur during construction. Temporary removal of vegetation would occur within the limits of disturbance. The inclusion of retaining walls along several western segments of the roadway would limit the extent of clearing and grading required for the Preferred Alternative. Limited number of trees would be removed from the east side of the roadway including areas within and bordering Rock Creek Park.

Project work could result in temporary displacement of mobile animal populations that are disturbed by the activities. Construction of the Build Alternatives and Preferred Alternative would be primarily in previously disturbed areas and edges of fragmented urban forest, which provide marginal habitat for terrestrial animals. Construction activities and operation of machinery would be disruptive to wildlife and would likely cause animals to retreat to deeper parts of the forest. However, it is expected that disjoined wildlife would repopulate the site when construction is complete and vegetation becomes reestablished.

Construction activities may also cause direct mortality of terrestrial and aquatic wildlife unable to escape construction equipment. In-stream work and stream crossing with equipment would temporarily disturb aquatic habitat. Such activities would be restricted to the extent practicable. Improved stormwater management would allow riparian and in-stream habitats downstream to reestablish.

Mitigation

Cleared areas would be replanted with a native seed mix and trees in consultation with DDOT's UFD and with NPS for areas bounding Rock Creek Park. Mature trees would be protected to the extent possible during construction or replaced according to DDOT's Standard Specifications for Highways and Structures - Section 608 Trees, Shrubs, Vines, and Ground Cover *and in coordination with DDOT's Urban Forestry Division. The identification of mature Special Trees would be performed in accordance with the District's Tree Canopy Protection Amendment Act of 2016. Removal of certain trees from DDOT property would require a DDOT Special Tree Removal Permit, while removal of trees from NPS land would be authorized under NPS Special Use Permit for construction.* Protection techniques generally include installation of tree protection fencing and staging construction equipment to avoid damaging trees and their root systems.

To prevent the introduction of new invasive species and to prevent the spread of existing populations during construction, BMPs would be implemented, including washing machinery before it enters the area, minimizing ground disturbance, and reseeded of disturbed areas. NPS staff would be consulted for preferred seed mixes for use in disturbed areas within NPS properties and additional measures may be included in the Special Use Permit such temporary activities.

During review of the Revised Draft EA, USFWS informed 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. The USFWS further determined that as long as no trees are destroyed or cut within the 150 foot radius around a maternity roost tree between June 1 to July 31, this project is considered "not likely to adversely affect" the Northern long-eared bat under the 4(d) rule. DDOT will follow the Time-of-Year (TOY) restriction as specified by the USFWS for tree cutting during construction. Detailed tree inventory would be prepared during final design. If any additional nests, hibernacula trees, or buffers around maternity roosts are identified, necessary consultation with the USFWS and DOEE would be completed at that time, pursuant to the requirements of the Migratory Bird Act, Endangered Species Act, and the Fish and Wildlife Coordination Act.

Erosion and sediment control plans, stormwater management plans, and BMPs would be used during construction to protect water quality and habitat integrity.

4.9.6 CULTURAL RESOURCES

Construction impacts to archaeological sites may result from any ground-disturbing action in the area of an NRHP-eligible or potentially eligible archaeological site, or modification to such a site that can permanently impact the physical integrity of that resource. Construction impacts to architectural resources include demolition, alteration of architectural traits, structural instability through vibration, and temporary audio intrusions during construction. Audible intrusions to the

setting during construction may result in only temporary impacts during construction unless they permanently alter or destroy those characteristics or qualities that make it potentially eligible for inclusion in the NRHP.

Use of heavy grading equipment may cause ground vibration that could potentially damage or topple two segments (H9 and H10) of the historic stone retaining wall along Broad Branch. Rock Creek Park stone and metal boundary markers may be disturbed through cut-and-fill activities during roadway rehabilitation. These markers may be inadvertently moved during roadbed preparation near the DDOT right-of-way or covered with fill but would be re-set. The stone and metal boundary markers would be temporarily re-located during construction and re-installed in the original location in coordination with the NPS.

The historic setting of the RCPHD and a trail element of the Rock Creek Park cultural landscape along Broad Branch would be temporarily impacted by audible intrusions, including increased noise from construction activity such as excavation; large vehicle movement, braking, and back-up signals; and construction crews.

Mitigation

A Memorandum of Agreement (MOA) has been prepared and executed by FHWA, DDOT, and NPS in consultation with consulting parties to resolve and mitigate the adverse effects to historic properties in accordance with Section 106 of the NHPA (see Appendix O). Mitigation for potential construction impacts to archaeological sites is addressed in Stipulation VI of the MOA. Mitigation measures to resolve construction impacts to architectural resources (i.e., historic stone retaining walls, stone headwalls for stormwater outfalls, stone boundary markers, the replacement of the Soapstone Creek Culvert, and original stone retaining walls at the Gatehouse at La Villa Firenze) are defined in Stipulations I, II, and III in the MOA.

Mitigation measures to minimize vibration which may create structural instability of two segments of the historic retaining wall would include:

- Specify realistic vibration limits in contract documents.
- Require the contractor to submit a list of operations that may generate vibration and work with the contractor to reduce the magnitude and/or duration.
- Route construction equipment to avoid impacts to sensitive receptors.
- Minimize duration of vibration impacts.

If inadvertent vibration damage occurs to the two segments of the historic retaining wall, the segments would be repaired or replaced in accordance with Stipulation I.B.1 of the MOA.

To minimize audio intrusions during construction activities, DDOT would implement the following mitigation measures as regulated by Title 20 of the District of Columbia Code of Municipal Regulations (DCMR).

- Use of shields, impervious fences or other physical sound barriers to reduce noise.
- Use of sound retardant housings or enclosures around noise producing equipment.

- Use of effective intake and exhaust mufflers on internal combustion engines and compressors.
- Conduct truck operations so that noise is kept to a minimum.
- Advise the engineer in writing of proposed haul routes prior to securing haul permit.
- Subject to the approval of the engineer, place stationary equipment to minimize noise impact on the surrounding community.

4.9.7 AIR QUALITY

Construction impacts on air quality are evaluated qualitatively due to the limited availability of detailed information (at this stage of the project) regarding equipment used during construction. Construction activities are estimated to be completed in 24 to 36 months.

Air quality impacts could occur primarily as a result of emissions from heavy-duty construction equipment such as bulldozers, backhoes, and cranes; diesel-fueled mobile sources such as trucks; diesel and gas-fueled generators; and on and offsite project-related vehicles such as service trucks and pickups. Fugitive PM₁₀ and PM_{2.5} emissions are associated with site preparation, demolition, ground excavation, grading, cut-and-fill operations, and structure erection. Fugitive dust emissions could also be generated as a result of construction-related traffic and wind erosion of uncovered demolition and excavation area. PM emissions would vary from day to day, depending on the level of activity, specific operations, and weather condition. Hot, dry weather conditions could aggregate PM emissions. Emission rates would depend on soil moisture, silt content of soil, wind speed, and the amount and type of operating equipment. Larger dust particles (PM₁₀) would settle near the source and fine particles (PM_{2.5}) would be dispersed over greater distances from the construction site. In addition, there would be engine exhaust from construction workers' personal vehicles, heavy trucks, and construction equipment. These emissions would primarily consist of NO_x, SO₂, PM, CO, and VOCs, which are common at construction sites. Emissions from operating equipment and vehicles during hot summer months would contribute to ozone formation.

If construction traffic or lane closures were to increase congestion in the area, emissions from traffic would increase temporarily and would be limited to the area surrounding the construction site. Some construction phases (particularly during paving operations using asphalt) would result in odors, which could be detectable to some people near the project site, but would be diluted as distance from the construction site increases.

Mitigation

District regulations regarding dust control and other air quality emission reduction controls, including DCMR Title 20 and other measures specified in DDOT's Standard Specifications for Highways and Structures – 107.17 Environmental Protection, would be followed. Construction generated dust would be further reduced through the following measures:

- Mist water over demolition or excavation operations.
- Cover trucks when moving materials.
- Minimize unnecessary vehicular and machinery activities.

- Provide vegetative cover for all exposed soils during and upon completion of construction.

4.9.8 NOISE

Noise impacts from construction activities are a function of noise generated by construction equipment, the proximity of sensitive uses to construction activities, and the duration of the construction effort. The contractor would be required to adhere to D.C. Law 2-53, District of Columbia Noise Control Act of 1977 and all provisions thereof, area noise ordinances for night work from 7 pm to 7 am, and to the restrictions on equipment as defined in DDOT's Standard Specifications for Highways and Structures – 105 Control of Work, 103 Standard Contract Provisions, and 107.17 Environmental Protection, except as permitted by a variance.

Mitigation

The noise control measures listed below could be used to minimize, to the greatest extent feasible, the noise levels in all areas surrounding construction activities.

- Use of shields, impervious fences or other physical sound barriers to reduce noise.
- Use of sound retardant housings or enclosures around noise producing equipment.
- Use of effective intake and exhaust mufflers on internal combustion engines and compressors.
- Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.
- Advise the engineer in writing of proposed haul routes prior to securing haul permit.
- Subject to the approval of the engineer, place stationary equipment to minimize noise impact on surrounding community.

4.9.9 VIBRATION

Construction activities have the potential for producing vibration levels that may be perceptible. Some construction activities could generate vibration levels high enough to cause damage to structures in the immediate roadway corridor (i.e., historic retaining walls and drainage structures). Even where vibration levels are lower or imperceptible, vibrations could produce ground-borne noise. The effects of ground-borne vibration could affect extremely sensitive activities such as those conducted at the Carnegie Institution's DTM building.

Recognizing the possibility that some damage could occur to adjacent structures, a pre-construction survey, including a detailed photographic record of existing structures, could be conducted. Restitution or repairs could be made based on actual damages if they are determined to be a result of construction activities.

Mitigation

The vibration control measures listed below could be used to minimize, to the greatest extent feasible, the vibration levels in all areas surrounding construction activities.

- Specify realistic vibration limits in contract documents.

- Require the contractor to submit a list of operations that may generate vibration and work with the contractor to reduce the magnitude and/or duration.
- Route construction equipment to avoid impacts to sensitive receptors.
- Minimize duration of vibration impacts.

Recognizing the highly specialized operations at the Carnegie Institute, normal impact assessments (predictive models) would not be considered applicable. Therefore, DDOT would continue to coordinate efforts during construction and develop schedules with the Institute so that advance notice is provided before any major ground-borne vibration activities are performed and the Institute can schedule vibration-sensitive tests during non-construction periods.

4.9.10 HAZARDOUS MATERIALS

The introduction of hazardous materials into the air, soil, or water is specifically prohibited by the Clean Air Act (regulating both mobile and stationary source emissions), the Clean Water Act (regulating discharges of pollutants into Waters of the US [WOUS]), the Occupational Safety and Health Act (ensuring worker/workplace safety), and the Toxic Substances Control Act (addressing the use and disposal of specific chemicals). Although well regulated, accidental discharges of petroleum products such as engine motor oils or fuels could occur within a construction site. All necessary precautions would be taken to ensure that spills are prevented. In the unlikely event of a spill, measures would be implemented to prevent pollutants from reaching storm drains or surface water (e.g., Broad Branch and Soapstone Creek) directly.

Emissions of volatile materials from construction machinery are regulated through the US Environmental Protection Agency (EPA). Actions to be taken in case of an accidental petroleum spill would be included in the project's Health and Safety Plan, approved by DDOT during the procurement process to select a contractor for the rehabilitation project.

Mitigation

Prior to construction, DDOT would develop and implement a spill and pollution prevention plan for hazardous waste and materials to document materials that may be on-site during project construction and measures to avoid and minimize release of potential pollutants into the environment. To further mitigate any potential risk to public safety, the contractor for the proposed construction would prepare and implement a plan for the management and disposal of controlled hazardous materials and contaminated soil and groundwater that may be encountered during construction activities, as defined in the DDOT Design and Engineering Manual.

4.10 INDIRECT AND CUMULATIVE EFFECTS

Indirect effects are those that may be caused by the proposed action but occur later in time or farther in distance than the direct impacts discussed elsewhere in this document. The most common indirect effects associated with road and highway projects have to do with induced development, and the impacts of such development that would not otherwise occur if the projects were not constructed.

Lands surrounding the proposed project corridor currently can be accessed by the existing road network. As such, they could be subject to development or redevelopment even in the absence of implementation of this project.

Much of the land along the west side of the road already is in residential uses and substantial additional development is not expected in the foreseeable future. Land along the east side of the road consists entirely of federal lands owned by NPS as part of Rock Creek Park. As such, it is very unlikely that this land would be developed in the future. Rather, the land would be managed by NPS in accordance with the Park's General Management Plan to preserve and enhance the recreational and natural and cultural resource protection functions of the Park. The proposed project would not provide any new direct access to adjacent undeveloped lands where access does not currently exist. Furthermore, the proposed improvements would not increase roadway vehicular capacity. Accordingly, no indirect impacts are anticipated.

The proposed project would serve traffic generated by development on adjoining lands and beyond the limits of the project, but would not cause any further such development. Moreover, the project is consistent with local comprehensive planning regarding land use goals in the surrounding area and transportation in the project corridor.

Cumulative effects are the incremental effects of an action when added to other past, present, and reasonably foreseeable future actions, regardless of the sponsor of those actions. The assessment of cumulative effects requires an assessment of the impact that past and present actions have had on the environmental resources in the project area that would also be impacted by the proposed project.

The current affected environment is a reflection of the impacts of those past and present actions over time. Additionally, a review of cumulative effects requires an assessment of how reasonably foreseeable future actions may affect the same environmental resources that would be directly affected by the project. Reasonably foreseeable future actions include the following:

- Implementation of the Rock Creek Park General Management Plan by the National Park Service.
- Improvements to Broad Branch Road between Linnean Avenue and Beach Drive along the western border of Rock Creek Park (approximately 1.5 miles in length).

Table 4-11 summarizes the more prominent environmental resources in the project area that would be impacted by the proposed project, the impact that these resources have experienced from past and present actions, the incremental impact expected from the proposed project, identification of potential reasonably foreseeable future actions, and the potential impact that may occur from other reasonably foreseeable future actions in or near the project area.

Despite the dramatic changes in the landscape that have occurred over time due to human settlement in the surrounding area, the intensity of the incremental impacts of the project are considered small, when viewed in the context of impacts from other past, present, and reasonably foreseeable future actions and would not rise to a level that would cause significant cumulative impacts.

Table 4-11. Summary of Cumulative Effects

RESOURCES	IMPACTS FROM PAST AND PRESENT ACTIONS	IMPACT FROM PROPOSED PROJECT	POTENTIAL FUTURE ACTION	POTENTIAL IMPACT ON RESOURCES FROM POTENTIAL FUTURE ACTIONS
Air Quality	Decrease in regional air quality as population, industry, and traffic increases, offset by improvements to air quality resulting from increasingly stringent emissions and fuel standards.	No violations of National Ambient Air Quality Standards (NAAQS) because traffic volumes are low, localized pollutant emissions also are low, and contributions to regional pollutant burdens are low.	Continuing development in region, accompanied by increasing regional traffic volumes; construction of other roadway improvements as programmed in the Constrained Long Range Plan.	Continuing improvements in vehicle and fuel technology, and resulting cleaner emissions, anticipated to offset increases in volumes of vehicles on regional travel network and potential impacts from other road improvements; cumulative effect not substantial.
Noise	Increase in noise levels as urbanization and traffic increase.	Not a Type I project, no noise analysis required. No highway capacity increases and no significant changes in horizontal or vertical alignment.	Continued urbanization with accompanying increases in traffic volumes.	Cumulative effect not significant.
Waters of the US, Including Wetlands	Conversion or culverting of water resources to make way for development; degradation of water quality from urban runoff, impervious surfaces, increased runoff, and sediment volumes.	Repair/replacement of drainage structures and other construction would cause temporary siltation during construction, which would be minimized through implementation of BMPs and stormwater management measures. Permanent improvements to receiving waters are expected as a result of the proposed stormwater management elements included.	Additional impervious surfaces and conversion of resources for growing urban area; permanent water quality effects could occur as a result of increased impervious surface; spills from vehicles; an increase in non-point source pollutants from asphalt, grease, oil, metals, nutrients, nitrogen, deicing salts, roadside vegetation management chemicals, and suspended solids and other elements associated with roadways. Implementation of Rock Creek Park General Management Plan by NPS would include elements to improve water quality in Rock Creek and tributaries.	Adverse effects offset by enforcement of stormwater management, erosion and sediment controls, and water quality permitting requirements under local and federal laws, including compensation requirements; cumulative effect not substantial.
Terrestrial and Aquatic Habitat and Wildlife	Conversion of wildlife habitat to other uses, and degradation of remaining habitat from urban impacts and fragmentation. Preservation of wildlife habitat in Rock Creek Park.	Minor impacts to vegetated areas that border the roadway as part of construction activities.	Continued loss due to urbanization and population growth. Implementation of Rock Creek Park General Management Plan by NPS would include elements to preserve and enhance wildlife habitat in Rock Creek Park.	Potential further degradation of remaining habitat due to urban influences, offset by preservation/enhancement activities in Rock Creek Park; cumulative effect not substantial.

► *Continued.*

Table 4-11. Summary of Cumulative Effects

RESOURCES	IMPACTS FROM PAST AND PRESENT ACTIONS	IMPACT FROM PROPOSED PROJECT	POTENTIAL FUTURE ACTION	POTENTIAL IMPACT ON RESOURCES FROM POTENTIAL FUTURE ACTIONS
Rock Creek Park	Minor impacts from in-park infrastructure (roads, trails, recreational and maintenance facilities). Minor impacts from other nearby projects, such as Broad Branch Road Improvements.	Minor use of park lands; temporary vegetation impacts; minor visual impacts, particularly during the construction period. Stormwater management elements would reduce severe erosion and sedimentation occurring in streams within the Park.	Implementation of Rock Creek Park General Management Plan by NPS would continue to preserve and protect Park resources.	Implementation of Rock Creek Park General Management Plan by NPS would continue to preserve and protect Park resources.

4.11 PERMITS AND AUTHORIZATIONS

The following resources may require coordination with regulatory agencies and/or permits if they would be affected by the proposed project.

4.11.1 HAZARDOUS MATERIALS SITES

Coordination with the DOEE is recommended if hazardous substances occur in the construction area to determine permit requirements and appropriate management procedures, *including a spill and pollution prevention plan*.

4.11.2 WATER QUALITY

Section 402 of the Clean Water Act (33 U.S.C. 1344) regulates the discharge from any point source into WOUS and requires a permit from EPA. Activities that would require a permit include construction dewatering operations associated with activities such as utility excavation, culvert installation, trench digging, or other subsurface activities.

The placement of dredge or fill materials into WOUS is regulated under Section 404 of the Clean Water Act and requires a permit from USACE. Construction activities that could require a permit include extended roadway embankments, stream crossings, and culvert rehabilitations. DOEE provides the Water Quality Certificate for Section 402 and 404 permits.

In accordance with the DCMR Title 21-Chapter 5 Water Quality and Pollution, an erosion and sediment control plan is required for 50 square feet of land disturbance and a stormwater management plan is required for 5,000 square feet of land disturbance.

In accordance with the Clean Water Act, work resulting in alteration of, or work within a floodplain, waterway, or wetland within the District of Columbia requires a Jurisdictional Determination and Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Wetland from the USACE (Nationwide Permit 27 – Aquatic Habitat Restoration, Establishment and Enhancement Activities).

4.11.3 TREE REMOVAL

The removal of mature trees would be coordinated through DDOT's UFD and performed in accordance with DDOT's Standard Specifications for Highways and Structures - Section 608 Trees, Shrubs, Vines and Ground Cover. *The identification of mature Special Trees would be performed in accordance with the District's Tree Canopy Protection Amendment Act of 2016. Removal of certain trees from DDOT property would require a DDOT Special Tree Removal Permit, while removal of trees from NPS land would be authorized under NPS Special Use Permit for construction.* Additionally, work done outside park property that may cause damage to species within park property (e.g., root damage) would be coordinated with NPS.

4.11.4 FLOODPLAINS

In accordance with DCMR Title 20 – Chapter 31 Flood Hazard Rules, a building permit shall be required for all construction and development occurring in an identified floodplain area and a floodplain development plan and study are required.

In accordance with NPS DO 77-2 *Floodplain Management*, construction within floodplains on NPS land requires authorization from the NPS Water Resources Division.

4.11.5 PARKS

In accordance with NPS DO 53 *Special Park Uses*, *temporary activities on NPS property would be accomplished through a Special Use Permit including access, construction, and site restoration, including stabilization of streams and removal of trees.* As indicated in Section 4.11.3, continued coordination with NPS would be conducted for any work that may have an impact on trees and shrubs within park property. This includes work done outside park property that may cause damage to species within park property (e.g., root damage). Continued coordination with the District DPR would be conducted for any work that may have an impact on the triangle park at the intersection of Brandywine Street and Broad Branch Road.

4.12 SECTION 4(f) EVALUATION

This Section 4(f) Evaluation has been prepared in compliance with Section 4(f) of the US Department of Transportation (USDOT) Act of 1966, which is codified at 49 U.S.C. § 303 and 23 U.S.C. § 138, with implementing regulations at 23 CFR § 774.

4.12.1 INTRODUCTION

Section 4(f) states FHWA may not approve the “use” defined as: the permanent incorporation of land from a Section 4(f) resource into a transportation facility; temporary occupancy of land that is adverse in terms of the statute's preservation purpose; or when a project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired, unless a determination is made that:

- (1) There is no feasible and prudent avoidance alternative, as defined in § 774.17, to the use of land from the property; and
- (2) The action includes all possible planning, as defined in § 774.17, to minimize harm to the property resulting from such use; or FHWA determines that the use of the property, including any measure(s) to minimize harm (such as any avoidance, minimization, mitigation, or

enhancement measures) committed to by the applicant, will have a de minimis impact, as defined in 23 CFR §774.17, on the property.

The authority to administer Section 4(f) and make Section 4(f) approvals resides with the Secretary of the USDOT. The Secretary of Transportation has delegated the authority for administering Section 4(f) to the FHWA Administrator in 49 CFR § 1.48.

With regards to historic sites, 23 CFR § 774.17 states:

Historic site. For purposes of this part, the term "historic site" includes any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization that are included in, or are eligible for inclusion in, the National Register.

Official(s) with jurisdiction over Historic Sites:

(1) In the case of historic properties, the official with jurisdiction is the SHPO for the State wherein the property is located or, if the property is located on tribal land, the THPO. If the property is located on tribal land but the Indian tribe has not assumed the responsibilities of the SHPO as provided for in the National Historic Preservation Act, then a representative designated by such Indian tribe shall be recognized as an official with jurisdiction in addition to the SHPO. When the ACHP is involved in a consultation concerning a property under Section 106 of the NHPA, the ACHP is also an official with jurisdiction over that resource for purposes of this part. When the Section 4(f) property is a National Historic Landmark, the National Park Service is also an official with jurisdiction over that resource for purposes of this part.

(2) In the case of public parks, recreation areas, and wildlife and waterfowl refuges, the official(s) with jurisdiction are the official(s) of the agency or agencies that own or administer the property in question and who are empowered to represent the agency on matters related to the property.

The proposed rehabilitation of Broad Branch Road (the project) requires FHWA approval because FHWA has oversight responsibility for the Federal-aid program and is participating in the funding of the project. In addition, the project requires use of land from properties protected by Section 4(f), and therefore, FHWA approval is also required in order for this Section 4(f) use to proceed.

4.12.2 DESCRIPTION OF PURPOSE AND NEED AND PROPOSED ACTION

DDOT, in conjunction with the FHWA, and in cooperation with NPS, is proposing the rehabilitation of a 1.5-mile segment of Broad Branch Road NW between Linnean Avenue NW and Beach Drive NW, a portion of which abuts the southwestern border of Rock Creek Park (see **Figure 4-1**). The existing two-lane Broad Branch Road lies almost entirely within DDOT right-of-way and is maintained by DDOT. The eastern edge of the roadway between 27th Street and Beach Drive borders Rock Creek Park, which is owned and maintained by the NPS.

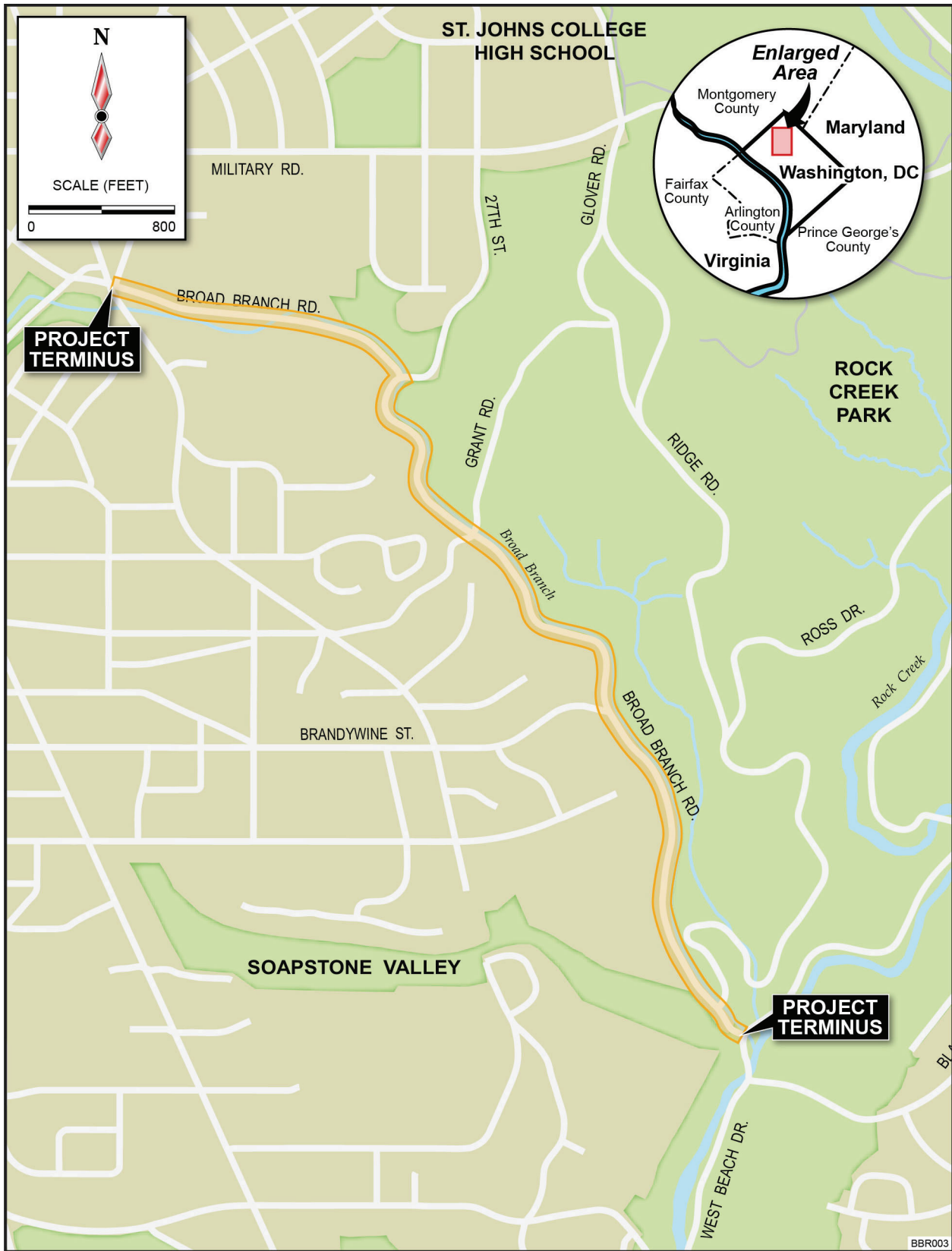


Figure 4-1. Project Location

4.12.2.1 Purpose and Need

The purpose of the proposed action is to rehabilitate Broad Branch Road to satisfy operational and safety needs in a manner keeping with the setting of the project area. Context sensitive solutions took into account the adjoining land uses that consist of residential, foreign diplomatic properties; institutional developments; and wooded areas, including Rock Creek Park. Improvements to the corridor considered all modes of transportation including motorized vehicles, bicycles, and pedestrians.

The needs for improvements to Broad Branch Road relate primarily to deficiencies in the existing roadway infrastructure and stormwater management system; the safety of motorists, pedestrians, and bicyclists; and linkages to serve pedestrian and bicycle travel along the roadway itself as well as to the Rock Creek Park trail systems (i.e., Rock Creek Park Trail, Western Ridge Trail, and Soapstone Valley Trail).

4.12.2.2 Proposed Action

The proposed action is to rehabilitate Broad Branch Road and control stormwater runoff. Other elements considered for inclusion within the roadway cross-section included bicycle and pedestrian facilities. Along its 1.5-mile length, Broad Branch Road varies in terms of its topography and roadway cross-section. The DDOT-owned right-of-way ranges from approximately 33 to 120 feet along Broad Branch Road. The narrowest width (33 feet) is generally located at the southern end of the corridor, south of Brandywine Street, which limits the types of improvements at this end of the corridor.

While the DDOT-owned right-of-way width generally increases north of Grant Road and Davenport Street, the proximity of Broad Branch stream and Rock Creek Park presents design constraints along the east side of the roadway up to where the Broad Branch stream crosses the road approximately 1,000 feet from the northern terminus of the project. Given these varying features, one cross-section is not appropriate for the full length of the roadway and the project considered variable cross-sections based on the project purpose and need and the available right-of-way. Detailed descriptions of *each of the Build Alternatives and the Preferred Alternative*² are presented in Chapter 2.

4.12.3 DESCRIPTION OF SECTION 4(f) PROPERTIES

Section 4(f) and the implementing regulations in 23 CFR § 774 define a Section 4(f) property as publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance. A historic site includes any prehistoric or historic district, site, building, structure, or object included on, or eligible for inclusion on, the NRHP.

In determining the applicability of Section 4(f) to historic sites, FHWA, in cooperation with DDOT, consulted with the DC SHPO who has jurisdiction to identify all properties on or eligible for the NRHP in the District of Columbia. The Section 4(f) requirements apply to historic sites on

² Based on comments received on the Revised Draft EA, the Preferred Alternative provides an option for a shared use path, in lieu of sidewalk and with a reduced-width rain garden, between Linnean Avenue and 27th Street. The shared use path option would remain within the same footprint and would remain in the DDOT right-of-way.

or eligible for the NRHP unless FHWA determines that an exception under 23 CFR§ 774.13 applies.

Several either contributing historic properties or historic properties that are listed on the NRHP with Section 4(f) applicability occur within the project area where construction would take place, including areas needed for staging, materials stockpiling, and utility relocations:

- Rock Creek Park Historic District,
- Soapstone Creek Culvert,
- Gatehouse at La Villa Firenze, and
- Rock Creek Park.

Detailed descriptions of the NRHP-eligible resources are presented in Section 3.2.4 and parklands are discussed in Section 3.3.9. Summaries are provided below.

4.12.3.1 Rock Creek Park Historic District

The Rock Creek Park Historic District (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 on 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. Architectural features associated with the RCPHD located within the project area include three bridges, two roads, three historic trails, a culvert, stormwater outfalls with stone headwalls, stone retaining walls, and stone boundary markers.

4.12.3.2 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. The downstream wing walls were most likely added in 1934 when the culvert was extended. 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 Soapstone Creek Culvert is considered individually eligible for the NRHP and is also a contributing element to the RCPHD.

4.12.3.3 Gatehouse at La Villa Firenze

The residence located at 4400 Broad Branch Road NW is a Tudor Revival style house constructed between 1925 and 1927 and is currently the Italian ambassador's residence, known as La Villa Firenze. A gatehouse is located north of the driveway leading from Broad Branch Road to La Villa Firenze located on the hilltop. 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 and are considered contributing elements to the Gatehouse. A small portion of the stone retaining walls are located within DDOT right-of-way.

The Gatehouse at La Villa Firenze is considered a contributing element to this residential complex, which is considered NRHP-eligible.

4.12.3.4 Rock Creek Park

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 (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, Western Ridge Trail, access to the horse stables and equestrian field, and the Rock Creek Nature Center and Planetarium.

Rock Creek Park functions as both a contributing element to the RCPHD and as a recreational Park facility within the RCPHD.

4.12.3.5 Other Section 4(f) Properties

Other Section 4(f) properties adjacent to the project area include two recreational resources: Fort Circle Park and Soapstone Valley Park (also a part of the RCPHD). Although the Triangle Park at the intersection of Broad Branch Road and Brandywine Street is owned by the District DPR, it is not considered a Section 4(f) property because its major purpose is not for park, recreation, or refuge activities (FHWA, 2013) but rather it serves as green space within a traffic island.

The project would not require the constructive use of these properties. The reasons for this assessment are provided below.

Fort Circle Parks

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. 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 and 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 DPR.

Soapstone Valley Park

Soapstone Valley Park, managed by Rock Creek Park, is not located in the project alignment; however, it is accessible via Soapstone Creek Valley Trail, which is located on DDOT right-of-way and has an entrance on Broad Branch Road.

4.12.4 DESCRIPTION OF USE AND IMPACTS ON SECTION 4(f) PROPERTIES

Regarding the applicability of Section 4(f) to historic sites, there are essentially four Section 4(f) historic properties eligible for or listed on the NRHP that have potential for "use" as defined in 23 CFR §774.17 that will be "adversely effected" by the Build Alternatives where one of those properties that contributes to a NRHP's historic site is also a Section 4(f) Park facility. They are:

the NRHP-listed RCPHD; the individually NRHP-eligible Soapstone Creek Culvert, the NRHP-eligible gatehouse at La Villa Firenze, and Rock Creek Park which functions as both a contributing resource to the RCPHD and as a recreational Park facility within the RCPHD (**Table 4-12**).

4.12.4.1 Rock Creek Park Historic District

Construction of any of the three Build Alternatives and the Preferred Alternative would require permanent incorporation and loss of contributing elements to the RCPHD: the demolition and reconstruction of segments of retaining walls and stormwater outfall headwalls. The stone and metal boundary markers would be temporarily re-located during construction and re-installed by DDOT in the original location in coordination with the NPS.

4.12.4.2 Soapstone Creek Culvert

Construction of any of the three Build Alternatives and the Preferred Alternative would require permanent incorporation (demolition and replacement) of the Soapstone Creek Culvert.

4.12.4.3 Gatehouse at La Villa Firenze

Construction of three Build Alternatives and the Preferred Alternative would require permanent incorporation and partial reconstruction of portions of the original stone retaining walls at the entrance to the driveway to the Gatehouse at La Villa Firenze.

Alternatives 3 and 4 require reconstruction of portions of the stone retaining walls on the Government of Italy property. Alternative 2 and the Preferred Alternative would require reconstruction of portions of the stone retaining walls located within DDOT right-of-way.

Table 4-12. Summary of Use of Section 4(f) Properties

	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 3 MODIFIED	ALTERNATIVE 4
NRHP-listed Rock Creek Park Historic District				
Temporary Use	Yes	Yes	Yes	Yes
Permanent Incorporation	Yes	Yes	Yes	Yes
Loss of Function	Minimal	Minimal	Minimal	Minimal
NRHP-eligible Soapstone Creek Culvert				
Temporary Use	No	No	No	No
Permanent Incorporation	Yes	Yes	Yes	Yes
Loss of Function	Yes	Yes	Yes	Yes

► *Continued.*

Table 4-12. Summary of Use of Section 4(f) Properties

	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 3 MODIFIED	ALTERNATIVE 4
NRHP-eligible Gatehouse at La Villa Firenze				
Temporary Use	No	No	No	No
Permanent Incorporation	Yes	Yes	Yes	Yes
Loss of Function	Minimal	Minimal	Minimal	Minimal
Rock Creek Park (Contributing Element to the RCPHD and Recreational Facility within RCPHD)				
Temporary Use	Yes (outfall construction)	Yes (outfall construction)	Yes (roadway, retaining wall and outfall construction)	Yes (outfall construction)
Permanent Incorporation	Yes (1,192 sq ft)	Yes (1,758 sq ft)	Yes (1,691 sq ft)	Yes (4,024 sq ft)
Loss of Park Function	No	No	No	No

4.12.4.4 Rock Creek Park

Permanent incorporation of Rock Creek Park would increase with each Build Alternative, as roadway widening was shifted to the east side of the road to avoid encroachments upon land of any of the Sovereign Nations. (Note that the square footage of permanent incorporation reported in the following is based on the quantities of area of permanent park impact from right-of-way acquisition and area of permanent park impact from construction without right-of-way acquisition provided in Table 4-8, Park Property Impacts.)

Construction of Alternative 2 would result in the permanent incorporation of 1,192 square feet of Rock Creek Park based on cut-and-fill activities for the new road bed.

Under Alternative 3, permanent incorporation of 1,758 square feet of Rock Creek Park would occur for cut-and-fill activities for the road bed, acquisition of additional right-of-way for the road, and sidewalk construction.

Under the Preferred Alternative, permanent incorporation of 1,691 square feet of Rock Creek Park would occur for cut-and-fill activities for the road bed, acquisition of additional right-of-way for the road, and sidewalk construction.

Finally, construction of Alternative 4 would result in permanent incorporation of 4,024 square feet of Rock Creek Park based on cut-and-fill activities for the road bed, acquisition of additional right-of-way for the road, and sidewalk construction.

Temporary use of Rock Creek Park would be required for the excavation and replacement of stormwater outfall pipes under each Build Alternative and the Preferred Alternative; however, the ground surface would be restored to its original elevation and re-vegetated as appropriate.

4.12.5 AVOIDANCE ALTERNATIVES

The applicability of Section 4(f) to the “use” of each of the four Section 4(f) historic properties identified in this section was evaluated to:

1. Determine whether there is any feasible and prudent avoidance alternative to the use of land from the Section 4(f) property;
2. If there were no feasible and prudent avoidance alternatives, determine which of the alternatives described in Section 7 would result in the least overall harm to the Section 4(f) property; and
3. Identify the planning and actions to be taken to minimize harm to the property resulting from the Section 4(f) use.

4.12.5.1 Rock Creek Park Historic District

Avoidance Alternatives Considered. The primary intent of Section 4(f) is to avoid the “use” of Section 4(f) properties as defined by 23 CFR §774. The No Action Alternative is the only alternative that can completely avoid the use of contributing elements of the RCPHD within the project area.

The No Action Alternative would include minor restoration activities (safety and routine maintenance) that would maintain the continuing operation of the existing roadway. The No Action Alternative would avoid any use of contributing elements of the RCPHD (i.e., retaining walls and stormwater outfall headwalls). However, this alternative would not meet the established purpose and need for the project. Routine maintenance of the existing roadway would not correct the deficiencies in the existing roadway infrastructure and stormwater management system; provide for increased safety of motorists, pedestrians, and bicyclists; and establish linkages to serve pedestrian and bicycle travel along the roadway itself as well as to the Rock Creek Park trail systems (i.e., Rock Creek Park Trail and Soapstone Valley Trail).

Feasibility and Prudence Test. Subsequent to consultations with the DC SHPO, it has been determined that the “effects” to historic properties resulting from the Broad Branch “action” meet the criteria for an “adverse effect” as defined in 36 CFR § 800.5 – Assessment of adverse effects. Those “effects” to contributing elements of the RCPHD would involve demolition of segments of retaining walls and stormwater outfall headwalls. This Section 4(f) use applies to all three Build Alternatives and the Preferred Alternative.

The potential avoidance alternative, the No Action Alternative, was evaluated in terms of feasibility and prudence in meeting the purpose and need of the project and still avoiding the Section 4(f) use of contributing elements of the RCPHD. The No Action Alternative does not address the project’s purpose and need and would not correct the deficiencies in the roadway, improve stormwater management, and increase public safety. Implementation of the No Action

Alternative would compromise the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need, and would result in unacceptable safety or operational problems; therefore, the No Action Alternative is not considered a prudent alternative to avoid the Section 4(f) use of contributing elements of the RCPHD.

Build Alternatives 2, 3, 4 and the Preferred Alternative remain as the only alternatives that would address the purpose and need, but would still result in the Section 4(f) use of contributing elements of the RCPHD. All three Build Alternatives and the Preferred Alternative represent appropriate engineering designs that would correct the structural deficiencies in the roadway and improve stormwater management; therefore, these alternatives are considered feasible. All four alternatives would improve safety and operational problems on Broad Branch Road; would not result in additional construction, maintenance, or operational costs of extraordinary magnitude; would not cause other unique problems or unusual factors; and would not create cumulative impacts of extraordinary magnitude. After mitigation measures are implemented to alleviate impacts to resources identified in this Final EA, these alternatives would not create additional social, economic, or environmental impacts; would not disrupt established communities; would not result in disproportionate impacts to minorities or low-income populations; and would not create additional impacts to environmental resources protected under Federal statutes. All three Build Alternatives and the Preferred Alternative are considered prudent. Therefore, there is no feasible and prudent alternative to the Section 4(f) use of contributing elements of the RCPHD.

Least Harm. There is no feasible and prudent alternative that avoids the Section 4(f) use of contributing elements of the RCPHD; therefore, it must then be determined which of the four remaining Build Alternatives (Build Alternatives 2, 3, 4, and Preferred) would cause the least harm based on seven balancing factors identified in 23 CFR §774.3(c)(1).

Factor 1: The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property). Build Alternatives 2, 3, 4, and the Preferred Alternative would all result in the demolition and replacement of contributing elements of the RCPHD (i.e., retaining walls and stormwater outfall headwalls). Mitigation measures for all alternatives may include, but not be limited to: preparing a work plan and conducting an intensive architectural field survey based on the project's limits of disturbance and immediately adjacent areas to augment the preliminary descriptions of the historic stone retaining wall segments, stone stormwater outfalls and stone boundary markers; repairing or replacing historic stone retaining walls and stone headwalls for stormwater outfalls reusing historic materials to the maximum extent possible or if the quantity of historic materials is insufficient to face the replacement retaining walls and headwalls, new materials which are similar, or identical, to the historic materials would be procured and installed; and recording the locations of the stone boundary markers, temporarily storing them in a secured area, and re-setting them in their original locations post-construction in consultation with NPS. Benefits include stabilizing the historic stone retaining walls and stone stormwater outfalls from further natural deterioration. A Section 106 MOA has been executed to resolve the adverse effect from the demolition of the retaining walls and stormwater outfall headwalls (see Appendix O)

Factor 2: The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection. As noted above, each of the Build Alternatives and the Preferred Alternative would result in the demolition and replacement of contributing elements of the RCPHD to meet the purpose and need of the project.

The RCPHD is defined by 90 contributing elements which include both categories or systems of resources and individual resources. Multiple resources may be identified within each resource category. Two resource categories (historic stone retaining walls, and culverts and stormwater outfalls) of the 60 resource categories or individually contributing elements to the RCPHD would be affected. In addition, the stone boundary markers have not been specifically identified in the NRHP nomination forms but are considered contributing elements to the RCPHD by the DC SHPO and NPS. The three contributing resource categories (historic stone retaining walls, culverts and stormwater outfalls, and stone boundary markers) contain numerous resources. No systematic survey of the RCPHD has been conducted to identify all retaining wall segments (15 segments identified here), stormwater outfalls (10 stone outfalls identified here) and culverts (the Soapstone Creek Culvert would be discussed separately below), or stone boundary markers (3 identified here).

Although some retaining wall segments and stone outfalls associated with two contributing resource categories of the RCPHD would be affected, no harm would occur to the remaining 88 contributing elements that are protected activities, attributes and features of this Section 4(f) resource.

Factor 3: The relative significance of each Section 4(f) property. The RCPHD is among three other Section 4(f) properties that would be affected by Build Alternatives 2, 3, and 4; the Preferred Alternative impacts only two of the other three Section 4(f) properties. A preliminary assessment of relative significance is provided below, based on function, number of contributing elements, and physical disturbance of the Section 4(f) resource. The RCPHD consists of 1,754 acres of land dominated by picturesque landscapes featuring forested areas, streams, valleys, meadows, and sloping hills, and is listed in the NRHP 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 is considered first in relative significance of the four Section 4(f) properties and is the most significant.

Factor 4: The views of the official(s) with jurisdiction over each Section 4(f) property. The official with jurisdiction over contributing elements of the RCPHD is NPS. As a result of ongoing coordination throughout the NEPA and NHPA (Section 106) processes, NPS acknowledges the adverse effects to the contributing elements of the RCPHD and is a signatory to the Section 106 MOA to resolve the adverse effects. With the execution and implementation of the MOA, NPS has no objections. *After review of the Revised Draft EA and Section 4(f) evaluation, the DOI, which includes the NPS, on October 22, 2020, concurred that there are no feasible or prudent*

avoidance alternatives and that the Preferred Alternative would cause the least overall harm (see Appendix Q).

Factor 5: The degree to which each alternative meets the purpose and need for the project. The two primary factors of the purpose and need of the project, to resolve deficiencies in the existing roadway infrastructure and stormwater management, are met by all four Build Alternatives. Build Alternative 2 partially meets the purpose and need: it does not provide sidewalks in conformance with DDOT's Complete Streets Policy, DDOT's Design and Engineering Manual, and the District's Priority Sidewalk Assurance Act of 2010 that requires the provision of sidewalks along DC streets for any roadway undergoing major reconstruction.

Build Alternatives 3 and 4 and the Preferred Alternative provide additional improvements to address other factors of the purpose and need: improve the safety of motorists, pedestrians, and bicyclists; and provide linkages to serve pedestrian and bicycle travel along the roadway itself as well as to the Rock Creek Park trail systems. Upon completion and regardless of the Build Alternative, the demolition and replacement of retaining walls and stormwater outfall headwalls would correct the structural deficiencies of Broad Branch Road and improve stormwater management.

Factor 6: After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f). Potential impacts related to in-stream work and removal of vegetation have been identified as a result of mitigation measures to reconstruct the historic stone retaining walls and stone outfalls, contributing elements of the RCPHD. Reconstruction of the historic stone retaining walls and stone outfalls would require the establishment of work zones within Broad Branch Creek; protective measures would be developed to ensure that construction materials, such as mortar, do not fall into the creek. In-stream work would require permits from USACE and DOEE in accordance with Sections 402 and 404 of the Clean Water Act. Erosion and sedimentation control and stormwater management plans would be developed in accordance with DCMR to minimize off-site impacts. Impacts to trees would be avoided to the maximum extent possible by minimizing cut/fill/pavement within the root zone. All trees would be protected during construction or replaced according to DDOT's Standard Specifications for Highways and Structures - Section 608 Trees, Shrubs, Vines and Ground Cover. When construction is completed and the rehabilitated Broad Branch Road becomes fully operational, the project area (including both Section 4(f) and non-Section 4(f) resources) would revert back to the environmental conditions that existed prior to construction. With the implementation of protective measures during construction, obtaining an in-stream permit, establishing erosion and sedimentation control and stormwater plans, minimizing impacts to trees and vegetation, and tree replacement as needed, no adverse impacts would occur to resources not protected by Section 4(f).

Factor 7: Substantial differences in costs among the alternatives. The estimated costs of the Build Alternatives (in 2018 dollars) range from \$37.4 million to \$57.5 million. The difference in costs are appreciable, approximately 35 percent between highest and lowest. Build Alternative 2 would cost approximately \$37.4 million. Build Alternative 3 would cost approximately \$43.7 million. The Preferred Alternative would cost approximately \$56.3 million. Build Alternative 4 would cost approximately \$57.5 million. Build Alternative 2 is the least costly.

4.12.5.2 Soapstone Creek Culvert

Avoidance Alternatives Considered. The primary intent of Section 4(f) is to avoid the “use” of Section 4(f) properties as defined by 23 CFR §774. The No Action Alternative is the only alternative that can completely avoid the use of the Soapstone Creek Culvert within the project area. However, the No Action Alternative would not correct the deficiencies in the roadway, would not improve stormwater management, and would not increase public safety. For these reasons, this No Action alternative would not satisfy the stated purpose and need of the project.

Feasibility and Prudence Test. Subsequent to consultations with the DC SHPO, it has been determined that the “effects” to historic properties resulting from the Broad Branch “action” meet the criteria for an “adverse effect” as defined in 36 CFR § 800.5 – Assessment of adverse effects. Those “effects” to the Soapstone Creek Culvert would involve demolition of the culvert. This Section 4(f) use applies to all three Build Alternatives and the Preferred Alternative.

The potential avoidance alternative, the No Action Alternative, was evaluated in terms of feasibility and prudence in meeting the purpose and need of the project and still avoiding the Section 4(f) use of the Soapstone Creek Culvert. The No Action Alternative does not address the project’s purpose and need and would not correct the deficiencies in the roadway, improve stormwater management, and increase public safety. Implementation of the No Action Alternative would compromise the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need and would result in unacceptable safety or operational problems; therefore, the No Action Alternative is not considered a prudent alternative to avoid the Section 4(f) use of the Soapstone Creek Culvert. Build Alternatives 2, 3, 4, and the Preferred Alternative remain as the only alternatives that would address the purpose and need, but they would all still result in the Section 4(f) use of the Soapstone Creek Culvert.

All three Build Alternatives and the Preferred Alternative require the demolition and replacement of the Soapstone Creek Culvert, considered individually eligible and also as a contributing element to the RCPHD, in order to address the stormwater management deficiencies identified in the purpose and need (Sections 1.1 and 1.2). Any alternative that does not include the demolition and replacement of Soapstone Creek Culvert would compromise the project to the degree that it is unreasonable to proceed.

All three Build Alternatives and the Preferred Alternative represent appropriate engineering designs that would correct the structural deficiencies in the roadway and improve stormwater management; therefore, these alternatives are considered feasible. All four alternatives would improve safety and operational problems on Broad Branch Road; would not result in additional construction, maintenance, or operational costs of extraordinary magnitude; would not cause other unique problems or unusual factors; and would not create cumulative impacts of extraordinary magnitude. After mitigation measures are implemented to alleviate impacts to resources identified in this Final EA, these alternatives would not create additional social, economic, or environmental impacts; would not disrupt established communities; would not result in disproportionate impacts to minorities or low income populations; and would not create additional impacts to environmental resources protected under Federal statutes. All four Build

Alternatives are considered prudent. Therefore, there is no feasible and prudent alternative to the Section 4(f) use of the Soapstone Creek Culvert.

Least Harm. There is no feasible and prudent alternative that avoids the Section 4(f) use of the Soapstone Creek Culvert; therefore, it must then be determined which of the four remaining Build Alternatives (Build Alternatives 2, 3, 4, and Preferred Alternative) would cause the least harm based on seven balancing factors identified in 23 CFR §774.3(c)(1).

The analysis considered proposed mitigation measures and the severity and location of the Section 4(f) use among the four Build Alternatives.

Factor 1: The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property). Build Alternatives 2, 3, 4, and the Preferred Alternative would all result in the demolition and replacement of the Soapstone Creek Culvert. Mitigation measures for all alternatives may include, but are not limited to: careful removal of the historic materials (existing rough cut stone, original hand cut capstones and red brick from within the barrel arch) for potential reuse, installing a prefabricated modular bridge reusing the historic materials or if the quantity of original materials is insufficient to face the replacement culvert headwalls and wing walls, new materials which are similar, or identical, to the historic materials would be procured and installed. Benefits include stabilizing and upgrading the culvert to prevent or reduce future flooding events and erosion of the Broad Branch Road bed. A Section 106 MOA has been executed to resolve the adverse effects from the demolition of the Soapstone Creek Culvert for the proposed action (see Appendix O).

Factor 2: The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection. As noted above, each of the Build Alternatives would result in the demolition and replacement of the Soapstone Creek Culvert to meet the purpose and need of the project. Upon reconstruction of the Soapstone Creek Culvert, the activities, attributes, and features that qualify it as an historic property would no longer exist and therefore, there would be nothing left to harm.

Factor 3: The relative significance of each Section 4(f) property. The Soapstone Creek Culvert is among four other Section 4(f) properties that would be affected by the project, regardless of the Build Alternatives selected; the Preferred Alternative impacts three of the four properties. A preliminary assessment of relative significance is provided below, based on function, number of contributing elements, and physical disturbance of the Section 4(f) resource. The culvert's relative significance in comparison to the other three Section 4(f) properties is based on its loss of physical integrity resulting from partial collapse of the Soapstone Creek Culvert after flooding related to a major storm event in April 2011 and the subsequent temporary structural repair (installation of a corrugated steel lining to stabilize the barrel arch). The Soapstone Creek Culvert is considered fourth in relative significance of the four Section 4(f) properties and is the least significant.

Factor 4: The views of the official(s) with jurisdiction over each Section 4(f) property. The official with jurisdiction over the Soapstone Creek Culvert are DDOT (upstream side) and NPS (downstream side). DDOT has determined that the Soapstone Creek Culvert, individually eligible and also a contributing element of the RCPHD, must be demolished and replaced to

correct deficiencies in the roadway, improve stormwater management, and increase public safety on Broad Branch Road. DDOT is a signatory to the Section 106 MOA to resolve the adverse effects to historic properties. As a result of ongoing coordination throughout the NEPA and NHPA (Section 106) processes, NPS acknowledges the adverse effects to Soapstone Creek Culvert and is also a signatory to the Section 106 MOA to resolve the adverse effects. With the execution and implementation of the MOA, DDOT, and NPS have no objections. *After review of the Revised Draft EA and Section 4(f) evaluation, the DOI, which includes the NPS, on October 22, 2020, concurred that there are no feasible or prudent avoidance alternatives and that the Preferred Alternative would cause the least overall harm (see Appendix Q).*

Factor 5: The degree to which each alternative meets the purpose and need for the project. The two primary factors of the purpose and need of the project, to resolve deficiencies in the existing roadway infrastructure and stormwater management, are met by all four Build Alternatives. Build Alternative 2 partially meets the purpose and need: it does not provide sidewalks in conformance with DDOT's Complete Streets Policy, DDOT's Design and Engineering Manual, and the District's Priority Sidewalk Assurance Act of 2010 that requires the provision of sidewalks along DC streets for any roadway undergoing major reconstruction.

Build Alternatives 3 and 4, and the Preferred Alternative provide additional improvements to address other factors of the purpose and need: improve the safety of motorists, pedestrians, and bicyclists; and provide linkages to serve pedestrian and bicycle travel along the roadway itself as well as to the Rock Creek Park trail systems. Upon completion and regardless of the Build Alternative, the reconstruction of the Soapstone Creek Culvert would correct the structural deficiencies of Broad Branch Road and improve stormwater management.

Factor 6: After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f). Potential impacts for in-stream work in Broad Branch and removal of vegetation have been identified as a result of mitigation measures to reconstruct the Soapstone Creek Culvert. Reconstruction of the Soapstone Creek Culvert would require the establishment of work zones within both Soapstone Creek and Broad Branch Creek; protective measures would be developed to ensure that construction materials, such as mortar, do not fall into the creeks. In-stream work would require permits from USACE and DOEE in accordance with Sections 402 and 404 of the Clean Water Act. Erosion and sediment control and stormwater management plans would be developed in accordance with DCMR to minimize off-site impacts.

Impacts to trees would be avoided to the maximum extent possible by minimizing cut/fill/pavement within the root zone. All trees would be protected during construction or replaced according to DDOT's Standard Specifications for Highways and Structures - Section 608 Trees, Shrubs, Vines and Ground Cover. When construction is completed and the rehabilitated Broad Branch Road becomes fully operational, the project area (including both Section 4(f) and non-Section 4(f) resources) would revert back to the environmental conditions that existed prior to construction. With the implementation of protective measures during construction, obtaining in-stream permits, establishing erosion and sedimentation control and stormwater plans, minimizing impacts to trees and vegetation, and tree replacement as needed, no adverse impacts would occur to resources not protected by Section 4(f).

Factor 7: Substantial differences in costs among the alternatives. The estimated costs of the Build Alternatives (in 2018 dollars) range from \$37.4 million to \$57.5 million. The difference in costs are appreciable, approximately 35 percent between highest and lowest. Build Alternative 2 would cost approximately \$37.4 million. Build Alternative 3 would cost approximately \$43.7 million. The Preferred Alternative would cost approximately \$56.3 million. Build Alternative 4 would cost approximately \$57.5 million. Build Alternative 2 is the least costly.

4.12.5.3 Gatehouse at La Villa Firenze

Avoidance Alternatives Considered. The primary intent of Section 4(f) is to avoid the “use” of Section 4(f) properties as defined by 23 CFR §774. The No Action Alternative avoids the use of features associated with the Gatehouse at La Villa Firenze within the project area.

The No Action Alternative would include minor restoration activities (safety and routine maintenance) that would maintain the continuing operation of the existing roadway. The No Action Alternative would avoid any use of features associated with the Gatehouse at La Villa Firenze. However, this alternative would not meet the established purpose and need for the project. Routine maintenance of the existing roadway would not correct the deficiencies in the existing roadway infrastructure and stormwater management system; provide for increased safety of motorists, pedestrians, and bicyclists; and establish linkages to serve pedestrian and bicycle travel along the roadway itself as well as to the Rock Creek Park trail systems (i.e., Rock Creek Park Trail and Soapstone Valley Trail).

Feasibility and Prudence Test. Subsequent to consultations with the DC SHPO, it has been determined that the “effects” to historic properties resulting from the Broad Branch “action” meet the criteria for an “adverse effect” as defined in 36 CFR § 800.5 – Assessment of adverse effects. Those “effects” to features associated with the Gatehouse at La Villa Firenze would involve relocation of portions of the original stone retaining walls at the entrance to the driveway and construction of new retaining walls. This Section 4(f) use applies to all three Build Alternatives and the Preferred Alternative.

The potential avoidance alternative, the No Action Alternative was evaluated in terms of feasibility and prudence in meeting the purpose and need of the project and still avoiding the Section 4(f) use of features associated with the Gatehouse at La Villa Firenze. The No Action Alternative does not fully address the project’s purpose and need and would not correct the deficiencies in the roadway, improve stormwater management, and increase public safety. Implementation of the No Action Alternative would compromise the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need and would result in unacceptable safety or operational problems; therefore, the No Action Alternative is not considered a prudent alternative to avoid the Section 4(f) use of features associated with the Gatehouse at La Villa Firenze.

Build Alternatives 2, 3, 4, and the Preferred Alternative would address the purpose and need, but would still result in the Section 4(f) use of features associated with the Gatehouse at La Villa Firenze. These three Build Alternatives and the Preferred Alternative represent appropriate engineering designs that would correct the structural deficiencies in the roadway and improve stormwater

management; therefore, these alternatives are considered feasible. These three Build Alternatives would improve safety and operational problems on Broad Branch Road; would not result in additional construction, maintenance, or operational costs of extraordinary magnitude; would not cause other unique problems or unusual factors; and would not create cumulative impacts of extraordinary magnitude. After mitigation measures are implemented to alleviate impacts to resources identified in this Final EA, these alternatives would not create additional social, economic, or environmental impacts; would not disrupt established communities; would not result in disproportionate impacts to minorities or low-income populations; and would not create additional impacts to environmental resources protected under Federal statutes. These three Build Alternatives and the Preferred Alternative are considered prudent.

Least Harm. There is no feasible and prudent alternative that avoids the Section 4(f) use of features associated with the Gatehouse at La Villa Firenze; therefore, it must be determined which of the four Build Alternatives (Build Alternatives 2, 3, 4, and the Preferred Alternative) would cause the least harm based on seven balancing factors identified in 23 CFR §774.3(c)(1).

Factor 1: The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property). Build Alternatives 2, 3, 4, and the Preferred Alternative would all result in the relocation of features associated with the Gatehouse at La Villa Firenze (i.e., retaining walls); however, the extent of rehabilitation varies by Build Alternatives with the least amount of mitigation required for Build Alternative 2 and the Preferred Alternative and the most amount of mitigation associated with Build Alternative 4. Mitigation measures for Build Alternatives 2, 3, 4, and the Preferred Alternative may include, but are not limited to: documenting the original stone retaining wall at the driveway entrance to the Gatehouse; updating the existing DC SHPO Determination of Eligibility form; careful removal of the historic materials (original stone and stone veneer) for potential reuse; and replacing the stone retaining walls reusing historic materials to the maximum extent possible or if the quantity of historic materials is insufficient to face the replacement retaining walls, new materials which are similar, or identical, to the historic materials would be procured and installed. Benefits include stabilizing the retaining wall from further natural deterioration. A Section 106 MOA has been executed to resolve the adverse effects from the relocation of portions of the retaining walls for the Preferred Alternative (see Appendix O).

Factor 2: The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection. As noted above, the three Build Alternatives and the Preferred Alternative would result in the relocation of portions of the stone retaining walls associated with the Gatehouse at La Villa Firenze to meet the purpose and need of the project.

The retaining walls are contributing features to the Gatehouse which is associated with a larger estate/residential complex, La Villa Firenze. Other contributing features of the Gatehouse include Tudor style architecture such as half-timbering and steeply pitched roofs, and stone pillars along the driveway. These other contributing elements would not be affected by the reconstruction of portions of the original historic stone retaining wall. Although a contributing feature (retaining walls) associated with the Gatehouse at La Villa Firenze would be affected, no harm would occur

to the remaining contributing elements that are protected activities, attributes and features of this Section 4(f) resource.

Factor 3: The relative significance of each Section 4(f) property. The Gatehouse at La Villa Firenze is among three other Section 4(f) properties that would be affected by the project, by Build Alternatives 2, 3, 4, and the Preferred Alternative. A preliminary assessment of relative significance is provided below, based on function, number of contributing elements, and physical disturbance of the Section 4(f) resource. Its relative significance in comparison to the other three Section 4(f) properties is based on its function as a gatehouse within a larger estate/residential complex, La Villa Firenze and subsequent alterations of the original materials of the Gatehouse. Previous minor changes or additions to or removal of historic materials from the Gatehouse and landscape features at the entrance include the replacement of the slate roof with asphalt shingles, removal of window shutters, and installation of a new metal fence and gate, new light fixtures in the stone pillars along the drive, and a new tall lamppost along the drive. The Gatehouse at La Villa Firenze is considered third in relative significance of the four Section 4(f) properties.

Factor 4: The views of the official(s) with jurisdiction over each Section 4(f) property. *The official with jurisdiction over historic features associated with the Gatehouse at La Villa Firenze, as defined in as defined in 23 CFR § 774.17, is the DC SHPO; however, some sections of stone retaining walls determined as historic are located within DDOT right-of-way.* In 2014, the Government of Italy (*the owner of the Gatehouse at La Villa Firenze*) expressed its concern and firm opposition to any action expropriating any portion of the La Villa Firenze property. The Embassy requested that the US Department of State adopt any measures necessary to protect the principle of inviolability of diplomatic missions guaranteed by international law (Government of Italy 2014). In 2018, the Government of Italy stated that Build Alternatives 3 and 4 would significantly impact the Gatehouse, particularly in respect to the pedestrian access to the house and the distance between the house and the new perimeter wall and fence. In addition, the Government of Italy was not in a position to agree to Build Alternatives 3 or 4, nor to any build option that would have a significant impact on the market value of the Gatehouse and the La Villa Firenze property as a whole (Government of Italy 2018). *Subsequently, the Government of Italy does not support any Candidate Build Alternatives that would require property acquisition or permanent easement (i.e., Candidate Build Alternatives 3 and 4), or that would be detrimental to the fair market value of the Gatehouse. Therefore, Candidate Build Alternatives 3 or 4 in addition to other build options considered that would impact the market value of the Gatehouse and the La Villa Firenze property are not feasible. Candidate Build Alternative 2 and the Preferred Alternative do not require property acquisition or permanent easement of the Government of Italy property; therefore, they are been carried forth for consideration as feasible build alternatives.*

As a result of ongoing coordination throughout the NEPA process, DC SHPO acknowledges the adverse effects to the stone retaining walls associated the Gatehouse at La Villa Firenze within the DDOT right-of-way and is a signatory to the Section 106 MOA to resolve the adverse effects. With the execution and implementation of the Section 106 MOA, DC SHPO has no objections.

Factor 5: The degree to which each alternative meets the purpose and need for the project. The two primary factors of the purpose and need of the project, to resolve deficiencies in the existing roadway infrastructure and stormwater management, are met by all four Build Alternatives. Build Alternative 2 partially meets the purpose and need: it does not provide sidewalks in conformance with DDOT's Complete Streets Policy, DDOT's Design and Engineering Manual, and the District's Priority Sidewalk Assurance Act of 2010 that requires the provision of sidewalks along DC streets for any roadway undergoing major reconstruction.

Build Alternatives 3 and 4 and the Preferred Alternative provide additional improvements to address other factors of the purpose and need: improve the safety of motorists, pedestrians, and bicyclists; and provide linkages to serve pedestrian and bicycle travel along the roadway itself as well as to the Rock Creek Park trail systems. Upon completion of Build Alternatives 3, 4, and the Preferred Alternative, the relocation of portions of the stone retaining walls associated with the Gatehouse at La Villa Firenze would correct the structural deficiencies of Broad Branch Road and improve stormwater management.

Factor 6: After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f). Potential impacts to land use/ownership and vegetation have been identified as a result of mitigation measures to relocate and replace portions of the historic stone retaining walls, contributing elements of the Gatehouse at La Villa Firenze. Land use/ownership would change with the acquisition of permanent roadway right-of-way from the Government of Italy. Under Build Alternative 3, 13,281 square feet would become DDOT right-of-way; under Build Alternative 4, 17,272 square feet would become DDOT right-of-way. Based on previous coordination with the Government of Italy (Government of Italy 2014, 2018), land acquisition is contrary to the principle of inviolability and the magnitude of this type of adverse impact is high.

Impacts to trees would be avoided to the maximum extent possible by minimizing cut/fill/pavement within the root zone. All trees would be protected during construction or replaced according to DDOT's Standard Specifications for Highways and Structures - Section 608 Trees, Shrubs, Vines and Ground Cover. When construction is completed, and the rehabilitated Broad Branch Road becomes fully operational, the project area (including both Section 4(f) and non-Section 4(f) resources) would revert back to the environmental conditions that existed prior to construction. Even with minimizing impacts to trees and vegetation, and tree replacement as needed, severe adverse impacts would occur as the result of land acquisition of sovereign soil to resources not protected by Section 4(f).

Factor 7: Substantial differences in costs among the alternatives. The estimated costs of the Build Alternatives (in 2018 dollars) range from \$37.4 million to \$57.5 million. The difference in costs are approximately 35 percent between highest and lowest. Build Alternative 2 would cost approximately \$37.4 million. Build Alternative 3 would cost approximately \$43.7 million. The Preferred Alternative would cost approximately \$56.3 million. Build Alternative 4 would cost approximately \$57.5 million. Build Alternative 2 is the least costly and Build Alternative 4 is the most costly.

4.12.5.4 Rock Creek Park

Avoidance Alternatives Considered. The primary intent of Section 4(f) is to avoid the “use” of Section 4(f) properties as defined by 23 CFR §774. The No Action Alternative is the only alternative that can completely avoid use of Rock Creek Park within the project area.

The existing roadway is located within DDOT right-of-way, with minor exceptions. These exceptions occur in six short sections along the project corridor where the existing roadway was constructed outside DDOT-owned property. These small areas account for a total area of 923 square feet. All but one location is located on the east side of the roadway where the northbound lane encroaches on Rock Creek Park. The single encroachment on the west side of the roadway occurs where a curve in the southbound lane enters land of a Sovereign Nation (the Republic of Peru). The location of the roadway, outside of the DDOT-owned right-of-way, may be due to inconsistencies in survey bounds that existed when the current Broad Branch Road was constructed or may be the result of previous repaving projects. *These inconsistencies will be investigated, shared, and resolved in cooperation with the applicable property owners during the design phase of the project.*

The No Action Alternative would include minor restoration activities (safety and routine maintenance) that would maintain the continuing operation of the existing roadway. The No Action Alternative would avoid any use of Rock Creek Park. However, this alternative would not meet the established purpose and need for the project. Routine maintenance of the existing roadway would not correct the deficiencies in the existing roadway infrastructure and stormwater management system; provide for increased safety of motorists, pedestrians, and bicyclists; and establish linkages to serve pedestrian and bicycle travel along the roadway itself as well as to the Rock Creek Park trail systems (i.e., Rock Creek Park Trail and Soapstone Creek Valley Trail).

Feasibility and Prudence Test. The Section 4(f) use of Rock Creek Park would involve permanent incorporation of parklands for cut-and-fill activities for the road bed, acquisition of additional right-of-way for the road, and sidewalk construction. This Section 4(f) use applies to all three Build Alternatives, and the Preferred Alternative.

The potential avoidance alternative, the No Action Alternative, was evaluated in terms of feasibility and prudence in meeting the purpose and need of the project and still avoiding the Section 4(f) use of Rock Creek Park. The No Action Alternative does not address the project’s purpose and need and would not correct the deficiencies in the roadway, improve stormwater management, and increase public safety. Implementation of the No Action Alternative would compromise the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need and would result in unacceptable safety or operational problems; therefore, the No Action Alternative is not considered a prudent alternative to avoid the Section 4(f) use of Rock Creek Park.

Build Alternatives 2, 3, 4, and the Preferred Alternative remain as the only alternatives that would address the purpose and need, but they would still result in the Section 4(f) use of Rock Creek Park. Permanent incorporation of Rock Creek Park would increase with each Build Alternative (Table 4-12). Construction of Build Alternative 2 would result in the permanent incorporation of

1,192 square feet of Rock Creek Park based on cut-and-fill activities for the new road bed. Under Build Alternative 3, permanent incorporation of 1,758 square feet of Rock Creek Park would occur for cut-and-fill activities for the road bed, acquisition of additional right-of-way for the road, and sidewalk construction. Under the Preferred Alternative, permanent incorporation of 1,691 square feet of Rock Creek Park would occur for cut-and-fill activities for the road bed, acquisition of additional right-of-way for the road, and sidewalk construction. Finally, construction of Build Alternative 4 would result in permanent incorporation of 4,024 square feet of Rock Creek Park based on cut-and-fill activities for the road bed, acquisition of additional right-of-way for the road, and sidewalk construction. This Section 4(f) use applies to all three Build Alternatives and the Preferred Alternative.

All four Build Alternatives represent appropriate engineering designs that would correct the structural deficiencies in the roadway and improve stormwater management; therefore, these alternatives are considered feasible. All four alternatives would improve safety and operational problems on Broad Branch Road; would not result in additional construction, maintenance, or operational costs of extraordinary magnitude; would not cause other unique problems or unusual factors; and would not create cumulative impacts of extraordinary magnitude. After mitigation measures are implemented to alleviate impacts to resources identified in this Final EA, these alternatives would not create additional social, economic, or environmental impacts; would not disrupt established communities; would not result in disproportionate impacts to minorities or low-income populations; and would not create additional impacts to environmental resources protected under Federal statutes. All four Build Alternatives are considered prudent. Therefore, there is no feasible and prudent alternative to the Section 4(f) use of Rock Creek Park.

Least Harm. There is no feasible and prudent alternative that avoids the Section 4(f) use of the Rock Creek Park; therefore, it must then be determined which of the four Build Alternatives (Alternatives 2, 3, 4, and the Preferred Alternative) would cause the least harm based on seven balancing factors identified in 23 CFR §774.3(c)(1).

Factor 1: The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property). Build Alternatives 2, 3, 4, and the Preferred Alternative would all result in permanent incorporation of Rock Creek Park. Seven small slivers of the Rock Creek Park boundary located along Broad Branch Road would be incorporated into the DDOT right-of-way and the loss of these slivers cannot be mitigated. Acquisition of additional right-of-way from the NPS will be processed through a Transfer of Jurisdiction (TOJ) between DDOT and NPS, *as there is no other feasible alternative to implement this project*. Temporary use of Rock Creek Park would be required for the excavation and replacement of stormwater outfall pipes under each Build Alternative.

As a part of this project, erosion and sediment control plans, stormwater management plans, and a “treatment train” of BMP techniques would be developed to minimize direct waterway disturbance and sediment from construction areas. Measures may include berms, dikes, watertight enclosures, silt barriers, netting, mulch, temporary and permanent seeding, avoidance of stream crossings, crossings of waterways at right angles when necessary, sediment basins, and other methods. The construction contractor would be required to comply with the conditions

and pollution control measures specified in DDOT's Standard Specifications for Highways and Structures – 618 Erosion and Sediment Control. Cleared areas would be replanted with a native seed mix and trees in consultation with DDOT's UFD and with NPS for areas bounding Rock Creek Park. Mature trees would be protected to the extent possible during construction or replaced according to DDOT's Standard Specifications for Highways and Structures - Section 608 Trees, Shrubs, Vines, and Ground Cover. Protection techniques generally include installation of tree protection fencing and staging construction equipment to avoid damaging trees and their root systems.

The removal of mature trees would be coordinated through DDOT's UFD and performed in accordance with DDOT's Standard Specifications for Highways and Structures - Section 608 Trees, Shrubs, Vines and Ground Cover; see Section 4.1.4.

A tree survey was conducted of the project area to identify trees greater than four inches in diameter; however, continued coordination with NPS is required for any work that may have an effect on trees and shrubs within the property.

Removal of trees from NPS land would be covered by an NPS Special Use Permit for construction. A tree inventory will be conducted and submitted to NPS to account for trees that will be impacted and removed during project construction, including work conducted outside Rock Creek Park property that may cause damage to species within park property (e.g., root damage). A pre-determined value for tree species type and/or size inclusive of values for tree types will be assessed. The tree inventory will be evaluated in continuous coordination with NPS. All issues related to trees will be assessed in the design phase, prior to moving into construction. Site restoration and revegetation are included in the conditions of the permit. Before a permit is approved, all conditions of the permit will be agreed upon by both agencies. These conditions will relay into the construction documents so that the contractor is aware of the requirements associated with the inadvertent tree or vegetation damage.

Beneficial impacts to Rock Creek Park from Build Alternatives 2, 3, 4, and the Preferred Alternative would be the improved linkages between two NPS park resources (Rock Creek Park and Soapstone Valley Park). Build Alternatives 3, 4, and the Preferred Alternative would also provide for safer access to park resources by the addition of non-motorized facilities. In addition to sidewalks, Build Alternatives 3, 4, and the Preferred Alternative would include crosswalks that would allow for safer access to the existing multi-use trail and park facilities than provided by existing facilities. The project would restore Rock Creek Park to its preconstruction conditions. In addition, the project would commit to providing enhancements and upgraded amenities to Rock Creek Park in coordination with the NPS and Commission of Fine Arts (CFA).

Factor 2: The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection. As noted above, each of the Build Alternatives would result in the permanent incorporation of Rock Creek Park. Permanent incorporation of Rock Creek Park occurs along the west boundary along Broad Branch Road. Small slivers of the park boundary would be incorporated into the DDOT right-of-way; however, the overall percentage of acres to be incorporated in each Build Alternative is tiny: Build Alternative 2 is 1,192 square feet (0.027 acres) or 0.0015 percent of the park; Build

Alternative 3 is 1,758 square feet (0.04 acres) or 0.0022 percent of the park; the Preferred Alternative is 1,691 square feet (0.039 acres) or 0.0022 percent of the park; and Build Alternative 4 is 4,024 square feet (0.09 acres) or 0.005 percent of the park. Although tiny amounts of acreage along the western park perimeter would be affected, minimal harm would occur to the vast majority and central core of Rock Creek Park (1,754 acres) that encompass protected activities, attributes and features of this Section 4(f) resource.

Factor 3: The relative significance of each Section 4(f) property. Rock Creek Park is among three other Section 4(f) properties that would be affected by Build Alternatives 2, 3, and 4. A preliminary assessment of relative significance is provided below, based on function, number of contributing elements, and physical disturbance of the Section 4(f) resource. Rock Creek Park was established in 1890 by an Act of Congress for scenic and recreational enjoyment. It encompasses U.S. Reservation 339 and is 1,754 acres in size. The park is a natural reserve within a heavily urbanized area and includes an extensive network of hiking footpaths and horseback riding trails, scenic roads, access to the horse stables and equestrian field, and the Rock Creek Nature Center and Planetarium. Rock Creek Park one of the premiere recreational facilities in Washington, DC and is considered second in relative significance of the four Section 4(f) properties.

Factor 4: The views of the official(s) with jurisdiction over each Section 4(f) property. The official with jurisdiction over Rock Creek Park is NPS. NPS has expressed minor objections to Build Alternatives 2, 3, and 4 which would permanently use more square footage of Rock Creek Park than the Preferred Alternative. *After review of the Revised Draft EA and Section 4(f) evaluation, the DOI, which includes the NPS, on October 22, 2020, concurred that there are no feasible or prudent avoidance alternatives and that the Preferred Alternative would cause the least overall harm (see Appendix Q).*

Factor 5: The degree to which each alternative meets the purpose and need for the project. The two primary factors of the purpose and need of the project, to resolve deficiencies in the existing roadway infrastructure and stormwater management, are met by all four Build Alternatives. Build Alternative 2 partially meets the purpose and need: it does not provide sidewalks in conformance with DDOT's Complete Streets Policy, DDOT's Design and Engineering Manual, and the District's Priority Sidewalk Assurance Act of 2010 that requires the provision of sidewalks along DC streets for any roadway undergoing major reconstruction.

Build Alternatives 3, 4, and the Preferred Alternative provide additional improvements to address other factors of the purpose and need: improve the safety of motorists, pedestrians, and bicyclists; and provide linkages to serve pedestrian and bicycle travel along the roadway itself as well as to the Rock Creek Park trail systems. Upon completion of construction and regardless of the Build Alternative, the acquisition of additional right-of-way from Rock Creek Park would correct the structural deficiencies of Broad Branch Road and improve stormwater management.

Factor 6: After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f). Potential impacts have been identified within Rock Creek Park including in-stream work in Broad Branch and removal of vegetation. Erosion and sedimentation Control and stormwater management plans would be developed in accordance with DCMR to

minimize off-site impacts. In-stream work would require permits from USACE and DOEE in accordance with Sections 402 and 404 of the Clean Water Act.

Impacts to trees would be avoided to the maximum extent possible by minimizing cut/fill/pavement within the root zone. All trees would be protected during construction or replaced according to DDOT's Standard Specifications for Highways and Structures - Section 608 Trees, Shrubs, Vines and Ground Cover.

When construction is completed and the rehabilitated Broad Branch Road becomes fully operational, the project area (including both Section 4(f) and non-Section 4(f) resources) would revert back to the environmental conditions that existed prior to construction. By obtaining an in-stream permit, establishing erosion and sedimentation control and stormwater plans, minimizing impacts to trees and vegetation, and completing tree replacement as needed, no adverse impacts would occur to resources not protected by Section 4(f).

Factor 7: Substantial differences in costs among the alternatives. The estimated costs of the Build Alternatives (in 2018 dollars) range from \$37.4 million to \$57.5 million. The difference in costs are appreciable, approximately 35 percent between highest and lowest.

Build Alternative 2 would cost approximately \$37.4 million. Build Alternative 3 would cost approximately \$43.7 million. The Preferred Alternative would cost approximately \$56.3 million. Build Alternative 4 would cost approximately \$57.5 million. Build Alternative 2 is the least costly.

4.12.6 LEAST OVERALL HARM ANALYSIS TO SECTION 4(f) PROPERTIES

As previously described, there is no feasible and prudent alternative that avoids the Section 4(f) use of contributing elements of RCPHD (retaining walls and stormwater outfall headwalls), the Soapstone Creek Culvert, the contributing elements associated with the Gatehouse at La Villa Firenze (stone retaining walls), and inclusive of Rock Creek Park as both a contributing historic resource and as a Park recreational facility.

Build Alternatives 2, 3, 4, and the Preferred Alternative are the only Build Alternatives that would address the project's purpose and need; however, with regards to the applicability of Section 4(f) to historic sites, all of the proposed Build Alternatives inclusive of the Preferred Alternative would "adversely affect" historic sites protected as Section 4(f) properties.

A least overall harm balancing factor table and systematic rating system was developed in close coordination with FHWA and in accordance with regulations contained in 23 CFR §774.3(c)(1) (**Table 4-13**) and is based on the discussions of the seven balancing factors for each Section 4(f) resource provided above. The analysis considered the resolution of "adverse effects" contained in the Section 106 MOA (see Appendix O) relative to the applicability of Section 4(f) to historic sites and the "use" of all Section 4(f) properties given there are no "feasible and prudent" avoidance alternatives to "use" of the Section 4(f) properties as defined in 23 CFR §774.17.

The results of that analysis are provided in the discussions that follow.

Table 4-13. Balancing Factors Determining Least Overall Harm Alternative and Systematic Rating System

SECTION 4(f) PROPERTY	ALTERNATIVE 2							LEAST OVERALL HARM RATING	ALTERNATIVE 3							LEAST OVERALL HARM RATING
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	
Rock Creek Park Historic District	1	1	1	1	3	1	1	9	1	1	1	1	1	1	2	8
Soapstone Creek Culvert	1	1	4	1	3	1	1	12	1	1	4	1	1	1	2	11
Rock Creek Park	2	2	2	2	3	1	1	13	2	2	2	2	1	1	2	12
Gatehouse at La Villa Firenze	1	1	3	1	3	1	1	11	2	1	3	1	1	3	2	13
Total Least Overall Harm Rating- Alternative 2								45	Total Least Overall Harm Rating- Alternative 3							44
SECTION 4(f) PROPERTY	ALTERNATIVE 4							LEAST OVERALL HARM RATING	ALTERNATIVE 3 MODIFIED (PREFERRED ALTERNATIVE)							LEAST OVERALL HARM RATING
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	
Rock Creek Park Historic District	1	1	1	1	1	1	3	9	1	1	1	1	1	1	3	9
Soapstone Creek Culvert	1	1	4	1	1	1	3	12	1	1	4	1	1	1	3	12
Rock Creek Park	2	2	2	2	1	1	3	13	2	2	2	1	1	1	3	12
Gatehouse at La Villa Firenze	3	1	3	1	1	3	3	15	1	1	3	1	1	1	3	11
Total Least Overall Harm Rating- Alternative 4								49	Total Least Overall Harm Rating- Alternative 3 Modified (PREFERRED ALTERNATIVE)							44

Rating Approach 1=Best to 4=Worst

Factor 1: The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property).

- 1 = Maximum Ability
- 2 = Some Ability
- 3 = No Ability

Factor 2: The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection.

- 1 = No Harm Post mitigation
- 2 = Minimal Harm Post mitigation
- 3 = Some Harm Post mitigation

Factor 3: The relative significance of each Section 4(f) property (pending validation by the NPS and SHPO).

- 1= Most Significant to 4= Least Significant
- 1 = Rock Creek Park Historic District
- 2 = Rock Creek Park
- 3 = Gatehouse at La Villa Firenze
- 4 = Soapstone Creek Culvert

Factor 4: The views of the official (s) with jurisdiction over each Section 4(f) property.

- 1 = No objections
- 2 = Minor objections
- 3 = Complete objection

Factor 5: The degree to which each alternative meets the purpose and need for the project.

- 1 = Fully meets Purpose and Need
- 2 = Moderately meets Purpose and Need
- 3 = Generally meets Purpose and Need

Factor 6: After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f).

- 1 = No adverse impacts after mitigation
- 2 = Minimal adverse impacts after mitigation
- 3 = Moderate adverse impacts after mitigation

Factor 7: Substantial differences in costs among the alternatives.

- 1 = \$30 million - \$39 million
- 2 = \$40 million - \$49 million
- 3 = \$50 million - \$59 million
- 4 = \$60 million - \$69 million

4.12.6.1 Analysis

Factor 1: The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property). Build Alternatives 2, 3, 4, and the Preferred Alternative would all result in demolition and replacement of contributing elements of RCPHD (retaining walls and stormwater outfall headwalls), the Soapstone Creek Culvert, and portions of the original stone retaining walls associated with the Gatehouse at La Villa Firenze. The extent of relocation of portions of the original stone retaining walls associated with the Gatehouse at La Villa Firenze varies by Build Alternatives, with the least amount of mitigation required for Build Alternative 2 and the Preferred Alternative and the most amount of mitigation associated with Build Alternative 4.

In accordance with Section 106, subsequent to applying the criteria of “adverse effect”, it has been determined the proposed “action” will have an “adverse effect” on the identified historic properties. As a result of that determination, a Section 106 MOA has been developed and executed between FHWA, DDOT, NPS, and the DC SHPO in consultation with consulting parties to resolve and mitigate adverse effects to historic properties in accordance with Section 106 of the NHPA.

As noted above, each of the Build Alternatives would result in the “use” of Rock Creek Park. During the NEPA process, coordination has been conducted with NPS and CFA to determine measures to minimize harm to Rock Creek Park. Beneficial impacts to Rock Creek Park from Build Alternatives 2, 3, 4, and the Preferred Alternative would be the improved linkages between two NPS park resources (Rock Creek Park and Soapstone Creek Valley Park). Build Alternatives 3, 4, and the Preferred Alternative would also provide for safer access to park resources by the addition of non-motorized facilities.

In addition to sidewalks, Build Alternatives 3, 4, and the Preferred Alternative would include crosswalks that would allow for safer access to the existing multi-use trail and park facilities than provided by existing facilities.

As shown in **Table 4-13**, Factor 1 ratings are the same for each Section 4(f) Resource in Build Alternative 2 and the Preferred Alternative, where there is maximum ability to mitigate adverse impacts to the contributing elements of the RCPHD, Soapstone Creek Culvert, and the contributing elements of the Gatehouse at La Villa Firenze, and some ability to mitigate adverse impacts to Rock Creek Park.

Build Alternatives 3 and 4 require extensive and increasing mitigation measures related to the relocation of portions of the stone retaining walls associated with the Gatehouse at La Villa Firenze and therefore, these Build Alternatives have higher ratings.

Factor 2: The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection. Build Alternatives 2, 3, 4, and the Preferred Alternative would have no harm to the protected activities, attributes, or features of two of the four protected Section 4(f) resources. Although some retaining wall segments and stone outfalls associated with two contributing resource categories of the RCPHD would be affected, no harm would occur to the remaining 88 contributing elements that

are protected activities, attributes and features. Similarly, although a contributing feature (retaining walls) associated with the Gatehouse at La Villa Firenze would be affected, no harm would occur to the remaining contributing elements (Tudor style architecture such as half-timbering and steeply pitched roofs, and stone pillars along the driveway) that are protected activities, attributes and features.

All four Build Alternatives require demolition and replacement of the Soapstone Creek Culvert to meet the purpose and need of the project. Upon demolition of the culvert, the attributes and features that qualify it for protection would no longer exist and therefore, there would be nothing left to harm. Build Alternatives 2, 3, 4, and the Preferred Alternative would all result in “use” of Rock Creek Park with implementation of Alternative 2 resulting in the smallest amount of permanent incorporation (1,192 square feet for sidewalk construction) and Build Alternative 4 resulting in the largest amount of permanent incorporation (4,024 square feet based on acquisition of additional right-of-way for the road and sidewalk construction). However, the overall percentage of acres to be incorporated in each Build Alternative is very small ranging from 0.0015 percent (Alternative 2) to 0.005 percent (Build Alternative 4) of the Rock Creek Park acreage. Although small amounts of acreage along the western park perimeter would be affected, minimal harm would occur to the vast majority and central core of Rock Creek Park (1,754 acres) that encompass protected activities, attributes and features of this Section 4(f) resource.

As shown in **Table 4-13**, Factor 2 ratings are the same for each Section 4(f) resource for each of the Build Alternatives.

Factor 3: The relative significance of each Section 4(f) property. A preliminary assessment of relative significance is provided, based on function, number of contributing elements, and physical disturbance of the Section 4(f) resource. However, the officials with jurisdictional authority over the Section 4(f) properties, which includes DDOT and NPS and may be inclusive of the consulting parties (such as the Government of Italy), may further determine the relative significance of each of those properties in comparison to one another. As shown in Table 4-13, Factor 3 ratings are the same for each Section 4(f) resource for each of the Build Alternatives.

Factor 4: The views of the official(s) with jurisdiction over each Section 4(f) property. Agencies or organizations with jurisdiction over the four affected Section 4(f) resources include *DC SHPO and NPS*. Coordination with *DC SHPO* and NPS has been conducted throughout the NEPA process. DDOT has determined that demolition and replacement of contributing elements of RCPHD (retaining walls and stormwater outfall headwalls), and replacement of the Soapstone Creek Culvert represent appropriate engineering designs that would correct the structural deficiencies in the roadway and improve stormwater management on Broad Branch Road. NPS has expressed minor objections to Build Alternatives 2, 3, and 4 which would “use” more square footage of Rock Creek Park than the Preferred Alternative. NPS is a signatory to the Section 106 MOA to resolve the adverse effects to the contributing elements of the RCPHD and the Soapstone Creek Culvert. With the execution and implementation of the Section 106 MOA, NPS has no objections. *After review of the Revised Draft EA and Section 4(f) evaluation, the DOI, which includes the NPS, on October 22, 2020, concurred that there are no feasible or prudent avoidance*

alternatives and that the Preferred Alternative would cause the least overall harm (see Appendix Q).

The official with jurisdiction over historic features associated with the Gatehouse at La Villa Firenze, as defined in 23 CFR § 774.17, is the DC SHPO; however, some sections of stone retaining walls determined as historic are located within DDOT right-of-way. The Government of Italy (the owner of the Gatehouse at La Villa Firenze) has expressed its concern and firm opposition to any action expropriating any portion of the La Villa Firenze property and stated that Build Alternatives 3 and 4 would significantly impact the Gatehouse, particularly in respect to the pedestrian access to the house and the distance between the house and the new perimeter wall and fence. In addition, the Government of Italy was not in a position to agree to Build Alternatives 3 or 4, nor to any build option that would have a significant impact on the market value of the Gatehouse and the La Villa Firenze property as a whole. Subsequently, the Government of Italy does not support any Candidate Build Alternatives that would require property acquisition or permanent easement (i.e., Candidate Build Alternatives 3 and 4), or that would be detrimental to the fair market value of the Gatehouse. Therefore, Candidate Build Alternatives 3 or 4 in addition to other build options considered that would impact the market value of the Gatehouse at the La Villa Firenze property are not feasible. Candidate Alternative 2 and the Preferred Alternative do not require property acquisition or permanent easement of the Government of Italy property; therefore, they are being carried forth for consideration as feasible build alternatives. As a result of ongoing coordination throughout the NEPA process, DC SHPO acknowledges the adverse effects to the stone retaining walls associated with the Gatehouse at La Villa Firenze within the DDOT right-of-way and is a signatory to the Section 106 MOA to resolve the adverse effects. With the execution and implementation of the Section 106 MOA, DC SHPO has no objections.

Factor 5: The degree to which each alternative meets the purpose and need for the project. The two primary factors of the purpose and need of the project, to resolve deficiencies in the existing roadway infrastructure and stormwater management, are met by all four Build Alternatives. Build Alternative 2 partially meets the purpose and need: it does not provide sidewalks in conformance with DDOT's Complete Streets Policy, DDOT's Design and Engineering Manual, and the District's Priority Sidewalk Assurance Act of 2010 that requires the provision of sidewalks along DC streets for any roadway undergoing major reconstruction. Build Alternatives 3, 4, and the Preferred Alternative provide additional improvements to address other factors of the purpose and need: improve the safety of motorists, pedestrians, and bicyclists; and provide linkages to serve pedestrian and bicycle travel along the roadway itself as well as to the Rock Creek Park trail systems. As shown in Table 4-13, Factor 5 ratings are the same for Build Alternatives 3, 4, and the Preferred Alternative. Build Alternative 2 generally meets the purpose and need but does not address pedestrian safety concerns and therefore has a higher rating.

Factor 6: After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f). Potential impacts related to in-stream work and removal of vegetation have been identified as a result of mitigation measures to: reconstruct the historic stone retaining walls and stone outfalls, contributing elements of the RCPHD; reconstruct the Soapstone Creek Culvert; and stormwater requirements within Rock Creek Park for Build Alternatives 2, 3, 4, and

the Preferred Alternative. Reconstruction of the historic stone retaining walls and stone outfalls would require the establishment of work zones within Broad Branch Creek; protective measures would be developed to ensure that construction materials, such as mortar, do not fall into the creek. In-stream work would require permits from USACE and DOEE in accordance with Sections 402 and 404 of the Clean Water Act. Erosion and sedimentation control and stormwater management plans would be developed in accordance with DCMR to minimize off-site impacts. With the implementation of protective measures during construction, obtaining an in-stream permit, establishing erosion and sedimentation control and stormwater plans, minimizing impacts to trees and vegetation, and tree replacement as needed, no adverse impacts would occur to resources not protected by Section 4(f).

Potential impacts to land use/ownership and vegetation have been identified as a result of mitigation measures to relocate and replace portions of the historic stone retaining walls, contributing elements of the Gatehouse at La Villa Firenze. Land use/ownership would change with the acquisition of permanent roadway right-of-way from the Government of Italy under Build Alternatives 3 and 4. Under Build Alternative 3, 13,281 square feet would become DDOT right-of-way; under Build Alternative 4, 17,272 square feet would become DDOT right-of-way. Based on previous coordination with the Government of Italy (Government of Italy 2014, 2018), land acquisition is contrary to the principle of inviolability and the magnitude of this type of adverse impact is high.

Impacts to trees would be avoided to the maximum extent possible by minimizing cut/fill/pavement within the root zone. All trees would be protected during construction or replaced according to DDOT's Standard Specifications for Highways and Structures - Section 608 Trees, Shrubs, Vines and Ground Cover. When construction is completed, and the rehabilitated Broad Branch Road becomes fully operational, the project area (including both Section 4(f) and non-Section 4(f) resources) would revert back to the environmental conditions that existed prior to construction. Even with minimizing impacts to trees and vegetation, and tree replacement as needed, severe adverse impacts would occur as the result of land acquisition of sovereign soil to resources not protected by Section 4(f).

As shown in Table 4-13, Factor 6 ratings are the same for Build Alternative 2 and the Preferred Alternative as there would be no adverse impacts to resources not protected by section 4(f). Build Alternatives 3 and 4 require acquisition of permanent roadway right-of-way from the Government of Italy which is contrary to the principle of inviolability and therefore, these Build Alternatives have higher ratings.

Factor 7: Substantial differences in costs among the alternatives. The estimated costs of the Build Alternatives (in 2018 dollars) range from \$37.4 million to \$57.5 million. The difference in costs are appreciable (approximately 35 percent between highest and lowest) and they would be considered substantial for purposes of Section 4(f). Build Alternative 2 would cost approximately \$37.4 million. Build Alternative 3 would cost approximately \$43.7 million. The Preferred Alternative would cost approximately \$56.3 million. Build Alternative 4 would cost approximately \$57.5 million. Build Alternative 2 is the least costly. As shown in Table 4-13, Factor 7 ratings are range of construction costs which vary by Build Alternatives.

4.12.6.2 Preliminary Assessment

There is no feasible and prudent avoidance alternative, as defined in 23 CFR §774.17, to the “use” of land from Rock Creek Park and/or the RCPHD and the following contributing elements to that historic site/district having applicability to the requirements of Section 4(f) as previously discussed: retaining walls and stormwater outfall headwalls; the Soapstone Creek Culvert; the stone retaining walls associated with the Gatehouse at La Villa Firenze; and Rock Creek Park.

Based on the least overall harm balancing factor table and systematic rating system (**Table 4-13**), *the Preferred Alternative and Alternative 3 have the best ratings for least overall harm. The primary discriminator between the Preferred Alternative and Alternative 3 is the serious concerns expressed by the Government of Italy (the owner of the Gatehouse at La Villa Firenze) of potential land acquisition of sovereign property for DDOT right-of-way required for Alternative 3 (Factor 6).* Sovereign soil is protected by the principle of inviolability of diplomatic missions as guaranteed by international law.

4.12.7 OVERALL PLANNING AND MEASURES TO MINIMIZE HARM

All proposed Build Alternatives have a “use” as defined of property protected by Section 4(f) or applicable to Section 4(f) for historic sites. Contributing elements of the RCPHD include: retaining walls and stormwater outfall headwalls; Soapstone Creek Culvert; the stone retaining walls associated with the Gatehouse at La Villa Firenze; and Rock Creek Park as both a contributing historic site and as a Park facility; however, all possible planning to minimize harm to Section 4(f) properties have been investigated. Minimization measures have been/will be incorporated into the design of the road and stormwater outfall features while other mitigation measures, as appropriate, have been stipulated in the Section 106 MOA (see Appendix O).

Measures to minimize harm incorporated into the project design include:

- Replacement of Soapstone Creek Culvert: Use of context sensitive design and materials; reuse of existing materials as appropriate.
- Construction of new retaining and coping walls: Use of context sensitive design and appropriate materials.
- Reconstruction of existing historic retaining walls: Use of context sensitive design and materials; reuse of existing materials as appropriate.
- Replacement of outfalls: Reconstruction of stone surrounds in portions of the stone retaining walls and stone headwalls; reuse of existing materials as appropriate.
- Post-construction activities: re-setting original stone and metal boundary markers considered contributing elements to the RCPHD.
- Post-construction activities: Restoration of native tree species and vegetation in Rock Creek Park.

4.12.8 AGENCY COORDINATION

Agency coordination began in 2010, shortly after DDOT initiated the Broad Branch Road Rehabilitation project. Additional agency coordination was undertaken with subsequent planning studies, through which options for Broad Branch Road improvements were developed

and evaluated, leading to the development of the alternatives analyzed in this Section 4(f) Evaluation. Agency coordination efforts have continued as part of preparation of the document being prepared pursuant to requirements of the NEPA, which for the Broad Branch Road Rehabilitation project is an EA. A summary of agency coordination efforts for the project relevant to Section 4(f) issues and including Section 106 consultation is presented in Chapter 5.

NPS and DC SHPO are OWJ over Section 4(f) properties. FHWA submitted the Section 4(f) Evaluation to the Department of the Interior, which includes the NPS, for review and comment. NPS was provided with administrative drafts of each document and their comments were incorporated accordingly. On October 22, 2020, the DOI concurred that there are no feasible or prudent avoidance alternatives and that the Preferred Alternative would cause the least overall harm (see Appendix Q). As a result of ongoing coordination throughout the NEPA process including the execution and implementation of the Section 106 MOA, DC SHPO has no objections.

In addition to the coordination points and meetings outlined in Chapter 5, Public Involvement and Agency Coordination, FHWA and DDOT have coordinated with OWJs through the following:

- NPS: FHWA and DDOT held regular monthly coordination meetings with NPS throughout the development of the EA. The purpose of the meetings was to share information and discuss project issues and coordination needs.
- *DC SHPO: FHWA and DDOT held regular monthly coordination meetings with DC SHPO throughout the development of the EA. The purpose of the meetings was to share information and discuss project issues and coordination needs.*

4.12.9 SECTION 4(f) CONCLUSION

FHWA and the DC SHPO, in close consultation with DDOT have determined that the proposed rehabilitation of Broad Branch Road will have adverse effects on the original stone retaining walls within the DDOT right-of-way that are associated with the NRHP-eligible Gatehouse at La Villa Firenze; on several contributing elements of the NRHP listed Rock Creek Park Historic District that fall under the purview of both DDOT and NPS, including fourteen of fifteen segments of a historic stone retaining walls, ten historic stone headwalls for stormwater outfalls, three stone boundary markers; and the Soapstone Creek Culvert, which has also been determined individually eligible for listing in the NRHP. All four Build Alternatives require the demolition and replacement of the Soapstone Creek Culvert in order to address the stormwater management deficiencies identified in the project's purpose and need. Any alternative that does not include the demolition and replacement of Soapstone Creek Culvert would compromise the project to the degree that it is unreasonable to proceed. The project's purpose and need cannot be met while avoiding Section 4(f) properties. Therefore, there is no prudent and feasible avoidance alternative.

The proposed action includes all possible planning to minimize harm to the Section 4(f) resources through the use of context sensitive design and materials; reuse of existing materials as appropriate; and restoration of native tree species and vegetation in Rock Creek Park. There has been coordination with local agencies, NPS, DC SHPO, ACHP, and the consulting parties (the

Government of Italy) in the Section 106 process to minimize impacts to contributing elements of the RCPHD (retaining walls and stormwater outfall headwalls) and the Soapstone Creek Culvert, and the stone retaining walls associated with the Gatehouse at La Villa Firenze to develop mitigation measures to resolve the adverse effect on these historic properties.

Based on the preliminary analysis using the seven balancing factors table, the Preferred Alternative and Alternative 3 have the best ratings for least overall harm. The primary discriminator between the Preferred Alternative and Alternative 3 is the serious concerns expressed by the Government of Italy (the owner of the Gatehouse at La Villa Firenze) of potential land acquisition of sovereign soil for DDOT right-of-way in Alternative 3. Sovereign soil is protected by the principle of inviolability of diplomatic missions as guaranteed by international law.

After review of the Revised Draft EA and Section 4(f) evaluation, the DOI, which includes the NPS, on October 22, 2020, concurred that there are no feasible or prudent avoidance alternatives and that the Preferred Alternative would cause the least overall harm (see Appendix Q).

4.13 SECTION 6(f)

The Land and Water Conservation Fund (LWCF) Program was established in 1965 by the federal government to expand public, outdoor recreation space. Section 6(f) provides matching funds in the form of grants to states or municipalities for acquisition, planning, or improvements to public outdoor recreation space. Any property in which LWCF money was used is considered a 6(f) resource. In the District of Columbia, the District DPR is the recipient of such funds. A list from NPS of LWCF grants in the DC area does not indicate that any funds were used for projects in the Broad Branch Road project area.

4.14 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The implementation of the improvements to Broad Branch Road involves a commitment of natural, physical, human, and fiscal resources. Land used in the construction of the improvements is considered an irreversible commitment during the time that the land is used for transportation facilities. Land within this project area is already used for the roadway and is not anticipated to change from either the maintenance or improvement of this road. If a greater need arises for use of the land or if Broad Branch Road is no longer needed, the land can be converted to another use. At present, there is no reason to believe that such a conversion would ever be necessary or desirable.

Considerable amounts of fossil fuels, labor, and highway construction materials, such as cement, aggregate, asphalt, and steel would be expended for the improvements. Additionally, large amounts of labor and natural resources would be used in the fabrication and preparation of construction materials. These materials are generally not retrievable; however, they are not in short supply and their use would not have an adverse impact on the continued availability of these resources. Any construction would also require a substantial one-time expenditure of local, state, and federal funds that are not retrievable.

The commitment of these resources is based on the concept that residents in the immediate area and the region would benefit from the improved quality of the transportation system. These benefits would consist of improved infrastructure, including roadway pavement and geometrics,

stormwater management, and upgraded structures, and separate facilities for pedestrians and bicycles to improve system linkage for pedestrians and bicyclists to parks, schools, residential areas adjacent to Broad Branch Road, and the NPS multi-use trail system.

4.15 SUMMARY OF MITIGATION AND COMMITMENTS

Impacts to all resources have been avoided to the extent possible as part of the project development process and preliminary designs of the Build Alternatives *and Preferred Alternative*. *While the project would result in some minor impacts to the natural, cultural, socioeconomic, and transportation environments, subsequent to the implementation to the required mitigation as appropriate, none of these impacts rise to a level of significance as defined by CEQ.* An ordered approach to mitigating unavoidable impacts has been followed that includes the following sequencing:

Minimization -> Repair or Restore -> Reduce over time -> Compensate

Proposed mitigations for these unavoidable impacts and the environmental commitments to assure their implementation are summarized in the following table (Table 4-14).

Table 4-14. Summary of Mitigation and Commitments

PROPOSED MITIGATION MEASURES AND COMMITMENTS
COORDINATION & FINAL DESIGN
<i>DDOT will continue to coordinate with federal and District agencies, local organizations, the general public, and other stakeholders in accordance with, and to ensure compliance of, all applicable federal and District laws and regulations during future phases of design and construction.</i>
<i>DDOT will ensure that all applicable federal and District permits are obtained, including, but not limited to: Section 402 and 404 of the Clear Water Act (33 U.S.C. 1344); Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Wetland (Nationwide Permit 27 - Aquatic Habitat Restoration, Establishment and Enhancement Activities); a National Pollutant Discharge Elimination System (NPDES) permit; a building permit for any work within an identified floodplain area in accordance with DCMR Title 20 – Chapter 31 Flood Hazard Rules; a Special Tree Removal Permit in accordance with the District’s Tree Canopy Protection Amendment Act of 2016; a Transfer of Jurisdiction for the construction of permanent infrastructure on NPS Land and a Special Use Permit for temporary activity related to the rehabilitation of existing structures that support DDOT infrastructure within NPS property; or other construction-related permits.</i>
GEOLOGY, SOILS, AND TOPOGRAPHY
DDOT will obtain a construction permit from the District Department of Energy and Environment (DOEE) prior to any land disturbing activities.
DDOT will prepare initial erosion and sediment control plans and a stormwater management plans in support of design plans and permit applications.
The construction contractor will perform all construction activities in accordance with the plans and will be self-monitored for compliance.
WATER RESOURCES
DDOT will refine the analysis and quantity of stream impacts during the final design phase and will develop specific mitigations in coordination with the US Army Corps of Engineers (USACE) and DOEE during the permitting process. DDOT anticipates that stream credits will be purchased from an approved mitigation bank.
The construction contractor will develop erosion and sediment control plans (in accordance with USACE and DOEE permit requirements) for all areas of land disturbance during construction to minimize erosion and sediment transport to nearby receiving waters.

► Continued.

Table 4-14. Summary of Mitigation and Commitments

PROPOSED MITIGATION MEASURES AND COMMITMENTS
The construction contractor will be required to comply with the conditions and pollution control measures specified in DDOT's Standard Specifications for Highways and Structures – 618 Erosion and Sediment Control.
DDOT's final design will incorporate stormwater management designs to offset increases in runoff due to increased impervious areas. Designs will incorporate rain gardens and other Low Impact Development (LID) measures to further reduce storm event runoff.
DDOT's final design will include expanded capacity of the Soapstone Culvert and repair/extension to the existing culverts entering Broad Branch, which will mitigate the flooding issues that are currently prevalent in the project area.
<i>Disturbed portions of the stream bed and shores will be restored to original conditions following construction of stormwater outfalls and the restoration of adjacent retaining walls.</i>
<i>The proposed stormwater management system, such as new culvert outfalls, will include a series of best management practices (BMPs) to reduce the flow of stormwaters and minimize scour and plunge pool creation to lessen effects to downstream/receiving waters.</i>
WILDLIFE INCLUDING THREATENED AND ENDANGERED SPECIES
<i>DDOT will implement protective actions for the Northern long-eared bat (Myotis septentrionalis). DDOT will follow the Time-of-Year (TOY) restriction as specified by the USFWS for tree cutting during construction. Detailed tree inventory would be prepared during final design. If any additional nests, hibernacula trees, or buffers around maternity roosts are identified, necessary consultation with the USFWS and DOEE would be completed pursuant to the requirements of the Migratory Bird Act, Endangered Species Act, and the Fish and Wildlife Coordination Act.</i>
The construction contractor will develop erosion and sediment control plans, stormwater management plans, and BMPs in accordance with DDOT's Standard Specifications for Highways and Structures to protect habitat integrity.
VEGETATION
<i>The construction contractor will avoid disturbance to trees, to the maximum extent possible, by minimizing cut/fill/pavement within the root zone. Trees will be protected during construction to the extent practicable or replaced according to DDOT's Standard Specifications for Highways and Structures - Section 608 Trees, Shrubs, Vines and Ground Cover and in coordination with DDOT's Urban Forestry Division. The identification of mature Special Trees would be in accordance with the District's Tree Canopy Protection Amendment Act of 2016. Removal of certain trees from DDOT property would require a DDOT Special Tree Removal Permit, while removal of trees from NPS land would be covered by an NPS Special Use Permit for construction.</i>
The construction contractor will prevent the introduction of new invasive species and prevent the spread of existing populations by washing all machinery before it enters the construction area and by reseeding all disturbed areas with an approved seed mix.
CULTURAL AND PALEONTOLOGICAL RESOURCES
A Memorandum of Agreement (MOA) has been prepared and executed by FHWA and DDOT in consultation with NPS, DC SHPO, and other consulting parties to resolve and mitigate the adverse effects to historic properties in accordance with Section 106 of the NHPA. Mitigation for potential construction impacts to historic and archaeological sites are addressed in the stipulations contained in the executed Section 106 MOA (Appendix O). These stipulations include:
<ul style="list-style-type: none"> - Documentation of contributing elements of the Rock Creek Park Historic District (RCPHD) and the stone walls at the Gatehouse at La Villa Firenze. - Replacement and/or repair of RCPHD stone retaining walls and stone headwalls, Soapstone Creek Culvert, and the retaining walls at the Gatehouse at La Villa Firenze using architecturally compatible styles with reuse of existing stone or similar materials. - Careful removal and subsequent re-setting of RCPHD stone boundary markers. - Ongoing project review to ensure architectural compatibility of replacement or repair of stone features. - Construction contract requirements for a masonry contractor with demonstrated historic preservation expertise. - Inadvertent discovery procedures for unanticipated archaeological resources.

► Continued.

Table 4-14. Summary of Mitigation and Commitments

PROPOSED MITIGATION MEASURES AND COMMITMENTS
<p>Mitigation measures to minimize vibration which may create structural instability of two segments of the historic retaining wall will include:</p> <ul style="list-style-type: none"> - Specify realistic vibration limits in contract documents. - Require the contractor to submit a list of operations that may generate vibration and work with the contractor to reduce the magnitude and/or duration. - Route construction equipment to avoid impacts to sensitive receptors. - Minimize duration of vibration impacts. <p>To minimize audio intrusions during construction activities, DDOT will implement the following mitigation measures as regulated by Title 20 of the District of Columbia Code of Municipal Regulations (DCMR).</p> <ul style="list-style-type: none"> - Use of shields, impervious fences or other physical sound barriers to reduce noise. - Use of sound retardant housings or enclosures around noise producing equipment. - Use of effective intake and exhaust mufflers on internal combustion engines and compressors. - Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum. - Advise the engineer in writing of proposed haul routes prior to securing haul permit.
RIGHT-OF-WAY
<p>The acquisition of private right-of-way would be conducted in accordance with the <i>Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970</i>, as amended. Acquisition of NPS land will be implemented through a Transfer of Jurisdiction between NPS and DDOT.</p> <p><i>All property access (i.e., driveways and alleys) or property structures (i.e., fences, light posts, or other permanent features) that are impacted by the project will be restored and/or replaced in kind. Efforts to further minimize potential right-of-way impacts to all properties will occur during future phases of final design.</i></p>
AESTHETICS AND VISUAL QUALITY
<p>Context sensitive designs and architecturally compatible materials, as defined in the executed Section 106 MOA (see Appendix O), for construction will be used for the following project elements in order to maintain the aesthetic quality associated with the rural feel of the views from the residences:</p> <ul style="list-style-type: none"> - New retaining walls and sidewalks. - New concrete arch culvert over Soapstone Creek and associated outfall headwalls.
COMMUNITY RESOURCES
<p>DDOT will continue consultation with the Carnegie Institution to establish appropriate protocols to minimize potential vibration impacts and define scheduling during construction.</p>
EMERGENCY SERVICES
<p>DDOT will continue coordination with emergency service providers and include maintenance of traffic (MOT) plans in all construction documents to minimize disruptions to emergency service vehicles.</p>
PARKS AND RECREATION AREAS
<p>DDOT will coordinate all construction activities involving park properties with NPS and District Department of Parks and Recreation (DPR), including public notices to park users in advance of construction activities.</p> <p>DDOT will coordination with the District DPR regarding maintenance of rain gardens within the new Brandywine Road intersection</p>
UTILITIES AND INFRASTRUCTURE
<p>DDOT will maintain continuous coordination, including regularly scheduled monthly meetings, with utility companies during design and construction to ensure utility conflicts are avoided to the extent possible.</p> <p>The contractor will be required to contact Miss Utility to identify/mark all utilities prior to earth disturbance activities.</p>

► *Continued.*

Table 4-14. Summary of Mitigation and Commitments

PROPOSED MITIGATION MEASURES AND COMMITMENTS
Advance notifications will be issued to service customers for all planned outages in accordance with utility provider's approved procedures.
TRANSPORTATION
DDOT will prepare a maintenance of traffic (MOT) plan that identify routes to be used by the contractor to minimize traffic impacts and disruption to residential areas and park properties.
DDOT will maintain one lane of vehicular traffic on Broad Branch Road at all times during construction. Protected work zone passages will be established for bicyclists and pedestrians.
DDOT will schedule the roadway rehabilitation in phases and identify potential detour plans for phase.
DDOT will issue public notifications in advance of construction activities that affect vehicular and pedestrian travel.
AIR QUALITY
<p>The contractor will adhere to District regulations regarding dust control and other air quality emission reduction controls, including DCMR Title 20 and other measures specified in DDOT's Standard Specifications for Highways and Structures – 107.17 Environmental Protection, would be followed. Construction generated dust would be further reduced through the following measures:</p> <ul style="list-style-type: none"> - Mist water over demolition or excavation operations. - Cover trucks when moving materials. - Minimize unnecessary vehicular and machinery activities. - Provide vegetative cover for all exposed soils during and upon completion of construction.
NOISE AND VIBRATION
<p>The contractor will implement the following noise control measures, to the greatest extent feasible, to minimize the noise levels in all areas surrounding construction activities:</p> <ul style="list-style-type: none"> - Use of shields, impervious fences or other physical sound barriers to reduce noise. - Use of sound retardant housings or enclosures around noise producing equipment. - Use of effective intake and exhaust mufflers on internal combustion engines and compressors. - Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum. - Advise the engineer in writing of proposed haul routes prior to securing haul permit. - Subject to the approval of the engineer, place stationary equipment to minimize noise impact on surrounding community.
<p>The contractor will implement the following vibration control measures, to the greatest extent feasible, to minimize vibration levels in all areas surrounding construction activities:</p> <ul style="list-style-type: none"> - Route construction equipment to avoid impacts to sensitive receptors. - Minimize duration of vibration impacts.
DDOT will coordinate construction schedules with the Carnegie Institute so as to minimize disruption to vibration-sensitive operations at the facility.
HAZARDOUS WASTE AND MATERIALS
The contractor will prepare and implement a plan for management and disposal of controlled hazardous materials and contaminated soil and groundwater that may be encountered during construction activities, as defined in the DDOT <i>Design and Engineering Manual, Chapter 4.11 (Hazardous Waste and Materials/Contaminated Soils)</i> .
The contractor will prepare and implement a Health and Safety Plan to address preventative measures, spill controls, and remedial activities for hazardous material incidents.
<i>The contractor will prepare and implement a spill and pollution protection plan for hazardous waste and materials to document materials that may be on-site during project construction and measures to avoid and minimize release of potential pollutants into the environment.</i>