

National Park Service  
U.S. Department of the Interior

George Washington Memorial Parkway  
Arlington and Fairfax Counties, Virginia



# **GWMP North Section Rehabilitation Environmental Assessment/Assessment of Effect**

**March 2008**





**ENVIRONMENTAL ASSESSMENT**

**GWMP NORTH SECTION REHABILITATION**

**MARCH 2008**

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**GEORGE WASHINGTON MEMORIAL PARKWAY**  
Arlington and Fairfax Counties, Virginia

United States Department of the Interior • National Park Service

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**U.S. DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE**

**ENVIRONMENTAL ASSESSMENT/ASSESSMENT OF EFFECT  
GWMP NORTH SECTION REHABILITATION**

**GEORGE WASHINGTON MEMORIAL PARKWAY  
ARLINGTON AND FAIRFAX COUNTIES, VIRGINIA**

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**Summary**

The National Park Service (NPS), in cooperation with the Federal Highway Administration - Eastern Federal Lands Highway Division (EFLHD), proposes to rehabilitate the northern section of the George Washington Memorial Parkway (GWMP). The improvements would upgrade the roadway conditions on the northbound and southbound lanes and improve drainage and safety between Spout Run and the Capital Beltway (Interstate 495). This Environmental Assessment/Assessment of Effect analyzes the potential impacts of two alternatives (a No-Action Alternative and one Action Alternative with two roadside barrier options and five Route 123/GWMP interchange options) on the human environment in accordance with the National Environmental Policy Act of 1969. The NPS is also using this Environmental Assessment for Section 106 compliance with the National Historic Preservation Act of 1966, as amended, in conjunction with revising the 1993 Section 106 Programmatic Agreement (PA) covering Parkway rehabilitation.

Under Alternative A (the No-Action Alternative), the NPS would continue management actions that would include minimum rehabilitation of the northern section of the GWMP to maintain the existing integrity and character of the Parkway. Alternative B (the Preferred Alternative) would provide for a comprehensive rehabilitation program of the northern section of the Parkway. The scope of this alternative includes milling and overlaying the asphalt pavement; constructing new concrete curb, replacing and adding drainage inlets; rehabilitating the roadway shoulders, constructing crashworthy roadside barriers; replacing W-beam guardrail with steel-backed timber guardrail, and extending acceleration and deceleration lanes at the Park Police/Park Headquarters and the Central Intelligence Agency (CIA) interchange. Two options are considered for the roadside barriers. The preferred roadside barrier option (Option 2) includes replacing and lengthening existing rustic low (9"-18" tall) stone masonry walls with roadside barriers with flared ends consisting of higher (27" tall) concrete core stone clad walls and/or steel-backed timber guardrail in areas with critical views of the Potomac River Gorge. Furthermore, the southbound side of the Route 123/GWMP interchange would be reconfigured to include construction of new on-ramps and off-ramps. Five options are considered for the reconfiguration of the Route 123/GWMP interchange; the preferred option (Option 4) includes reconstructing the ramps on the southbound side of the GWMP resulting in a new intersection on Route 123.

Alternative A (the No-Action Alternative) and Alternative B would either have no or negligible impacts on wetlands; scenic rivers; floodplains; groundwater; topography; coastal zone; air quality; soundscape; lightscape; Indian Trust resources; ethnographic resources; agricultural lands, prime and unique farmlands; socio-economic environment; economics; land use; environmental justice; community facilities and services; infrastructure; park operations;

hazardous materials; and rare, threatened and endangered species. Negligible to minor impacts would occur to archeological resources. Under the No-Action Alternative, minor long-term adverse impacts would occur on geological resources, soils, and transportation and moderate long-term adverse impacts on safety would occur.

Under Alternative B (the Preferred Alternative), there would be beneficial impacts on geological resources, soils, water quality, safety, transportation, and visitor use and experience. Alternative B would have minor long-term adverse impacts on vegetation and wildlife. Alternative B would have moderate long-term adverse impact on historic structures, cultural landscapes, and aesthetics and visual resources. During construction, minor short-term adverse impacts would occur on historic structures, cultural landscapes, aesthetics and visual resources, soils, wildlife, surface waters, water quality, visitor use and experience and moderate short-term adverse impacts would occur on transportation.

### **Note to Reviewers and Respondents**

We value and welcome your input on this project. The public comment period closes on \_\_\_\_\_. The preferred system for receiving public comments electronically is through the NPS Planning, Environment, and Public Comment (PEPC) website, where the EA is publicly posted on the Internet. The PEPC database is a tool used by the NPS to manage official correspondence and analyze public comment in the planning process. The website address is <http://parkplanning.nps.gov/gwmp>. You may complete a comment form online. From the list of projects, click on the GWMP North Section Rehabilitation. In the left menu, click Document List, then March 2008 Environmental Assessment, and Comment on Document.

You can also mail comments to:

Mr. David Vela, Superintendent  
ATTN: GWMP North Section Rehabilitation EA  
George Washington Memorial Parkway  
Turkey Run Park  
McLean, Virginia 22101

Our practice is to make comments, including names and home addresses of respondents available for public review. Individual respondents may request that we withhold their home address from the record, which we would honor to the extent allowable by law. There may also be circumstances in which we would withhold from the record a respondent's identity, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. If you include personal information (including email), we may use it to provide further project updates during the planning process. Thank you for your interest in the George Washington Memorial Parkway, and your input in this project.



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## PURPOSE OF AND NEED FOR ACTION

The National Park Service (NPS), in cooperation with the Federal Highway Administration – Eastern Federal Lands Highway Division (EFLHD), proposes to rehabilitate the north section of the George Washington Memorial Parkway (GWMP) from Spout Run to the Capital Beltway (Interstate 495). Figure 1 shows the general vicinity of the study area. The upgrades involve numerous safety improvements such as replacing and lengthening existing rustic low (9”-18” tall) stone masonry walls with roadside barriers with flared ends consisting of higher (27” tall) concrete core stone clad walls and/or steel-backed timber guardrail, constructing acceleration and deceleration lanes, constructing new concrete curb, and replacing and adding drainage inlets. The roadway and ramps would be milled and overlaid, and the southbound GWMP/Route 123 interchange would be reconfigured.

This Environmental Assessment/Assessment of Effect analyzes the potential environmental impacts that would result from the implementation of these actions. This Environmental Assessment has been prepared in accordance with the National Environmental Policy Act of 1969, the regulations of the Council on Environmental Quality for implementing the Act (40 Code of Federal Regulations 1500-1508), the NPS Director’s Order #12 (*Conservation Planning, Environmental Impact Analysis, and Decision-making*) (NPS, 2001). The NPS is also planning to use this Environmental Assessment/Assessment of Effect for compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, in conjunction with revising the 1993 Section 106 Programmatic Agreement (PA) covering Parkway rehabilitation.

### PURPOSE OF THE ACTION

The purpose of the project is to rehabilitate the northern section of the GWMP from Spout Run to the Capital Beltway, including reconfiguring the southbound GWMP/Route 123 interchange to improve safety, traffic operations, and drainage; minimize outfall erosion; and extend the useable life of the roadway.

### NEED FOR THE ACTION

Rehabilitation of the northern section is needed because of the inadequacy of the existing roadway conditions to accommodate high volumes of traffic, resulting safety issues, and drainage problems. Specifically, the pavement from Spout Run to the Capital Beltway requires milling and overlaying to address issues associated with potholes, cracks, settlement, and subsequent effects to existing pavement from the replacement/addition of new curb and inlets. Much of the curb along the Parkway has deteriorated and requires replacement. Existing soil shoulders do not support the frequent pull-off use and require stabilization. The entrance to the Park Police/GWMP Headquarters does not have an appropriate deceleration lane length and there is not an acceleration lane. Two ramps at the CIA interchange on northbound and southbound GWMP have insufficient lengths to allow for smooth and safe exiting/entering maneuvers. These conditions make entering and exiting these areas difficult during peak travel periods.

Another need for the project is to upgrade the existing drop inlets that are located within the existing roadway. The existing drainage provisions system cannot drain the road surface effectively to prevent water from spreading into the travel lane. Ponding on the road surface causes hazardous driving conditions during storm events. Furthermore, landsliding is occurring on the hillsides of the Potomac River and is most likely exacerbated by inadequate drainage. At the

Route 123/GWMP interchange, the existing configuration presents a safety concern. The clover-leaf exit ramp from the Parkway to Route 123 has a very tight geometry, and the deceleration lane length is inadequate.

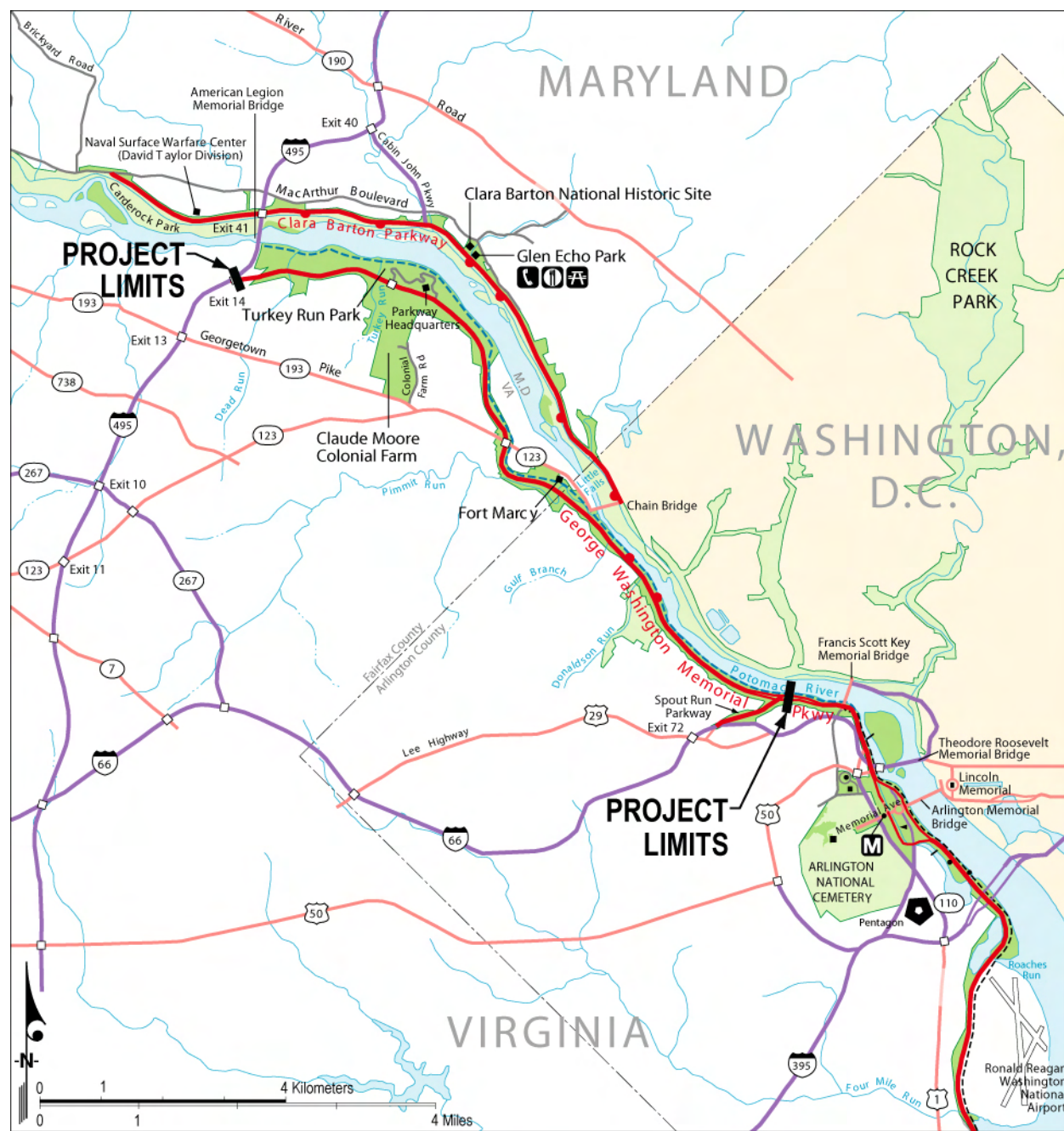


Figure 1. Site vicinity map

NPS/DSC/SEPTEMBER/850/20054

## PURPOSE AND SIGNIFICANCE OF THE PARKWAY

The GWMP was developed as a scenic parkway to help preserve the Potomac River Gorge and shoreline while serving as a memorial to the first president of the United States, George Washington. The GWMP was designated a National Park Unit in 1933. The first section, called the Mount Vernon Memorial Highway, was completed in 1932 to commemorate the bicentennial of George Washington's birth. As the Mount Vernon Memorial Highway was being completed, on May 29, 1930, President Herbert Hoover signed what became known as the Capper-Cramton Act, authorizing funds for the GWMP "to include the shores of the Potomac, and adjacent lands, from Mount Vernon to a point above the Great Falls on the Virginia side including the protection and preservation of the natural scenery of the Gorge and the Great Falls of the Potomac, the preservation of the historic Patowmack Canal, and the acquisition of that portion of the Chesapeake and Ohio Canal below Point of Rocks (Public Law 71-284, as found in Mackintosh, 1996)." This Act subsumed Mount Vernon Memorial Highway as a part of the GWMP and proposed the protection of the northern and southern shores of the Potomac.

Today, the GWMP extends from the Capital Beltway on the northern end to Mount Vernon in Fairfax County, Virginia, on the southern end. The Parkway is a key transportation artery in Northern Virginia providing access to Washington, DC, Arlington County, Fairfax County, and the City of Alexandria. As a result, many local residents consider the Parkway a commuter route; however, the Parkway offers travelers much more than convenience. The Parkway is a scenic, historic, and recreational setting away from the nearby urban pressures of metropolitan Washington, DC. Set parallel to the scenic Potomac River Gorge and across from Washington, DC, the Parkway has remarkable vistas of the Potomac River Gorge, Washington Monument, and the Lincoln Memorial. The Parkway links a group of parks that provide a variety of experiences to more than 9 million people a year supporting recreational, educational, and celebratory events, such as the Independence Day (the Fourth of July) celebration.

From its inception, the Parkway was seen as not only a utilitarian transportation route, but also as a recreational and environmental conservation area. The Parkway was designed as both a transportation route and a means to preserve and enhance the natural scenic qualities and cultural attributes along the Potomac River (Mackintosh, 1996). The Parkway idea came about as a number of influences that combined in the early-20th century, including the rising use of the automobile, the suburbanization of the Washington metropolitan area, the City Beautiful movement, and the popularity of outdoor recreation and ideals of conservation (Leach, 1990).

Following the passage of the Capper-Cramton Act, progress on the Parkway proceeded slowly for the first two decades, partly due to the Great Depression and then World War II. During this time, Frederick Law Olmsted, Jr. worked with other landscape architects including those from National Capital Parks and Planning Commission and the U.S. Commission of Fine Arts on the design of the Parkway as land acquisition continued. It was not until the mid-1950s that notable progress began on the Parkway resulting in part because of the plans to move the Central Intelligence Agency (CIA) to Fairfax County. By 1959, the road was completed north to the CIA interchange (Mackintosh, 1996). By the end of 1962, the Parkway opened to traffic from the recently completed section of the new Capital Beltway. Although originally envisioned as extending to the Great Falls, the Parkway never reached beyond the Capital Beltway.

The original section of the GWMP, the Mount Vernon Memorial Highway, was listed in the National Register in 1981 under criterion B for its commemoration of George Washington and un-



der criterion C for landscape architecture (NPS, 1981). The north section of the GWMP was listed in the National Register in 1995 under the same criteria.

## PROJECT BACKGROUND AND PLANNING

The greater part of the south section of the GWMP, including the Mount Vernon Memorial Highway and a section of the GWMP between Theodore Roosevelt Bridge and Spout Run, has been upgraded in a series of projects over the last 20 years. Past rehabilitation included pavement rehabilitation or reconstruction, reconstruction of concrete curb and gutter, and various other drainage and safety enhancements. The rehabilitation of the north section of the GWMP would upgrade this section to standards similar to the previously rehabilitated south section of the Parkway.

### Engineering, Traffic, and Safety Studies

A number of engineering, traffic, and safety studies have been completed for the George Washington Memorial Parkway. The early studies include the following:

- *Inventory of Existing Conditions for the Traffic Engineering Safety Improvements for the George Washington Memorial Parkway in Virginia, Washington, DC and Maryland* prepared by Bellomo-McGee, Inc., September 1984
- *George Washington Memorial Parkway Traffic Engineering and Safety Improvement Study*, prepared by Bellomo-McGee, Inc., September 1985
- *George Washington Memorial Parkway Columbia Island Trail and Roadway Study*, prepared by Bellomo-McGee, Inc., September 1986
- *Engineering Study for the George Washington Memorial Parkway*, prepared by the Federal Highway Administration, May 1989
- *Traffic Safety Study, George Washington Memorial Parkway, Virginia, Washington DC, and Maryland* prepared by Robert Peccia & Associates, August 1998
- *George Washington Memorial Parkway, Virginia, Maryland, and District of Columbia Engineering Study for Roads and Bridges*, Volume 1 of 2 prepared by the EFLHD, January 2003

These studies were used to develop the scope of the project to rehabilitate the north section of the GWMP from Spout Run to the Capital Beltway. The project was first entered into the NPS Federal Lands Highway Program in April 1999 and approved for the GWMP in October 1999. Due to anticipated funding constraints, project construction was divided into five phases, as discussed later in this Environmental Assessment. As part of the design activities by the Federal Highway Administration, the phasing of the project was reevaluated and the new project phasing is described in more detail in the alternatives chapter of this Environmental Assessment.

The most recent study is the *George Washington Memorial Parkway, North Section Improvements Candidate Alternatives Report*, prepared by Earth Tech (2006) for the NPS and the EFLHD. Earth Tech prepared a detailed preliminary analysis of several improvement alternatives for the northern section of the GWMP based on the recommendations of *George Washington Memorial Parkway, Virginia, Maryland, and District of Columbia Engineering Study for Roads and Bridges*, Volume 1 of 2 prepared by the EFLHD, January 2003. The preliminary analysis identified a number of locations along the GWMP network as candidates for either re-

habilitation or reconstruction. Descriptions of the study's findings can be found throughout this Environmental Assessment.

### **Other Planning Activities and Related Studies**

*Programmatic Agreement between the NPS, Virginia Department of Historic Resources, and the Advisory Council on Historic Preservation* (Appendix A). A Programmatic Agreement (PA) between the NPS, the Advisory Council on Historic Preservation, the Virginia Department of Historic Resources, the District of Columbia Historic Preservation Office, and the Maryland Historical Trust dated August 25, 1993, describes, in detail, the terms that the NPS must comply with to fulfill its responsibilities under Section 106 of the National Historic Preservation Act and the Council's regulations for undertakings that occur within the GWMP related to roadway rehabilitation for the northern portions of the Parkway. Subsequently, a temporary amendment to the PA was developed, as part of the mitigation required for impacts associated with emergency installation of temporary median barriers (W-beam guardrail on certain sections of the roadway and F shaped (Jersey) barriers on the bridges) and other safety improvements on the Parkway.

*NPS Design Exception Request and Response from EFLHD* (Appendix B). The NPS sent a letter dated July 7, 2005 requesting a design exception for guardwalls and lane widths. The NPS expressed concerns of the potential impacts to historic park resources related to certain safety improvements that are necessary to meet current roadway standards. The EFLHD responded in a letter dated August 26, 2005 stating that "*safety is not a design exception*" and explained the types of design elements that could be considered for a design exception. The EFLHD did not approve the NPS request to leave the existing walls as they are and to narrow the lanes from 12 feet to 11 feet because of safety considerations. Both letters are provided as Appendix B.

*Mount Vernon Trail Extension Feasibility Study*. In 1998, the Virginia Bicycling Federation and the Washington Area Bicyclist Association presented a proposal to the NPS to conduct a feasibility study, which would examine an extension of the Mount Vernon Trail from its terminus at Theodore Roosevelt Island to the Capital Beltway. The NPS performed a technical feasibility study that considered the placement of a paved trail extension and proposed various alternatives. The NPS is assessing the environmental consequences of the potential extension of the Mount Vernon Trail.

In May 2004, the NPS and the EFLHD completed a design scoping report, which identified the corrective actions needed for the north section of the GWMP and included a project description and preliminary cost estimates (FHWA, 2000). Also at that time, different alternatives were evaluated for the project. In the summer 2004, the NPS team completed an Environmental Screening Form pursuant to Director's Order #12, which identified potential issues associated with the project and the need for further investigation and impact analysis. The NPS had previously developed a PA for the rehabilitation of the Parkway from the City of Alexandria to the Capital Beltway (excluding the portion of the Parkway on Columbia Island) with the Advisory Council on Historic Preservation, the Virginia Department of Historic Resources, the District of Columbia Historic Preservation Office, and the Maryland Historical Trust. As part of this project, the NPS met with the Virginia Department of Historic Resources and the Advisory Council on Historic Preservation on May 10, 2006 to present the proposed project and any proposed design changes that would deviate from the original PA dated August 25, 1993, or the temporary amendment dated May 1997. As a result of the necessary changes to character-defining features of the Parkway to comply with safety standards, the NPS would continue to consult with the

State Historic Preservation Officers (SHPOs) and the Advisory Council on Historic Preservation, and propose further amendments to the PA to address the specific concerns of this project.

A project team meeting was conducted on August 19, 2004, to initiate the environmental assessment process. At this meeting, the team, made up of members from the NPS and the EFLHD, discussed the proposed project background and existing site conditions, potential issues, feasible alternatives, and potential impacts. Subsequently, numerous team meetings were held to refine the alternatives, and discuss potential impacts of the alternatives. In particular, the NPS held a Choosing-By-Advantages workshop in December 2005. Since NPS preservation mandates sometimes conflict with FHWA safety directives, the Choosing-By-Advantages presented a forum where these issues were discussed by an interdisciplinary team. From this workshop, the team recommended various options to be considered in the next steps of the planning process. The common goal identified at the workshop was to effectively balance resource protection, safety, and the visitor experience.

## ISSUES AND IMPACT TOPICS

### ISSUES

**Balancing the Roadway Design with Impacts to Park Resources.** One of the primary purposes of the rehabilitation of north section of the GWMP is to improve safety as was detailed in the *Traffic Safety Study, George Washington Memorial Parkway, Virginia, Washington, DC, Maryland*. In order to accomplish this, certain changes to the Parkway's original design are needed, such as changes to the stone masonry guardwalls. The issue lies with how to best accomplish safety improvements on the Parkway while avoiding and minimizing to the extent possible impacts to park resources. The NPS seeks to achieve an acceptable balance between safety improvements in accordance with the American Association of State Highway Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets (Greenbook)* and adverse impacts to the Parkway's historic character, natural resources, and scenic vistas.

**Maintaining the Historic Integrity of the Parkway.** The GWMP is listed on the National Register of Historic Places. The construction of the north section has the potential to have an effect on the Parkway's historic character and cultural landscape. Therefore, the design and construction of the north section of the GWMP must avoid and minimize to the extent possible impacts on the Parkway's historic character and features. The proposed project must be conducted in a manner that is consistent with the *Secretary of Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Restoring, and Reconstructing Historic Buildings* and the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.

**Improving Drainage and Reducing Outfall Erosion.** Throughout the GWMP, the drainage system has been a concern of the NPS not only because of safety issues (e.g. ponding on the roadway surface), but also because of erosion at the outfall structures. From a maintenance standpoint, there are problems with maintaining the pavement and inlets because automobiles drive over the inlets. Furthermore, the inlets affect the smoothness of the driving experience on the Parkway. Implementation of corrective actions for the outfall structures must fully consider potential impacts to water quality near streams with rare species as well as potential archeological resources. During construction, special considerations to reduce short-term impacts from erosion and sedimentation need to be considered to offer added protection to park resources.

**Minimizing Traffic Delays.** The GWMP is a chief commuter route carrying over 50,000 vehicles per day (Peccia, 1998), and provides direct access to Ronald Reagan Washington National Airport. In addition, many commuters, residents, and tourists use the Parkway to access downtown Washington, DC and suburbs. Due to high volumes of traffic, the NPS is concerned with delays caused by construction. The NPS would implement a traffic maintenance plan to ensure safe conditions for workers and travelers and to ensure that construction would be performed in a manner that minimizes disruption to the traveling public.

## IMPACT TOPICS ANALYZED IN DETAIL

Impact topics are resources of concern that would be affected, either beneficially or adversely, by the range of alternatives. Impact topics were identified based on Federal laws, regulations, Executive Orders, NPS *Management Policies* (NPS, 2000), the Environmental Screening Form from Director's Order #12 (NPS, 2001), and from the NPS's knowledge of limited or easily impacted resources. The Environmental Screening Form was completed by the NPS staff and identifies potential issues and impact topics that require additional investigation to address the requirements of the National Environmental Policy Act of 1969 and Director's Order #12 (NPS, 2001). Specific impact topics were developed to ensure the alternatives were compared based on the most relevant topics. As a means of evaluation, impact topics were analyzed in detail to compare the environmental consequences of the No-Action Alternative with the Action Alternative.

**Historic Structures.** The GWMP and its overall design, including the designed landscape, stone masonry guardwalls, and other structures, are contributing elements to the GWMP's listing on the National Register of Historic Places. The NPS is proposing to alter and/or change the appearance and features of the road, such as the stone masonry guardwalls. The NPS must consider potential impacts to Historic Structures that would result from the proposed improvements. Therefore, Historic Structures was addressed as an impact topic in this Environmental Assessment.

**Archeological Resources.** The proposed project would result in ground disturbance due to changes to the approaches and roadbed of the Route 123/GWMP interchange and shoulder areas abutting the GWMP, the acceleration and deceleration lanes extension, outfall repairs and access to make these repairs. These changes have the potential to impact historic and/or prehistoric archeological sites. Therefore, Archeological Resources was addressed as an impact topic in this Environmental Assessment.

**Cultural Landscapes.** The GWMP contains natural features and historic structures that contribute to some of the most recognizable cultural landscapes in the United States. Any construction along the Parkway must fully consider the potential impacts to a historic designed landscape. Therefore, Cultural Landscapes was addressed as an impact topic in this Environmental Assessment.

**Aesthetics and Visual Resources.** The GWMP offers unobstructed vistas of the Potomac River Gorge, monuments in Washington, DC, and historic and commemorative features throughout the Parkway. The GWMP North Section Rehabilitation has the potential to affect these vistas. Therefore, Aesthetics and Visual Resources were addressed as an impact topic in this Environmental Assessment.

**Geological Resources.** The rehabilitation of the north section of the Parkway includes corrective action to repair the drainage system on the Parkway. Presently, the drainage is resulting in areas of erosion on the steep bank of the Potomac River. When repairing the drop inlets and pipes on the Parkway, the designers need to consider the least damaging access to the outfalls and the potential effects on the existing landslide area and how to stabilize existing areas and minimize future erosion. Therefore, Geological Resources was addressed as an impact topic in this Environmental Assessment.

**Soils.** The rehabilitation of the north section of the Parkway and reconfiguration of the Route 123/GWMP interchange would result in soil disturbance. In addition, minor slope failures have occurred on the Parkway. Soils would also be impacted by construction access to repair/replace drainage pipes and outfalls. Therefore, Soils was addressed as an impact topic in this Environmental Assessment.

**Vegetation.** Reconfiguration of the Route 123/GWMP interchange, drainage improvements, and reconstruction of the guardwalls would have impacts to existing vegetation on the Parkway. Vegetation would also be impacted by construction access to repair/replace drainage pipes and outfalls. The potential impacts and mitigation measures to minimize impact to vegetation as well as revegetation need to be assessed. Therefore, Vegetation was addressed as an impact topic in this Environmental Assessment.

**Wildlife.** Removal of vegetation and land disturbance activities associated with the Route 123/GWMP interchange improvements would affect wildlife and would result in a small loss of woodland and stream habitat. Wildlife would also be impacted by construction access to repair/replace drainage pipes and outfalls. Therefore, Wildlife was addressed as an impact topic in this Environmental Assessment.

**Rare, Threatened, and Endangered Species.** Rare species are present on the Parkway. Rare species would also, potentially, be impacted by construction access to repair/replace drainage pipes and outfalls. This project needs to take into consideration ways to avoid and minimize potential effects on these species and their habitats. Therefore, Rare, Threatened, and Endangered Species was addressed as an impact topic in this Environmental Assessment.

**Surface Waters.** The reconfiguration of the Route 123/GWMP interchange and outfall repairs has the potential to have direct impacts on surface waters. Some outfalls occur in streams that are in jurisdictional waters of the United States. A small stream is located on the southwest quadrant of the Route 123/GWMP interchange. This stream would be impacted by the reconfiguration of the off ramp. Other streams would be impacted by construction access to repair/replace drainage pipes and outfalls. Therefore, Surface Waters was addressed as an impact topic in this Environmental Assessment.

**Water Quality.** Water quality in the streams would be affected from land disturbance and replacement of inlets along the Parkway. Maintaining water quality is also critical to preserve habitat in streams for rare species. Therefore, Water Quality was addressed as an impact topic in this Environmental Assessment.

**Safety.** One of the primary purposes of this project is to improve safety. The NPS also wants to keep the roadway and associated trails open during construction and, as a result, protective measures need to be studied and implemented to ensure safety to motorists and trail users during

construction. Therefore, Safety was addressed as an impact topic in this Environmental Assessment.

**Transportation.** The GWMP is a key transportation route and critical to the traffic flow to Washington, DC, and surrounding areas. Construction projects on the GWMP have the potential to cause excessive delays and congestion. As a result, potential impacts on area traffic and accessibility into downtown Washington, DC need to be assessed. Therefore, Transportation was addressed as an impact topic in this Environmental Assessment.

**Visitor Use and Experience.** The project alternatives have the potential to cause impacts on the visitor experience because of changes to the landscape, lane closures, and trail detours necessary for construction. Therefore, Visitor Use and Experience was addressed as an impact topic in this Environmental Assessment.

## IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

The impact topics listed below would have no effect, a negligible effect or in some specific cases, a minor effect for each alternative evaluated in this document. For specific definitions of negligible and minor impacts, please refer to the Environmental Consequences section. However, in general, negligible effects are effects that are localized and immeasurable. Topics that have either no, negligible, or minor effect are briefly discussed in this section of the Environmental Assessment and then dismissed from further consideration or evaluation.

### WETLANDS

The NPS officially recognizes the wetland definition used by the U.S. Fish and Wildlife Service (USFWS) as outlined in Classification of Wetlands and Deepwater Habitats of the United States (USFWS, 1979). This classification, called the Cowardin Classification System, generally states that wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. The single feature that most wetlands share is soil or substrate that is at least periodically saturated with or covered by water. The water creates severe physiological problems for all plants and animals except those that are adapted for life in water or in saturated soil (USFWS, 2005).

National Wetland Inventory maps, soils surveys for Fairfax County and Arlington County, aerial photos and GWMP and County geographic information system data on wetlands were reviewed to determine the presence of wetlands. Furthermore, a field investigation to determine the presence of wetlands in the study area was conducted. The bulk of the work proposed is located on the shoulder areas where streams have been bridged or piped under the roadway. For the outfall repair work, some of these outfalls convey water underneath the Parkway and are jurisdictional Waters of the U.S. regulated under Section 404 of the Clean Water Act and similar state regulations. Furthermore, a few of the outfalls are within the Fairfax County and Arlington County designated Resource Protection Areas.

Under the Cowardin Classification System, all streams are considered wetlands; therefore, the small stream at the Route 123/GWMP interchange is a wetland under this system. The area of wetland impact for two of the five Route 123/GWMP interchange options is very small (less than 0.2 acres). The other three options, including the preferred interchange option at Route 123, would have no direct impact and avoid the stream/wetland completely. At the outfall structures, placing fill materials to correct erosion and adding riprap into the stream at the end of the outfall

for energy dissipation would have a beneficial impact by stabilizing the stream channel and decreasing runoff velocities, erosion, and sediment deposition in the receiving waters. The area of the proposed rip rap and channel stabilization is already highly disturbed and as a result, the adverse impact of adding fill in waters of the U.S. would be negligible. The impacts to the stream, however, are described in the Surface Waters section for comparison purposes. As a result of the Action Alternative having negligible impacts to wetlands, Wetlands has been dismissed as an impact topic.

### **SCENIC RIVERS DESIGNATION**

No surface waters near the proposed project area are designated as a scenic river by the NPS; therefore, Scenic Rivers Designation was dismissed as an impact topic.

### **FLOODPLAINS**

A review of the FEMA Flood Insurance Rate Maps to define the extent of 100-year floodplains in the proposed project area indicated that parts of the proposed project area cross a 100-year regulatory floodplain (FEMA, 1982). However, construction on the proposed reconfiguration of the Route 123/GWMP interchange or other improvements proposed for the mainline would neither occur within nor would affect the 100-year floodplain. Therefore, the Action Alternative has negligible potential impacts to the 100-year floodplain and was dismissed from further consideration.

### **GROUNDWATER**

Groundwater aquifers underlying the proposed project area are unconsolidated deposits, consisting primarily of alternating layers of sand, gravel, shell, rock, silt, and clay. A shallow unconfined aquifer system lies above relatively impermeable clay beds. The principal source of groundwater withdrawal is a deeper system of unconfined aquifers (VDEQ, 2003). This project would have a small increase in impervious surfaces and overall, the alternatives are expected to have no effect on the groundwater resources within the study area because groundwater aquifers or infiltration would not be affected. Therefore, Groundwater has been dismissed from further consideration.

### **TOPOGRAPHY**

The proposed project area is characterized by low to moderate relief ranging from approximately 30 feet to 200 feet above mean sea level. Along the GWMP, steep banks form the majority of the eastern limit of the Parkway. The rehabilitation of the north section of the Parkway does not include deep excavations or substantial grading or filling, and it would not change the existing topography of the area. The alternatives would have negligible impact on the topography of the study area because the existing landforms would not change. Therefore, Topography has been dismissed from further consideration.

### **COASTAL ZONE MANAGEMENT**

“Pursuant to the Coastal Zone Management Act, in 1986, the National Oceanic and Atmospheric Administration approved the Virginia Coastal Resources Management Program. Accordingly, federal activities which are reasonably likely to affect any land or water use or natural resources of Virginia's designated coastal resources management area must be consistent with the enforceable policies of the Virginia Coastal Resources Management Program” (VDEQ, 2003).



All federal development projects inside the coastal zone are automatically subject to consistency and require a Consistency Determination.

Arlington and Fairfax Counties are within the state's coastal zone management area (VDEQ, 2003) and therefore, the proposed project area is within Virginia's Coastal Management Zone and subject to Federal Consistency Determination requirements under the Virginia Coastal Zone Management Program. The preferred alternative would have negligible effects on wetlands, floodplains, surface waters, or other resources associated with the state's coastal zone. The proposed project would have a beneficial effect on the coastal zone because the NPS would repair existing drainage infrastructure, thereby minimizing future erosion and sediment deposition. The proposed project would not result in any actions that have any foreseeable direct, indirect, secondary or cumulative impacts on Virginia's coastal zone; therefore, the NPS has determined the proposed project to be consistent with Virginia's Coastal Zone Management Program, and Coastal Zone Management has been dismissed from further consideration.

### **AIR QUALITY**

Air quality became a national concern in the mid-1960s, leading to the passage of the Air Quality Act in 1967. The Act (now referred to as the Clean Air Act) and subsequent amendments have established procedures for improving conditions, including a set of National Ambient Air Quality Standards. The U.S. Environmental Protection Agency (USEPA) is directed to set levels for pollutants in order to protect the public's health. The National Ambient Air Quality Standards have been adopted for six pollutants: carbon monoxide, nitrogen dioxide, ozone, particulate matter, sulfur dioxide, and lead. A system of monitoring stations was established across the country to measure progress in meeting these goals. If an area is found to exceed the allowable concentrations, local officials are required to develop a plan for achieving air quality that meets the standards.

In addition to these six criteria pollutants, volatile organic compounds (VOCs), which are created when fuels or organic waste materials are burned, are a source of concern and are regulated as precursors to ozone. Ozone is formed in, and downwind of, urban areas when sunlight and high temperatures cause photochemical reactions between emissions of VOCs and nitrogen oxides (NO<sub>x</sub>). Chief sources of VOCs and NO<sub>x</sub> include motor vehicles and construction equipment. Most hydrocarbons are presumed to be VOCs in the regulatory context, unless otherwise specified by the USEPA.

The proposed project area is located within the National Capital Interstate Air Quality Control Region, which includes Washington, DC, and several surrounding counties of Maryland and Virginia. The region currently meets National Ambient Air Quality Standards for all criteria pollutants except ozone. The USEPA has designated the region as a "serious non-attainment area" for ozone where precautions should be taken to limit emissions. The existing sources of air pollutants in and adjacent to the proposed project area are emissions from vehicular traffic on the Parkway and other surrounding highways.

Negligible short-term adverse impacts would occur from emissions during vehicular delays and from equipment during construction. Construction activities would be timed so that traffic delays would be minimized during peak driving and the improvements proposed would not increase roadway capacity. Also, open burning of construction or demolition material is not permitted at this time. If burning is necessary, it would be kept to a minimum, follow regulation,

and appropriate permits would be obtained. No cumulative or long-term impacts would result; therefore, Air Quality has been dismissed as an impact topic.

### **SOUNDSCAPE MANAGEMENT**

In accordance with the NPS's *Management Policies* (NPS, 2000a) and Director's Order #47, *Sound Preservation and Noise Management* (NPS, 2000b), an important objective of the NPS's mission is the preservation of natural soundscapes associated with NPS units. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequencies, magnitudes, and duration of human-caused sound considered acceptable varies among NPS units. Acceptance levels of noise for each park unit are generally greater in developed areas and less in undeveloped areas.

Several transportation-related noise sources currently exist in the proposed project area (i.e., GWMP traffic and aircraft activity surrounding the Ronald Reagan Washington National Airport). The greater part of land that adjoins the GWMP consists of residential communities that are considered noise sensitive areas. Arlington and Fairfax Counties have adopted noise ordinances that set stringent standards on noise generators, depending on the zoning district classification of the receiving property.

Implementation of the Action Alternative would have no long-term change to existing noise levels. The alternatives do not increase capacity of the roadway or shift the alignment of the roadway closer to any sensitive receptors along the Parkway. Short-term, construction related increases in noise levels would occur. The construction related impacts to nearby residents would be expected to be minor, because the construction would not affect any areas for prolonged periods and because of the existing distance and buffer between the Parkway and residential areas.

Construction activities can occur at anytime; however, there are noise limits by time of day for construction. The normal noise decibel level can be exceeded from 7:00 a.m. to 9:00 p.m. Monday through Friday and 10:00 a.m. to 9:00 p.m. on weekends and legal holidays. This would include the use of power equipment and other activities. With several transportation-related noise sources that currently exist, the noise levels associated with the construction activities would have a negligible impact on the soundscape of the Parkway; the change in frequencies, magnitudes, and duration of human-caused sound would not be perceptible or would be negligible. The GWMP North Section Rehabilitation project would have no long-term impacts and negligible short-term impacts on the soundscape. Therefore, Soundscape Management was dismissed as an impact topic for this document.

### **LIGHTSCAPE MANAGEMENT**

In accordance with the NPS's *Management Policies* (2001), the NPS strives to preserve, to the extent possible, the quality of lighting associated with natural ambient landscapes and the night sky, which includes highway lighting in the study area. New lighting is not proposed with this project. The use of lights at night by a contractor would be in compliance with the county's requirements. The NPS would notify the contractor of these restrictions prior to construction, and the contractor would adhere to these requirements. The Action Alternative would have a

negligible short-term impact if night time construction were to occur, and would not. Therefore, Lightscape Management was dismissed as an impact topic.

### **INDIAN TRUST RESOURCES**

The U.S. Department of the Interior Secretarial Order 3175 (Departmental Responsibilities for Indian Trust Resources) requires that any anticipated impacts to Indian Trust Resources from a proposed action by Department of Interior agencies be explicitly addressed in environmental documents. The Federal Indian Trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of Federal law with respect to American Indian and Alaskan Native Tribes. According to park staff, Indian Trust Resources do not 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 and Alaska Native Tribes. Therefore, this impact topic was dismissed from further consideration.

### **ETHNOGRAPHIC RESOURCES**

The NPS defines ethnographic resources as any “site, structure, object, landscape or natural resource feature assigned traditional legendary, religious, subsistence or other significance in the cultural system of a group traditionally associated with it” (NPS, 1998). Based on the park staff’s professional judgment, no ethnographic resources exist in the proposed project area. Therefore, this impact topic was dismissed from further consideration.

### **AGRICULTURAL LANDS, PRIME, AND UNIQUE FARMLAND SOILS**

The soils mapped on the proposed project area are not regulated under the Federal Farmland Protection Policy Act (7 Code of Federal Regulations (CFR) Part 658 of July 5, 1984, as superseded by the Farmland Protection Policy Act Final Rule of June 17, 1994). The existing soils on the proposed project area are mostly fill material or soils that have been subjected to prior disturbances by urban and industrial activities, including road construction. The soils on the site are mapped mostly as Urban Land, which is not classified as a Prime Farmland Soil. Because the soils in the study area are in an urban area, this resource was dismissed as an impact topic.

### **SOCIO-ECONOMIC ENVIRONMENT**

The GWMP North Section Rehabilitation project is located in Arlington and Fairfax Counties. The proposed project area of the Parkway runs parallel to the Potomac River, and it is in close proximity to developed and undeveloped areas. The north section of the GWMP provides northbound and southbound access to communities, recreational areas, parklands, government and business locations, and various commercial services throughout the area. One important function of the north section of the GWMP is as a commuter route to Washington, DC, Alexandria, and Arlington.

The labor force of Fairfax County in October 2004 totaled 584,495 with 11,327 (1.9%) of the total labor force being unemployed (Fairfax County, 2005a). The total labor force of Arlington County in 2002 totaled 116,476 with 3,013 (2.6%) of the total force being unemployed (Arlington County, 2005b).

There would be no change in employment in the area because of construction or implementation of the GWMP North Section Rehabilitation project. Minimal employment opportunities and some related revenues for construction materials are anticipated for the rehabilitation of the north

section and the Route 123/GWMP interchange reconfiguration. Access to the CIA would be maintained at all times, and the NPS would notify the CIA of any construction or detours. Minimal economic impacts to area businesses from transportation-impeded access would occur. However, these socio-economic impacts would be short-term and negligible, with only minor impacts to the local economies of the surrounding area. The proposed project is expected to have negligible to minor impact on the socio-economic environment; therefore, Socio-Economic Environment was dismissed as an impact topic.

## **ECONOMICS**

The GWMP is a commuter route used by many residents in Fairfax and Arlington Counties to get to downtown Washington, DC. In many cases, transportation projects that result in prolonged delays can have an effect on local economics. Travel time can be affected and there is a cost to businesses and consumers. Travel time costs refer to the value of time spent in travel. It includes costs to businesses by their employees, vehicles and goods, and costs to consumers for personal time spent in travel, such as commuting to and from work. The NPS, through time of day construction restrictions, would minimize impacts to a large majority of motorists using the Parkway. Construction would however have a minor adverse impact on the local economics because of delays. These impacts are expected to be negligible on local businesses because the NPS does not allow trucks or commercial vehicles on the Parkway. The impacts to the consumer would also be minimized to the extent possible by restricting construction during peak periods and notifying the public of construction activities. As a result, Economics was dismissed from further consideration in this Environmental Assessment.

## **LAND USE**

The project is located within the GWMP, between Spout Run and the Capital Beltway. Under the Arlington County Zoning Ordinance, the Parkway is zoned as Special District S-3A. This zoning district is to encourage the retention of property in a relatively undeveloped state. Under the Fairfax County Zoning Ordinance, the GWMP is zoned as Residential District R-1. The R-1 district is established to allow for single-family detached dwellings and other selected uses compatible with the low-density residential character of the district (Fairfax County, 2005). The rehabilitation of the Parkway and the reconfiguration of the Route 123/GWMP interchange would be consistent with existing zoning of the proposed project area and with the existing surrounding land use under the Arlington County and Fairfax County zoning ordinances; therefore, Land Use was dismissed as an impact topic.

## **ENVIRONMENTAL JUSTICE**

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority or low-income populations.

According to the 2000 U.S. Census statistics (U.S. Census, 2002a, b), the minority community in Arlington County, Virginia, is approximately 30 percent with approximately 9 percent of the population over the age of 65. The percentage of all individuals living below the poverty line in Arlington County is approximately 5 percent, which is considerably lower than the national average of 13 percent. Minorities and low-income populations do exist in Arlington County; how-

ever, no populations were identified as disproportionately impacted by the proposed alternative. Therefore, Environmental Justice was dismissed as an impact topic.

## COMMUNITY FACILITIES AND SERVICES

**Emergency, Fire, and Rescue Services.** The Arlington County Fire Department has 10 stations in the county staffed by career and volunteer firefighters and paramedics. Station No. 5, located at 1070 South Hayes Street, approximately 1¼ miles east of the proposed project area, provides the nearest fire and medic equipment (Arlington County, 2005). The Virginia Hospital Center in Arlington would most likely provide medical services for any incidents. The Fairfax County Fire and Rescue Department has 35 stations in the county staffed by career and volunteer firefighters and paramedics. McLean Station No. 1 located at 1455 Laughlin Avenue is approximately 3.8 miles west of Turkey Run Park and would most likely provide the nearest fire and rescue service in Fairfax County. There are no hospitals in Fairfax County within close proximity of the proposed project area (Fairfax County, 2005a). Rehabilitation of the north section of the GWMP would have a minor long-term benefit to emergency services because of the proposed emergency turn-around breaks in the median. However, the project would also have negligible short-term adverse impacts on fire and rescue activities because of the potential for increased traffic congestion during construction. The traffic congestion from lane closures would be minimized because of time of day work restrictions and public notification of construction activities. The delays would be similar to that experienced during rush hour traffic. Traffic impacts and delays are discussed in the Transportation section.

**Police.** The GWMP is patrolled by U.S. Park Police from the Turkey Run Park in McLean, Virginia. Rehabilitation of the north section of the Parkway and reconfiguration of the Route 123/GWMP interchange would have negligible impact on police capabilities or emergency response of the Park Police. Park Police would be notified of changes to traffic patterns and potential closures/delays associated with the Park Police/GWMP Headquarters entrance.

**Schools.** The Arlington County school system includes four public schools. Schools within the proposed project area include the Yorktown, HB-Woodlawn, and Washington-Lee Schools. The Fairfax County school system includes 24 public schools. Schools within the proposed project area include the McLean and Langley Schools. The proposed project would have a negligible impact on these county school bus routes because the proposed traffic control measures would only result in minor delays for those vehicles traveling the GWMP. Impacts to these school systems would be negligible.

**Parks and Recreation.** In Arlington County, there are approximately 35 community parks and recreational areas all within close proximity of the proposed project area. Additional facilities exist along the GWMP both north and south of the proposed project area. Nearby Arlington parks include the Gulf Branch Nature Center, Donaldson Run Park, and Upper Pimmit Run Park. Users and visitors to the area would continue to take advantage of the nearby park and recreational activities available and would not be impacted by the north section rehabilitation or the Route 123/GWMP interchange reconfiguration.

Fairfax County has approximately 20 community parks and recreational areas all within close proximity of the proposed project area. Additional facilities exist along the GWMP both north and south of the proposed project area. Fairfax County parks include Turkey Run Park, Claude

Moore Colonial Farm, Bryn Mawr, Franklin Woods, Dead Run Stream Valley, and Little Pimmit Run Stream Valley. Users and visitors to the area would continue to take advantage of the nearby park and recreational activities available and would not be impacted by the north section rehabilitation or the Route 123/GWMP interchange reconfiguration. Potential impacts on recreational activities on the GWMP are described in the Visitor Use and Experience section.

Overall, community facilities and services are not anticipated to be directly affected by the rehabilitation of the north section of the Parkway; therefore, Community Facilities and Services was dismissed as an impact topic.

## INFRASTRUCTURE

**Water and Sewer Service.** Arlington County buys drinking water for its county residents and businesses from the Division of the Army Corps of Engineers' Washington Aqueduct. The water supply source is the Potomac River. Arlington County operates its own sewage treatment facility. The Water, Sewer, and Streets Bureau operates and maintains the sewage system within the county (Arlington County, 2005a). Fairfax Water provides water to the majority of residents within Fairfax County. The water supply source is the Potomac River. Fairfax County operates its own sewage treatment facility (Fairfax County, 2005a).

The City of Falls Church owns and operates a pump house that is located within close proximity, northwest of the existing Route 123/GWMP interchange. The Falls Church pump house is one of several pumps that transport water from the Del Carlia reservoir in Maryland to the City of Falls Church and to the Park Police/GWMP Headquarters at Turkey Run Park. No water or sewer main lines or other related infrastructure would have to be realigned or taken out of service.

**Storm Drainage.** Storm drainage in the proposed project area is primarily sheet-flow runoff collecting at drop inlets on the Parkway and outlet back into natural drainage courses. The drop inlets are adjacent to the travel lanes, presenting a driving hazard (ponding) during storm events. Presently, there is considerable erosion at the discharge areas of the drainpipes that collect the water from the road surface. The NPS proposes to replace existing and install portions of new curb with new drop inlets, which would have a beneficial impact on the existing storm drainage on the Parkway. The repairs would protect the Parkway and the upsizing of some pipes would benefit upstream residents in a reduction in the flooding. The north section rehabilitation is not expected to substantially change drainage patterns or drainage infrastructure for the county and nearby residents; therefore, storm drainage was dismissed as an impact topic; however, the drainage improvements are discussed under a number of the impact topics such as surface waters, water quality, soils, and geological resources.

**Electrical Power and Natural Gas.** PEPCO and Dominion Virginia Power provide Arlington County and NOVEC provides Fairfax County with its electrical power supply. No electrical lines would be disturbed and outages would not occur as a result of rehabilitation efforts or the reconfiguration of the Route 123/GWMP interchange. If an outage does occur, NOVEC and PEPCO would be responsible for any necessary repairs. There are no natural gas lines in the area (Fairfax and Arlington Counties, 2005a).

**Communication.** Local telephone service is provided by Verizon. Fiber optic cables were identified in the proposed project area. In the event that a fiber optic cable would need to be relocated, the NPS would notify the utility company and coordinate relocation as a result of construction. Before any construction, the contractor would be required to contact "Miss Utility", the Virginia

information exchange center for identifying the locations of underground utility lines. There would be no impact to the local communication.

**Waste Management.** Solid waste generated from rehabilitation of the north section of the GWMP would be disposed of by a commercially-licensed waste management company that would comply with all federal and state requirements.

The existing infrastructure within the proposed project area is not anticipated to be directly affected by the rehabilitation of the north section of the GWMP or the Route 123/GWMP interchange reconfiguration. Before any construction, the contractor would be required to contact “Miss Utility” prior to any excavation to identify the location of utilities. The proposed project would not adversely impact water and sewer service, storm drainage, electrical power and natural gas, communication, and waste management. Therefore, Infrastructure was dismissed as an impact topic.

### **PARK OPERATIONS**

Park operations for this analysis refers to the quality and effectiveness of the infrastructure and the ability to maintain the infrastructure used in the operations of the park to adequately protect and preserve resources and to provide an effective visitor experience. Under all the alternatives, the GWMP would maintain the infrastructure and there would be no effect on park operations. At the Park Police/GWMP Headquarters, plans to extend acceleration and deceleration lanes would have a short-term negligible adverse impact due to construction activity. Lane closures during construction would cause short-term detours and delays to occur throughout the north section. By rehabilitating the Parkway in the case of the Action Alternative, the park operations would be improved by reducing the frequency of maintenance required. The GWMP North Section Rehabilitation project is expected to have a negligible impact on the park staff. Therefore, Park Operations has been dismissed from further consideration.

### **HAZARDOUS MATERIALS**

Hazardous waste generation at the proposed project area would be kept to a minimum, if produced, and handled appropriately according to Virginia Hazardous Waste Management Regulations (9 VAC 20-60). The NPS is encouraged to implement pollution prevention principles and Best Management Practices (BMP), including the reduction of materials used at the proposed project area, re-use of materials, and recycling of waste materials. In addition, no hazardous materials sites exist in the study area. Therefore, Hazardous Materials has been dismissed from further consideration.



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## ALTERNATIVES

This section describes the NPS's management alternatives for the GWMP North Section Rehabilitation project. Alternatives for this project were developed to resolve potential issues associated with safety, drainage, cultural resources, natural resources, and the aesthetic quality of the viewsheds.

### ALTERNATIVE A – NO-ACTION

The No-Action Alternative describes the action of continuing the present management operations and conditions. It does not imply or direct discontinuing the present action or removing existing uses, development, or facilities. The No-Action Alternative provides a basis for comparing the management direction and environmental consequences of the action alternative. Should the No-Action Alternative be identified, the NPS would respond to future needs and conditions associated with the roadway, guardwalls and guardrails, and the Route 123/GWMP interchange without significant actions or changes in present course.

Under the No-Action Alternative, the NPS would continue management actions that would include minimum rehabilitation of the Parkway to maintain the existing conditions and character of the Parkway. The NPS would conduct minor "spot" repairs and mill and overlay in sections of the road surface so the Parkway remains operational and safe; however, over time, deterioration of the road surface (i.e., potholes) would become more prevalent. The NPS would not replace and/or upgrade other features on the Parkway such as the Route 123/GWMP interchange, the drainage system, the existing roadside barriers, or the various acceleration/deceleration lanes.

### ALTERNATIVE B – REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)

Alternative B represents the NPS's preferred alternative and defines the rationale for the action in terms of resource protection and management, visitor and operational use, costs, and other applicable factors. Under Alternative B, the NPS in cooperation with the EFLHD would implement a series of roadway, drainage, and ramp improvements on the Parkway from Spout Run to the Capital Beltway (see Figure 2). The upgrades would involve numerous safety improvements, such as installing crashworthy concrete-core guardwalls and/or steel-backed timber guardrails, extending acceleration and deceleration lanes, and replacing drainage inlets and culverts. The roadway and ramps would be milled and overlaid, and the southbound side of Route 123/GWMP interchange would be reconfigured. The NPS would phase the proposed action alternative over an extended period.

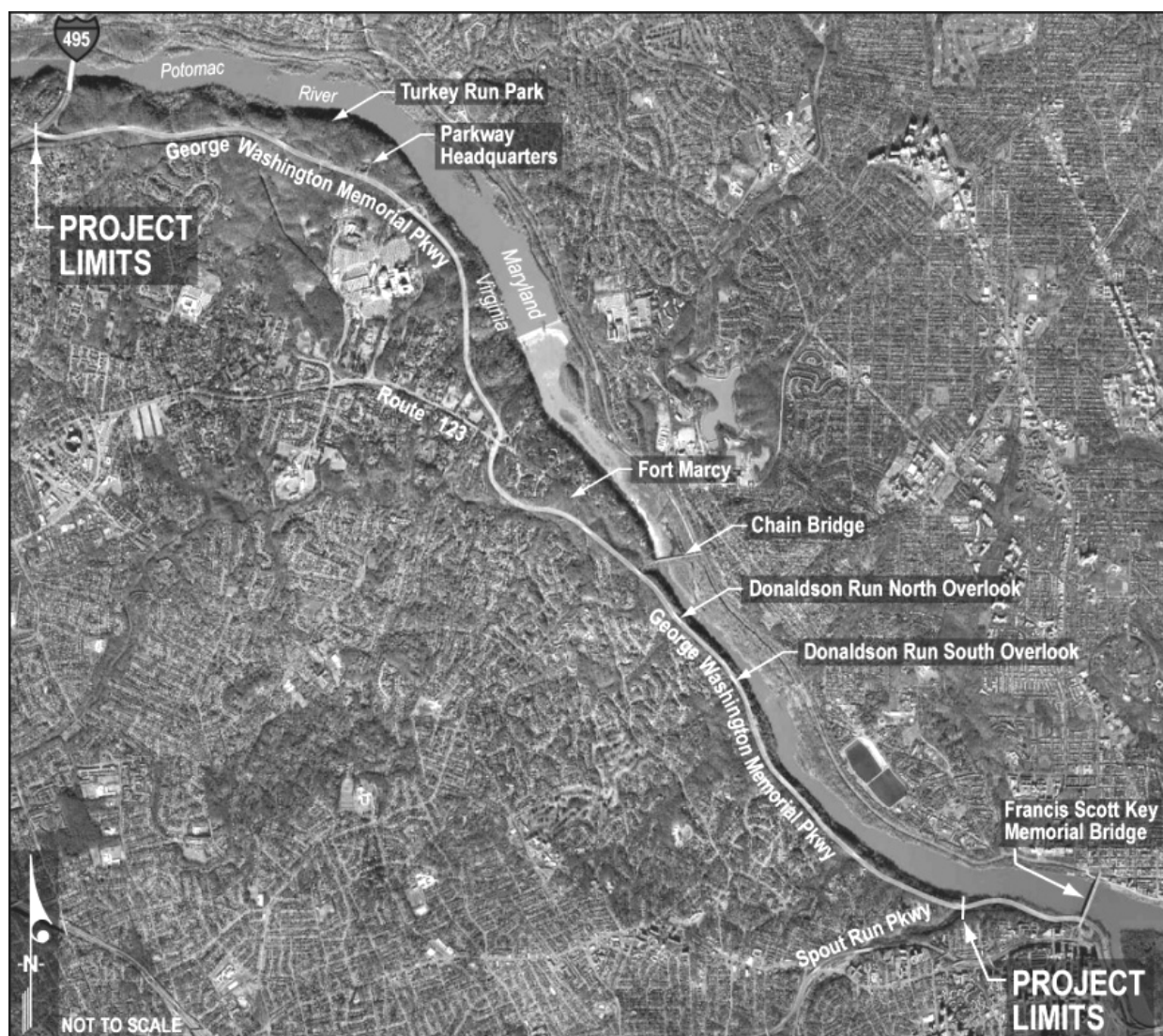
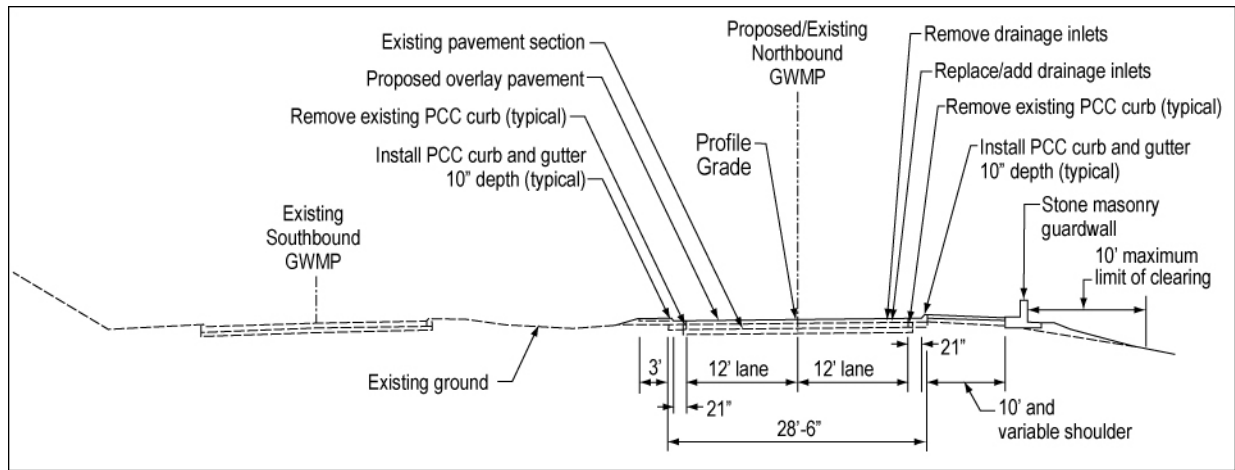


Figure 2. Project site aerial photograph (2001)

The components of Alternative B are described throughout this Environmental Assessment in the following sections: pavement/road rehabilitation; drainage improvements; shoulder rehabilitation, roadside barrier modification, which would include two options; acceleration/deceleration lane extensions; and the Route 123/GWMP interchange reconfiguration, which would include five build options. In addition, construction activities are described separately when applicable because they generally refer to all project components and have similar short-term effects. A typical cross section illustrating many of the improvements can be seen in Figure 3. This figure displays the overlay of pavement, typical location of the guardwall, and maximum limits of clearing for a typical section of the roadway under Alternative B.



NPS/DSC/SEPTEMBER/850/20055

**Figure 3. Alternative B typical cross section: pavement/road rehabilitation including curb, shoulder, and permanent concrete-core guardwall**

**Pavement/Road Rehabilitation from Spout Run to the Capital Beltway.** Alternative B would cover both northbound and southbound sides of the Parkway from Spout Run to the Capital Beltway. The GWMP is an asphalt-paved road with a mountable concrete curb along both the outside and inside edges of pavement over most of its length. The existing pavement section is approximately 6 inches of asphalt concrete over 4 inches of aggregate base. It is anticipated that the greater part of the road would be milled and overlaid with 5 inches of Superpave asphalt concrete pavement, with full-depth Superpave asphalt concrete pavement patching possibly being required in some areas (Earth Tech, 2005). Paving would be required to address issues associated with potholes, cracking, settlement, and subsequent effects to existing pavement from the replacement/addition of new curb and inlets.

**Shoulder Rehabilitation.** The existing unpaved shoulders on the Parkway would be reconstructed with an aggregate-topsoil mixture and either seeded or laid with sod. The reconstructed shoulders would ideally have a width of 6 to 10 feet on the right side of the road and a minimum width of 3 feet on the median side. Narrower shoulders would be required in some areas to avoid extensive grading or retaining structures. In areas of sensitive resources and steep slopes, the width would be reduced to 3 feet.

**Drainage Improvements.** The pavement is drained by a combination of small curb openings and grate inlets, which feed into pipe culvert systems that outlet onto the drainage course into the Potomac River. The inlet grates extend into the travel way and the roadside and median ditches are drained by field inlets tying into the same storm drain system (Earth Tech, 2005). Alternative B would replace the curb and existing inlets as well as add inlets. The design spread criterion for this project is 3 feet maximum spread for the 10-year event. Exceptions to this criterion are being considered. Additional inlets would be added to reduce spread to meet the design criteria.

Furthermore, to reduce future erosion and promote management of stormwater runoff, measures would include flow detention, energy dissipation, and stabilization of outfalls. Figure 4 shows a typical existing inlet on the Parkway. Various gutter pan widths between 12 and 21 inches were considered to correct drainage on the Parkway, but many resulted in unacceptable impacts or changes to the original designed roadway section, and therefore were dismissed (see Alternatives Considered but Dismissed Section). As a result, different curb opening and inlet spacing and siz-

es are being considered to reduce water spread on the roadway and in the travel lanes. More information on the effectiveness and spacing of each method can be found in the GWMP North Section Improvements Candidates Alternatives Report (Earth Tech, 2006).



**Figure 4. Current drainage grate inlet and curb opening**

The outfall structures throughout the GWMP are in poor condition, and many of these structures would be rehabilitated as part of Alternative B. An outfall survey has been completed and recommendations for each outfall are being developed by EFLHD. The location of each outfall is presented in Appendix G. Possible measures to repair the outfalls would include reconstruction using riprap, gabion baskets, or other products. Some outfall locations would be consolidated, use existing or new pipes, or would be abandoned altogether. The existing outfalls to remain (after consolidation) would need to be reconstructed and brought back as close to the existing grade as possible. This construction would require filling the eroded areas with structural fill or riprap. Each outfall structure would be evaluated on a case-by-case basis. During this survey effort, two stone masonry outfalls were identified; however, they do not require rehabilitation.

**Roadside Barrier Modifications.** Stone masonry guardwalls along the shoulders and the median of the GWMP are the predominant type of barrier. This type of roadside guardwall does not have a reinforced concrete core, is lower than the recommended height of 27-inches, and has uneven or jagged sides that exceed the recommended 1-inch variation in surface; therefore, it does not meet current safety standards for crashworthiness. The NPS would replace the current guardwalls along the north section of the Parkway to meet AASHTO highway safety guidelines.

Another type of guardrail found along the GWMP is the W-beam guardrail that separates the northbound and southbound roadways where the median width is minimal. This barrier type is functional and effective, but is classified as temporary by the NPS. The alternative would also include the removal of the existing W-beam guardrail and would replace it with the steel-backed timber guardrail. Furthermore, the existing jersey barriers on Glebe Road, Gulf Branch, Donaldson Run, and Windy Run bridges would be replaced with stone masonry guardwalls.



The following two options are being considered for roadside barriers to replace the existing stone walls. Alternative B would include the replacement of the existing stone masonry guardwalls with concrete-core stone masonry guardwalls or a combination of stone masonry with concrete core and steel-backed timber guardrail (see Figure 5).

Both options being considered would replace nearly all of the existing stone masonry guardwalls with a 27-inch high, concrete-core, stone masonry guardwall that meets AASHTO safety guidelines for crashworthiness. Construction of stone masonry must also meet the National Cooperative Highway Research Program (NCHRP) 350 requirements to prevent snagging of an impacting vehicle so in some cases the walls would be flared, extended, or connected.

#### Option 1 – Concrete Core, Stone Masonry Guardwall

Option 1 would call for the new walls to be crafted in accordance with the *Secretary of the Interior's Standards for Rehabilitation*, using as much of the historic fabric as possible, with sensitivity in design by matching the rough-cut stone shape, color, size, and spatial relationship of the stones to the mortar.

#### Option 2 – Combination Guardwall and Guardrail (Preferred Option)

The second option would use a combination of a 27-inch concrete-core stone masonry guardwall as described in Option 1 (using existing stone to the extent possible) and a steel-backed timber guardrail. With this option, existing stone ma-



**Existing Stone Walls**



**Option 1**



**Option 2**

**Figure 5. Existing and Simulated Roadside Barrier Options**

sonry guardwalls would be replaced with 27-inch, concrete-core, stone-faced guardwalls that are crafted using the existing and new stone (as needed), per the guidelines as specified in the *Secretary of the Interior's Standards for Rehabilitation*, and meet AASHTO's safety guidelines. In locations along the north section of the GWMP where an increase in the height and depth of the guardwall would have an adverse impact on viewsheds, a combination of the stone masonry walls and steel-backed timber guardrail would be implemented to maintain and enhance views of the Potomac River Gorge. This method opens some view under the steel-backed timber guardrail. Furthermore, the depth of the steel-backed timber barrier is less than the stone masonry guardwall. The narrower barrier would increase views to the Potomac River Gorge at certain points along the Parkway where the road is close to the barriers and the motorist is looking down to the river. This technique of utilizing steel-backed timber guardrails would also serve to denote view areas. The stone masonry guardwalls would replicate the character of the existing walls to the extent as possible by using the existing stone. A crashworthy transition from steel-backed timber guardrail to stone masonry guardwall is required.

The NPS is working in conjunction with the EFLHD and the Virginia Department of Historic Resources via the tenets of the previously signed PA to refine the approach.

**Acceleration/Deceleration Lanes Extension.** Alternative B would include constructing or extending acceleration/deceleration lanes at different locations along the north section of the Parkway. Also, as part of Alternative B, turn-around access for emergency vehicles would be provided on the north end. Plans would include extending acceleration/deceleration lanes at the NPS Headquarters entrance. The entrance to the NPS Headquarters currently provides a short deceleration lane/taper combination of approximately 150 feet on the northbound side of the GWMP for ingress right turns. In the southbound direction, a 175-foot deceleration lane/taper combination serves left turns to the Park Police/GWMP Headquarters. Vehicles making a right turn out of the entrance do not have an acceleration lane to allow for a smooth merge onto northbound GWMP. The deceleration lane for the northbound off ramp at Turkey Run begins 450 feet west of the NPS entrance. In order to address the issue of access at this location, a continuous auxiliary lane of approximately 570 feet between the entrance roadway and the ramp terminal at Turkey Run would be constructed (Earth Tech, 2005).

Alternative B would include improvements to the Central Intelligence Agency (CIA)/GWMP interchange. For the northbound deceleration lane, the start of the taper (lane reduction) would be shifted further away from the gore area (point at which the ramp meets the mainline of the roadway) and widened to a full lane's width. This deceleration lane would also be lengthened to 285 feet. These improvements would require a short retaining structure and encroach into the fringe of the existing forest. The existing stone walls would be retained on the ramps of the CIA/GWMP interchange. The alignment for the southbound CIA/GWMP interchange acceleration lane would be adjusted to provide a longer distance for vehicles to merge into the mainline Parkway traffic. This would include shifting this lane a few feet closer to the Parkway, connecting it in advance (upstream) of the existing merge point. This improvement would result in a longer parallel distance of the ramp with the Parkway and a better opportunity for motorists to accelerate and merge. There would be no changes to the southbound deceleration lane.

**Route 123/GWMP Interchange Reconfiguration.** Alternative B would include implementing a series of improvements at the Route 123/GWMP interchange. Work would include the reconfiguration of the ramps on the west side of the interchange to facilitate improved safety and flow along southbound GWMP. In addition, acceleration/deceleration lanes would be extended to al-



low smoother merging and diverging. Other improvements would address drainage, signing, pavement markings, curbs and gutters, and rehabilitating or resurfacing existing ramps on the east side of the interchange and Route 123 (Earth Tech, 2005).

Five build options were developed for the ramps west of the interchange connecting with the southbound direction of GWMP; the ramps east of the interchange would remain intact. In each of the five options, the existing configuration (loss of one through lane in the southbound direction at the interchange) would be modified to provide two continuous through lanes southbound all the way through the interchange. The various configurations were devised to improve upon the problematic operations associated with the tight radii of the on and off ramps, the substandard acceleration/deceleration lanes, the inadequate weaving between the two loop ramps, and the poor operating conditions at the intersection GWMP off ramp at Kirby Road (Earth Tech, 2005). Option 4 is the NPS preferred option.

The existing conditions and five build options (1 through 5) for the Route 123/GWMP interchange reconfiguration are explained in this section as they are presented in the *George Washington Memorial Parkway North Section Improvements* (Earth Tech, 2005). Figure 6 shows the no-build (existing) condition. Figures 7 through 11 show each build option. Each figure shows the configuration under each option, removal of existing roadway, existing roadway that would remain intact, and a conservative estimate of the construction limits of disturbance.

In addition to the five build options for the Route 123 GWMP Interchange reconfiguration, an option has been presented to shift the GWMP southbound mainline toward the median approximately 5 feet near the start of the off ramp to Route 123. The purpose of this shift is to minimize cutting into the slope on the south side of the roadway and having to build a retaining wall. Because of the mainline shift of the south bound roadway, approximately 400 feet of additional median guardrail would be required. Without the mainline shift, approximately 600-650 feet of stone masonry guardwall would need to be constructed; however, with the mainline shift only 420 feet of stone masonry guardwall would need to be constructed. This option is viable with the preferred Option 4.

Existing Conditions – Route 123/GWMP Interchange Reconfiguration

Under the existing conditions, the reconstruction of the ramps at the Route 123/GWMP interchange would not occur (see Figure 6).



**Figure 6. Route 123/GWMP Interchange Existing Conditions aerial photograph (2001)**

### Option 1 – Route 123/GWMP Interchange Reconfiguration

- Consolidate southbound GWMP off ramps, intersection opposite Kirby Road
- Realign Route 123 westbound on ramp to GWMP with radius doubled
- Create new Route 123 eastbound on ramp to GWMP with compound curve removed
- Remove all existing ramps on the west side of GWMP (Earth Tech, 2005)

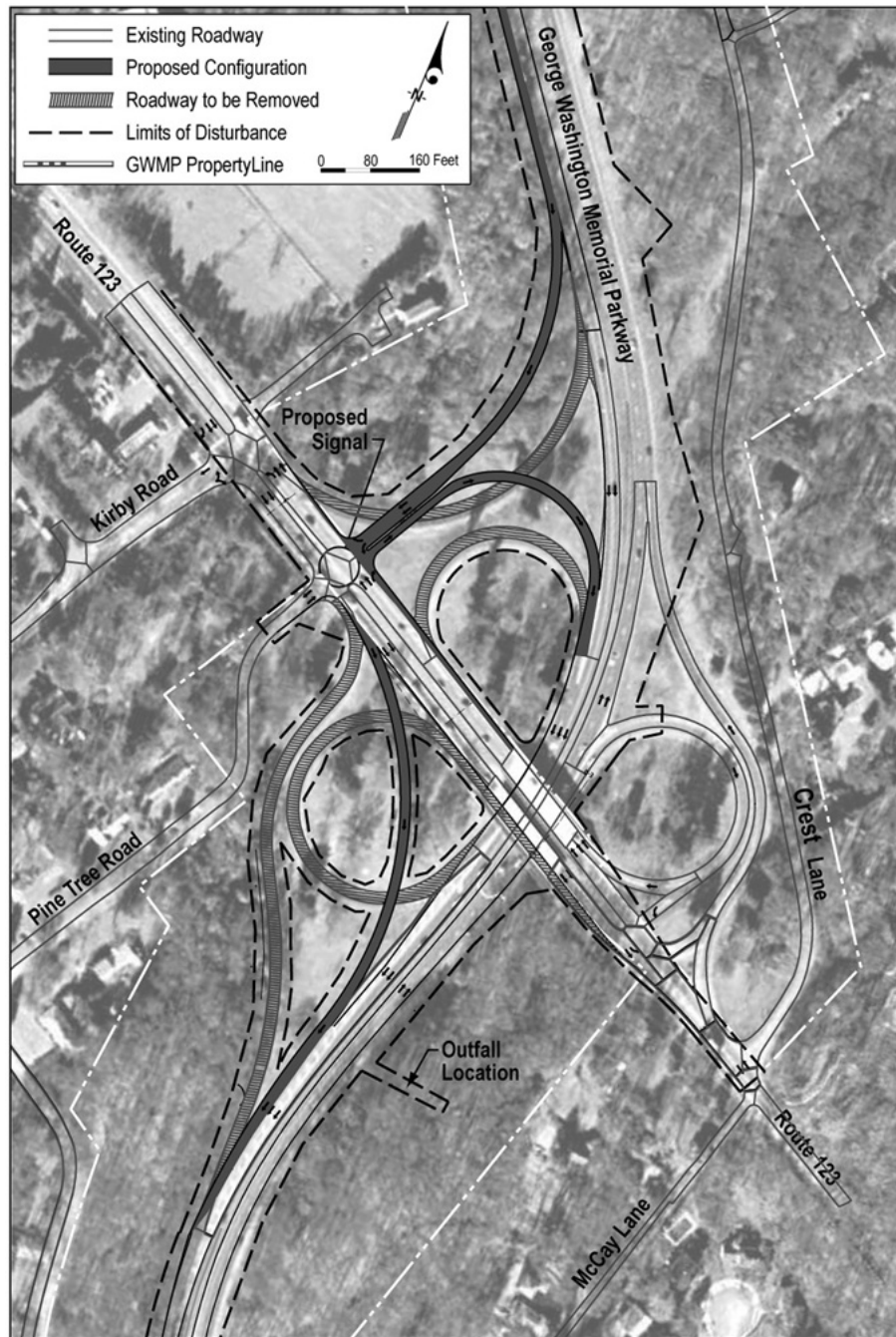


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**Figure 7. Route 123/GWMP Interchange Option 1**  
Source: *GWMP North Section Improvements* (Earth Tech, 2005)

### Option 2 – Route 123/GWMP Interchange Reconfiguration

- Consolidate southbound GWMP off ramps, intersecting opposite Pine Tree Road
- Create new signal at Pine Tree Road, clustered with existing signal at Kirby Road
- Realign Route 123 westbound on ramp to GWMP with larger radius
- Create new Route 123 eastbound on ramp to GWMP with compound curve removed
- Remove all existing ramps on the westbound side of GWMP (Earth Tech, 2005)



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**Figure 8. Route 123/GWMP Interchange Option 2**  
Source: *GWMP North Section Improvements* (Earth Tech, 2005)

### Option 3 – Route 123/GWMP Interchange Reconfiguration

- Consolidate southbound GWMP off and on ramps and intersect at a new intersection east of Pine Tree Road (modified diamond interchange)
- Removal of all existing ramps on the westbound side of GWMP (Earth Tech, 2005)



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**Figure 9. Route 123/GWMP Interchange Option 3**  
Source: *GWMP North Section Improvements* (Earth Tech, 2005)

**Option 4 – Route 123/GWMP Interchange Reconfiguration (Preferred Option)**

- Consolidate Route 123 on ramps to southbound GWMP and intersect at a new intersection east of Pine Tree Road (modified diamond interchange)
- Realign entrance to the Route 123 eastbound on ramp to GWMP and align opposite the consolidated off ramp from southbound GWMP
- Maintains tight southbound exit ramp to east bound Route 123
- Remove existing ramps in the northwest quadrant of the interchange (Earth Tech, 2005)



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**Figure 10. Route 123/GWMP Interchange Option 4**  
Source: *GWMP North Section Improvements* (Earth Tech, 2005)



### Option 5 – Route 123/GWMP Interchange Reconfiguration

- Modify existing Route 123 on ramp to southbound GWMP east of Pine Tree Road
- Use southbound off ramp for both eastbound and westbound Route 123 movements
- Remove existing ramps in the northwest quadrant of the interchange



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**Figure 11. Route 123/GWMP Interchange Option 5**  
Source: *GWMP North Section Improvements* (Earth Tech, 2005)

## ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with Director's Order #12 (NPS, 2001), the NPS is required to identify the "environmentally preferred alternative" in all environmental documents, including Environmental Assessments. The environmentally preferred alternative is determined by applying the criteria suggested in National Environmental Policy Act of 1969, which is guided by the Council on Environmental Quality. The Council on Environmental Quality provides direction that "[t]he environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in Section 101 of the National Environmental Policy Act, which considers:

- Fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations;
- Assuring for all generations safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
- Attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- Preserving important historic, cultural, and natural aspects of our national heritage and maintaining, wherever possible, an environment that supports diversity and variety of individual choice;
- Achieving a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
- Enhancing the quality of renewable resources and approaching the maximum attainable recycling of depletable resources (National Environmental Policy Act, Section 101)."

The No-Action Alternative is not the environmentally preferred alternative because it does not fulfill criteria 1, 2, 3, 5, and 6 listed above. Specifically, the No-Action Alternative would not meet criteria 1 (to assure that the north section of the GWMP is maintained long-term for each succeeding generation) because the roadway and drainage system would continue to deteriorate. The No-Action would, however, maintain the stone masonry walls in their original state, which are character-defining features of the Parkway. Criteria 2 and 3 would not be met because safety would be compromised because existing road conditions would continue to not meet modern safety standards. For instance, ponding water on the roadway causes an added hazard during storm events and the Route 123/GWMP interchange continues to cause safety concerns due to tight geometrics. The No-Action would continue to preserve the important historic, cultural, natural aspects through normal maintenance of the Parkway consistent with criterion 4. Rehabilitation would be necessary to achieve criterion 5: a balance between the resource and the population that use the Parkway to assure a high standard of living. The No-Action does not achieve this balance because the roadway is not designed for current speeds and excessive use. Lastly, the No-Action fails to enhance the quality of the resources (maintaining the useful life) of the Parkway and therefore does not fulfill criterion 6.

Alternative B, the Preferred Alternative, fulfills criteria 1, 2, 3, 5, and 6 of the environmentally preferred alternative but fails to meet criterion 4. The rehabilitation of the north section of the GWMP and the reconfiguration of the Route 123/GWMP interchange would fulfill the NPS's responsibilities as a responsible trustee of the environment (criterion 1) by rehabilitating certain



elements of the parkway essential to the long-term viability of the transportation infrastructure. Alternative B would assure a safe and aesthetically pleasing environment for future generations (criterion 2) through context sensitive design (i.e. simultaneously advancing the objectives of safety, mobility, enhancement of the natural environment, and preservation of community values) and avoidance measures to minimize impacts to sensitive natural resources on the Parkway. Alternative B attains the widest ranges of beneficial uses without risk of safety (criterion 3). The primary purpose of the proposed project is to enhance safety; through proper planning, the NPS has minimized the risk of other undesirable and unintended consequences. Alternative B would preserve to the extent possible important historic resources (criterion 4) through rehabilitation of the road surface and drainage system to extend the roadway's useful life; however, it fails to protect the contributing stone masonry walls because of necessary safety improvements. Alternative B achieves a balance between the resource and the population who use the Parkway to assure a high standard of living and enhances the quality of the renewable resource (criteria 5 and 6). This balance is accomplished through modernizing the existing drainage system and implementing modern safety standards with minimal compromise to the park resources and visitor experience and, again, because of the rehabilitation of the road surface and drainage system to extend their useful life. For these reasons described, Alternative B is the Environmentally Preferred Alternative.

## **PROJECT PHASING**

The EFLHD has developed three phasing schemes that are discussed in detail in *George Washington Memorial Parkway North Section Improvements Candidates Alternates Report* (Earth Tech, 2006). The main objective of project phasing is to determine the best construction scenario in terms of timeframes, bid packages, and costs for construction. The proposed project would likely be completed in three phases. The timing is uncertain and is dependent on project funding. The first phase would be the Route 123/GWMP interchange reconfiguration.

## **STAGING AREAS**

Staging areas for the project would utilize previous disturbed areas including the parking lots within Turkey Run Park, and maintenance areas (i.e. the "boneyard") as well as in some cases, the existing median. Lower parking lots in Turkey Run Park are presently being utilized for bridge painting on the northern section and would likely be used in some capacity for the GWMP North Section Rehabilitation. Based on past project experience in the northern section of the Parkway, the NPS would specify that the contractor stage their construction in previously disturbed areas away from visitor use to the extent possible. The contractor may seek off-site staging, for instance near GWMP 123 interchange. The contractor would be held responsible for complying with applicable local ordinances with regards to noise and use of the property.

## **MITIGATION MEASURES OF THE PREFERRED ALTERNATIVE**

Mitigation measures are presented as part of the Preferred Alternative and have been developed to lessen the adverse effects of the Preferred Alternative. The following mitigation measures are recommended for implementing the Preferred Alternative:

## CULTURAL RESOURCES

The NPS would continue coordination with the Virginia Department of Historic Resources, EFLHD, and the Advisory Council on Historic Preservation in accordance with Section 106 of the NHPA, as amended. The existing 1993 PA gives a sufficient framework in which to begin discussing adverse effects associated with this project. However, with the detailed studies that have been undertaken as part of this project, the NPS acknowledges that the 1997 temporary amendment to the PA has expired, and that a revised PA or an amendment to the 1993 PA would need to be formulated. A revised or amended PA would include coordination with the Virginia Department of Historic Resources, the Maryland Historical Trust, the DC Historic Preservation Office, and the Advisory Council on Historic Preservation. Mitigation for this particular undertaking would be conducted in a manner that is consistent with the *Secretary of Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Structures* and the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.

For the historic stone masonry guardwalls, NPS will document the historic stone masonry guardwalls on the north section. Features such as wall length, height, color, size of stones, spacing, mortar color, mortar type, and overall wall condition will be recorded. A representative sample of the walls will be photographed and sketch drawing completed.

A Cultural Landscape Inventory (CLI) will be prepared for the northern section of the GWMP. The CLI will provide detailed documentation of current and past contributing features to the GWMP cultural landscape. The CLI will also provide the framework for long-term management decision regarding protection of views and treatments for the cultural landscapes.

An archeological survey was undertaken for the area within the proposed roadway limit of disturbance and with a few exceptions, archeological resources were not uncovered in the proposed limits of disturbance because most of the improvements are within areas previously disturbed by the Parkway construction. If the work limits change from what was studied for the development of this Environmental Assessment/Assessment of Effect, additional archeological investigations would be required because archeological resource potential near the study area is high.

Between 2004 and 2007, three different archeological surveys were conducted within selected portions of the GWMP North Section Rehabilitation project area, in order to determine archeological resources within the project area. With a few exceptions, archeological resources were not uncovered in the proposed limits of disturbance because most of the improvements are within areas previously disturbed by the Parkway construction. Two instances of archeological resources were uncovered within the GWMP North Section mainline. Since these original surveys, planned to include improvements to the entrance of Fort Marcy have been dropped from this project. These sites now lie outside of the existing project area. Additional surveys of the outfall repair locations were conducted and the access routes to outfalls that traversed archeologically sensitive areas were modified to avoid these resources. If the work limits change from what was studied for the development of this Environmental Assessment/Assessment of Effect, additional archeological investigations would be required because archeological resource potential near the study area is high.

For those areas of known resources in the vicinity of the project limits of work, construction fencing would be installed near (but outside of) all park designated resource sensitive areas. The

project construction engineer and archeological monitor would be responsible for monitoring and enforcing the no impact zones. In particular, access and repair to outfalls would be conducted in such a manner to avoid archeological resources. A monitoring and contingency plan would be developed for outfall locations with known or high potential for archeological resources near or in work zones. In the event other known resources are uncovered or design changes, the NPS would seek to avoid the area to the extent practicable by choosing another access route or by choosing not to implement the improvement. If the area cannot be avoided, additional archeological investigation would be needed to determine the site's significance. Lastly, implementation of best management practices would occur to minimize ground disturbance activities that would affect archeological resources.

If archeological resources are uncovered during construction, all excavation work in that area would cease and archeological resources would be investigated. If the archeological resources are determined to be noteworthy by the park's cultural resource staff, the NPS would consult with the Virginia Department of Historic Resources to determine the appropriate next steps and, if necessary, mitigation. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act of 1990 (25 United States Code 3002) would be followed. All human remains, funerary objects, sacred objects, or objects of cultural patrimony would be left in place until the culturally affiliated tribe(s) was consulted and an appropriate mitigation or recovery strategy developed.

In the event human remains are discovered, ground disturbing activities would immediately cease, appropriate NPS Cultural Resources staff would be notified, as well as the local authorities, such as the police and/or the coroner, and the Virginia Department of Historic Resources in compliance with the Code of Virginia 10.1-2035. Paleontological remains and archeological specimens found within the construction area would be removed only by the NPS or their designated representatives. Workers would be informed on the penalties for illegally collecting artifacts or intentionally damaging archeological or historic property. Workers would be informed of the correct notification procedures in the event that previously unknown resources were uncovered during construction. In designated areas, ground-disturbing activities would be monitored by a NPS qualified archeologist for unanticipated discovery of archeological resources. If cultural material is uncovered during construction, work in the immediate area would be stopped, the site secured and GWMP would consult with VDHR according to 36 CFR 800.13.

#### **AESTHETICS AND VISUAL RESOURCES**

All work on the interchanges, roadway, guardrails and guardwalls, and median barriers would be conducted in a manner to minimize impacts to aesthetics and visual resources. Any new stonework necessary for the stone guardwall façades would use as much of the existing stone as feasible. The new work would match to the extent possible the color, texture, size of stones, and spatial relationship between the stones and mortar of the existing stonework and be conducted in a manner consistent with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*. To the extent practical, the construction equipment would be stored at a designated staging area to minimize visual impacts to the Parkway.

## TRANSPORTATION, TRAFFIC, AND SAFETY MITIGATION

Traffic Control and Management. A traffic control plan would be developed by the EFLHD and adhered to during construction by the contractor. Various work restrictions are necessary to minimize the impacts on traffic and safety. The EFLHD has prepared a conceptual group of traffic maintenance options in an effort to determine the most desirable method of maintaining traffic during construction (Earth Tech, 2005). Minimum traffic maintenance would include two traffic lanes inbound and one traffic lane outbound during the a.m. rush hour, and two traffic lanes outbound and one traffic lane inbound during the p.m. rush hour.

Coordination of Parkway Transportation Projects. The EFLHD, working in close coordination with the NPS, would consider the potential short-term adverse cumulative impacts on traffic when scheduling construction projects on the Parkway. Specifically, the traffic control and construction for the rehabilitation of the bridge over the north entrance to the airport, the Humpback Bridge replacement, the new entrance to Columbia Island Marina, and any other road improvements need to be coordinated and scheduled to minimize the potential cumulative effects on traffic congestion on the Parkway.

Trail Protection and Provisions. The Potomac Heritage Trail and a local trail provide access through the Route 123 Interchange. Trail safety provisions such as detours and user notifications would be implemented and incorporated into the public notification efforts for the duration of the alternatives and design. The NPS would try to keep the trail open during park operating hours, and any trail closures between Theodore Roosevelt Island and South Donaldson Overlook would be temporary and only during the guardwall construction.

The Maintenance of Traffic Plan would consider detours, closures, and protective measures for the Potomac Heritage Trail to ensure that visitors are safely and efficiently routed around construction in the project area. This plan would include means for communicating construction and closure schedules to the public and adequate barriers to keep visitors clear of active construction. In the event of total trail or road closures, press releases and notices on the park website would be made and signage would notify drivers of the intended closure dates and times.

## NATURAL RESOURCES

Use of Best Management Practices. Best management practices would be implemented by the contractor during construction. Soil compaction and disturbances would be kept to a minimal amount needed for construction activities. Appropriate sediment and erosion control measures (such as the installation silt fence and inlet protection) would be implemented to reduce soil erosion and runoff from the construction area. Disturbed soils would be revegetated according to the EFLHD and any additional GWMP requirements for soil stabilization and revegetation, including weed control measures. The contractor would implement measures to control fugitive dust during construction. Construction fencing would be installed near all park designated resource sensitive areas. The EFLHD construction engineer and biological monitor would be responsible for monitoring and enforcing the no impact zones.

Water Quality. The Preferred Alternative would be constructed in such a manner to avoid degrading water quality to the maximum extent possible. During construction, measures would be employed to prevent or control spills of fuels, lubricants, or other contaminants from entering waterways or wetlands. In addition, on-site water monitoring would be conducted if construction is needed on the banks of Windy Run, Gulf Branch, and Dead Run and known seeps to ensure

that water bodies within the study area would not be adversely impacted by construction activity. The contractor would implement erosion control measures to protect local water bodies from contamination. Actions would be consistent with the state's water quality standards and the Clean Water Act Section 401 certification. In the event outfall repairs are located in waters of the United States, a joint federal/state permit application would be prepared and submitted to Virginia Marine Resources Commission (VMRC) to obtain the appropriate authorization from the U.S. Army Corps of Engineers, Virginia Department of Environmental Quality, VMRC and other state agencies.

Vegetation. Impacted trees and shrubs would be replaced on a one-to-one diameter at breast height (dbh) ratio. Reclaimed areas would be monitored for up to three years after construction to determine if reclamation efforts are successful or if additional remedial actions are necessary. Remedial actions would include installation of erosion-control structures, reseeding and/or replanting the area, and controlling non-native plant species. In an effort to avoid the introduction of non-native/noxious plant species, no imported topsoil or hay bales would be used during revegetation. On a case-by-case basis the following materials would be evaluated for use for any erosion-control dams that would be necessary: certified weed-free rice straw, cereal grain straw that has been fumigated to kill weed seed, and wood excelsior bales.

Treatment of non-native vegetation would be completed in accordance with NPS-13, *Integrated Pest Management Guidelines*. To prevent the introduction and minimize the spread of non-native vegetation and noxious weeds, the following measures would be implemented during construction:

- Minimize soil disturbance.
- Pressure wash and/or steam clean all construction equipment to ensure that all equipment, machinery, rocks, gravel, or other materials are cleaned and weed free before entering the Parkway.
- Cover all haul trucks bringing asphalt or other fill materials from outside the park to prevent seed transport.
- Limit vehicle parking to existing roadways, parking lots, or access routes.
- Limit disturbance to roadsides and culvert areas, including limiting equipment to the roadbed area; no machinery or equipment should access areas outside the construction zone.
- Obtain all fill, rock, or additional topsoil from the project area, if possible. If not possible, obtaining weed-free sources from National Park Service approved sources outside the park would be required.
- Initiate revegetation of disturbed sites immediately following construction activities.

These measures would be specified to the contractor in the contract documents.

Rare, Threatened, and Endangered Species. For species of concern, areas with high potential or known resources would be surveyed at the approved time of year immediately before construction for each phase of work. The approved time of year would be determined through ongoing consultation with the GWMP's Natural Resource Manager and the Virginia Department of Con-

servation and Recreation. If any species is discovered during the survey, the area would be fenced and included as a no impact zone.

### **OUTFALL REHABILITATION**

In some instances, access to the areas for outfall rehabilitation is near known sensitive resources and outside of the existing disturbed areas. Many of these areas have been previously surveyed for rare plants and archeological resources. Additional natural and cultural resource surveys would be completed on a case-by-case basis, prior to subsequent design reviews, if required by GWMP resource staff. Additional hydrological and hydraulic analysis would be performed as necessary during the detailed design process to determine the potential impacts to streams and to assure adequate channel and bank protection. In areas of known rare species, biological monitoring would be performed to help monitor water quality and minimize disturbance to their habitat(s). Best Management Practices to minimize ground disturbance would be globally applied to the entire project, particularly drainage outfall construction activities.

At each design review, the interdisciplinary team, including GWMP resource staff, would conduct a field review, using the most up-to-date plans and make recommendations for additional mitigation strategies or special contract requirements. FHWA would make recommendations on how to provide construction access to outfalls that fall outside of existing disturbed corridors (i.e., over existing pipes) as soon as possible and prior to submission of the 70% design plans for GWMP resource staff review. Comments from GWMP resource staff would be incorporated into the 70% design plans.

A six to twelve foot wide access corridor would be specified to the contractor to minimize ground disturbance. The access corridors would avoid all areas of known sensitive resources. The access plan should identify the size and type of trees to be disturbed, and park staff would document these trees prior to disturbance. Individual trees requiring protection would be identified and appropriate barriers constructed. Access corridors would be surfaced with appropriate protective matting or similar Best Management Practices to further prevent disturbance. Construction barrier fencing would be required on both sides of construction access corridors. Access plans would also identify no impact zones, which would be the location of sensitive natural or cultural resources.

Prior to any drainage outfall construction activities (including clearing and grubbing, stockpiling of materials or equipment, and construction access routes), independent monitors would stake, flag, or mark construction limits and resource protection zones around cultural resource areas (i.e., historic stone headwalls) and natural resource areas (i.e., specimen trees, trees larger than 4 inches diameter at breast height, seeps). All drainage outfall construction activities would be conducted within the established construction limits and outside resource protection zones.

Archeological monitoring would be implemented during ground disturbing activities in the vicinity of culturally sensitive resources identified on the final design plans. Should cultural resources be discovered during ground disturbing activities, work would be halted in the area and the site secured until further direction from the Contract Officer. Construction debris would be immediately hauled away to an appropriate disposal location. GWMP resource staff, in consultation with FHWA, would make recommendations for additional outfall channel rehabilitation beyond what is shown on the 30% review plans. Soft (minimal impact) solutions would be explored for channel rehabilitation to the next downstream confluence, and in some cases, beyond, to a logical termination.

During construction, a hazardous spill plan would be in place, stating preventative measures as well as what actions would be taken in case a spill occurs. Construction debris would be immediately hauled to a NPS approved disposal location. Potential roadside habitat for small wildlife would be replaced if destroyed or damaged during construction. Reclaimed areas would be monitored after construction to determine if reclamation efforts are successful or if additional remedial actions are warranted. Revegetation would be initiated immediately following construction using site adapted native seed and/or plants. At the request of Park staff, trees removed by construction efforts would be left on site. Drainage outfalls identified as requiring additional rehabilitation would be recontoured and revegetated to natural conditions (natural spacing, abundance, and diversity of native plant species in the local vicinity) specified by GWMP staff and would be initiated immediately following construction. Native topsoil would be stripped and stored prior to any construction activity and reused as part of recontouring and revegetation activities. Imported hay bales or imported topsoil would not be permitted for any outfall construction or rehabilitation activities. Seed and planting plans would be implemented at the GWMP resource staffs discretion.

During construction, the following mitigation measures are recommended, where practicable, to limit impacts as a result of outfall repair access and construction:

- An independent biological monitor in consultation with the NPS Natural Resources Manager should be present during the construction activities for outfall repair and wall reconstruction. It is recommended that the contractor consult with this individual in the field as to the best access routes to each outfall in need of repair in order to minimize impacts to natural resources. Furthermore, tree protection measures should be explored and impacts to trees documented in the field.
- Any necessary tree pruning and/or removal should be conducted under the guidance of a tree care professional, such as a licensed arborist.
- The contractor should seek ways to minimize ground disturbance, such as rutting from construction equipment to the extent possible.
- When feasible, work in sensitive areas should be performed during the winter months when the ground is frozen, and herbaceous invasive species are less likely to establish.
- Where slopes permit, the use of structural matting or similar best management practices, should be utilized. While protective tree fencing would not be practical at each outfall repair point, the structural matting would be a useful tool in laying out least impacting access routes as well as to minimize ground disturbance caused by construction equipment accessing the outfall.
- Equipment size would be kept to a minimum for what is needed on each access route.

Pedestrian detours would be established and maintained around construction areas where required (i.e., Potomac Heritage National Scenic Trail). Trail safety provisions would be implemented along the Potomac Heritage Trail such as detours and closures. User notifications would be incorporated into the public notification efforts for the duration of design and construction. The NPS would make all feasible efforts to keep the trail open during park operating hours, and any trail closures would be temporary.

The GWMP Superintendent, DSC Project Manager and GWMP Project Manager would ensure that each project phase remains within the parameters established in the compliance documents and that required mitigation measures and special contract requirements are properly imple-

mented. GWMP resource staff and project managers would conduct and document a “Lessons Learned” field review / roundtable after the completion of each phase of construction, to be incorporated into subsequent phases of construction.

An education program would be presented by the field contact representative to all construction personnel prior to any construction activities. Following the onset of construction activities, any new employees would be required to formally complete the education program prior to working onsite. As a minimum, the education program would cover the following topics: (1) culturally and naturally sensitive resource distribution/occurrence; (2) sensitivity to human activities; (3) legal protection; (4) penalties for violation of state or federal laws; (5) reporting requirements; and (6) project protective mitigation measures. The NPS field contact representative would conspicuously stake, flag, or mark work area boundaries (including the new access roads, realignments, and parking/turnout areas) to minimize surface disturbance to the surrounding habitat. Material stockpiling, machinery storage, and vehicle parking would only be permitted in designated areas.

As more information is available during the detailed design, the design and construction methods would be evaluated for environmental consideration by a natural resources specialist familiar with the conditions on the GWMP.

#### **PUBLIC OUTREACH**

To notify park visitors and commuters of construction-related delays or changes in traffic patterns, the NPS would use a combination of public notification techniques such as posting information on the park’s website and public information meetings and/or open houses. Variable message boards on the Parkway would be posted two weeks in advance of construction and public notices would be placed in local newspapers or other sources. The EFLHD would coordinate construction activities with the Virginia Department of Transportation.

#### **SUSTAINABILITY**

The NPS has adopted the concept of sustainable design as a guiding principle of facility planning and development. The objectives of sustainability are to design park facilities to minimize adverse effects on natural and cultural values, to reflect their environmental setting, and to maintain and encourage biodiversity; to construct and retrofit facilities using energy-efficient materials and building techniques; to operate and maintain facilities to promote their sustainability; and to illustrate and promote conservation principles and practices through the sustainable design and ecologically sensitive use. Essentially, sustainability is living within the environment with the least impact on the environment.

The rehabilitation of the north section of the GWMP subscribes to and supports the NPS’s guiding principles on sustainability. The rehabilitation of the road surface would extend the life of the existing roadway, which would reduce maintenance requirements in the future. Use of the existing historic fabric of the stone walls to construct new stone masonry guardwalls supports sustainability. Overall, the proposed rehabilitation of the north section is the sustainable solution that makes the best use of the existing materials and opportunities to improve the site while improving safety and minimizing potential impacts on the natural and cultural environment.



## CONSTRUCTION COST AND SCHEDULE

The NPS projected an estimated project cost of between \$53 and \$57 million (EarthTech, 2006). The construction is initially planned for three phases during the Fiscal Years 2008 through 2011 timeframe.

## ALTERNATIVES CONSIDERED BUT DISMISSED

Other alternatives and options were considered during the planning stages and project scope development for this project. Alternatives considered, but dismissed, and the reasoning for their dismissal, are provided below.

**Barrier Option using Steel-Backed Timber Guardrail.** An option was considered that would replace all of the existing stone masonry guardwalls with steel-backed timber guardrail. This option was considered because it would open up existing views even further to the Potomac River. It would also provide some cohesiveness throughout the Parkway since steel-backed timber guardwalls are already present in several places along the Parkway. However, it was determined that the historic materials, patina, and natural character of the stone walls are essential character-defining features of the northern section of the Parkway. Replacing the historic stone walls with steel-backed timber guardrail opens the views to the Potomac, but the impacts to historic structures, the cultural landscape, and aesthetics and visual resources outweighed the benefits of the added view by the steel-backed timber guardrail; therefore, this option was dismissed.

**Reconfigure Entrance at Fort Marcy.** The existing entrance to Fort Marcy is a two-lane paved roadway that intersects with the northbound lanes of the GWMP. Acceleration and deceleration lanes are not provided, and the exit operates under stop control. The relocation of the park entrance approximately 575 feet to the north in order to allow for the addition of acceleration and deceleration lanes without any impacts to the Pimmit Run Bridge was considered, but the NPS found that impacts to cultural resources, specifically the earthworks associated with Fort Marcy, outweighed the benefits of the geometric improvements; hence, the improvement alternative was dismissed (Earth Tech, 2005). This decision was supported by the low number of accidents and a very low overall use of the entrance/exit during peak travel periods.

**Extension of Acceleration and Deceleration at Overlooks.** NPS considered extending the acceleration and deceleration lanes at the two Donaldson Run Overlooks but due to steep grades, cost of retaining walls needed, and resource impacts, the options were dismissed.

**Shift Parkway Baseline and Different Gutter Configurations.** Two alternatives were considered for the mainline alignment of the GWMP in the conceptual phase. The Shifted Baseline allowed for the modification to the curb and gutter section and/or shoulder on the median side, while minimizing the change in the footprint along the forest edge. Under this scenario, the baseline of each direction of the GWMP would be shifted closer to the median in order to allow for a new gutter pan on the outside lane and/or a wider shoulder on the outside edge of the roadway. This alternative is limited to where the alignment shift may occur because the median is too narrow in several areas, including the vicinity of the Windy Run Bridge, Donaldson Run, Fort Marcy Park, Route 123, the CIA interchange, Turkey Run, and the Capital Beltway. One of the disadvantages to this alternative is the costs associated with shifting the baseline. The second disadvantage to this alternative would be the disturbance of the median width and the resulting removal of trees from the median and subsequent impacts on cultural and

natural resources. Moreover, the duration of construction would be much longer, as would the preparation of roadway design plans.

A matrix of design options was considered for the applicability regarding curb and gutter configurations. Options included curb with a 12-inch gutter pan and curb with a 21-inch gutter pan. It was determined that either of these options would change the alignment of the Parkway resulting in impacts to the park resources and therefore were dismissed from future consideration.

## **IMPACT COMPARISON MATRIX**

Table 1 compares and contrasts each of the alternatives, including the degree to which each alternative accomplishes the purpose or fulfills the need identified in the Purpose and Need section. Table 2 presents impacts of the alternatives, including the No-Action Alternative for comparative purposes and a concise summary of each alternative's potential effects by impact topic. Table 3 provides a comparison of potential impacts associated with each interchange option at Route 123 and GWMP.

**TABLE 1: COMPARATIVE SUMMARY OF THE NO-ACTION AND ACTION ALTERNATIVE**

<b>Alternative A (No-Action Alternative)</b>	<b>Alternative B Rehabilitate GWMP from Spout Run to Capital Beltway Including Route 123/GWMP Interchange Reconfiguration (Preferred Alternative)</b>
<p>Under Alternate A (the No-Action Alternative), the NPS would continue management actions that would include minor repairs of the roadway while maintaining the existing integrity and character of the historic site.</p> <p><b>Meets Project Objectives?</b></p> <p>The No-Action Alternative does not fulfill the project objectives to improve safety and drainage conditions. Under the No-Action Alternative, only minor rehabilitation of the roadway would be conducted, as needed, which does not address safety and drainage concerns.</p>	<p>Under Alternative B (the Preferred Alternative), the NPS would implement a series of roadway, drainage, and ramp improvements on the Parkway from Spout Run to the Capital Beltway. The upgrades would involve numerous safety improvements such as installing crashworthy concrete-core guardwalls and steel-backed timber guardrails, extending acceleration and deceleration lanes, constructing new concrete curb, replacing drainage inlets and culverts, and rehabilitation of the shoulders. The roadway and ramps would be milled and overlaid, and the southbound side of Route 123/GWMP interchange would be reconfigured.</p> <p><b>Meets Project Objectives?</b></p> <p>Alternative B would fulfill the project objectives to improve safety and drainage along the northern section of the Parkway because construction of new concrete curb, installation of crashworthy guardwalls, milling and overlaying the road surface, extending acceleration/deceleration lanes, and reconfiguration of the Route 123/GWMP interchange would have safety and drainage improvements.</p>

**TABLE 2: COMPARATIVE SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS**

Impact Topic	Alternative A (No-Action Alternative)	Alternative B Rehabilitate GWMP from Spout Run to Capital Beltway Including Route 123/GWMP Interchange Reconfiguration (Preferred Alternative)
<b>Historic Structures</b>	The No-Action Alternative would have no adverse impacts on historic resources because the NPS would maintain the historic integrity of the Parkway near its existing state. No cumulative effect would occur.	Implementing Alternative B would have moderate long-term adverse impacts on historic structures of the Parkway because of changes in design elements necessary to comply with today's AASHTO safety guidelines. There would be no effect on other nearby historic structures eligible for or listed in the National Register of Historic Places. A moderate adverse cumulative effect would occur.
<b>Archeological Resources</b>	The No-Action Alternative would have no adverse impacts on archeological resources because there would be no earth disturbing activities associated with maintaining current conditions. No cumulative effect would occur.	Under Alternative B including Route 123/GWMP Interchange Option 4, negligible to minor impacts would occur to archeological resources because the area of potential effects (which includes the Parkway for the length of the project limit) was surveyed and the areas of known archeological resources would be avoided. No cumulative effects would occur.
<b>Cultural Landscapes</b>	The No-Action Alternative would have no impact on the cultural landscape because the NPS would perform minor spot repairs to maintain the appearance of the Parkway near its existing conditions. There would be no cumulative effect.	Implementing Alternative B would have moderate long-term adverse impacts on the cultural landscape because of the change in character of the historic stone walls, change in the views, and other changes to the historically-designed landscape. The rehabilitation of the north section of the GWMP would be conducted in accordance with the <i>Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes</i> . Alternative B would have a moderate adverse cumulative effect to the cultural landscape.
<b>Aesthetics and Visual Resources</b>	The No-Action Alternative would have no adverse impacts on the aesthetics and visual resources of the Parkway because the NPS would maintain near its existing state. No cumulative effect would occur.	Alternative B would have a moderate long-term adverse impact from changes to the designed landscape and the addition of new elements to the viewshed. A minor short-term adverse impact would occur during construction because of the equipment and signage necessary for construction activity. Minor, short-term and long-term, adverse cumulative effects would occur.

<b>Geological Resources</b>	The No-Action Alternative would have minor long-term adverse impacts on the geological resources because drainage from the Parkway would continue to erode the steep banks near the outfall pipes. A minor long-term adverse cumulative effect would occur.	Alternative B would have a long-term beneficial impact on geological resources because of the installation of new infrastructure and modern stormwater management practices as well as stabilization measures. No cumulative effect on geologic resources would occur.
<b>Impact Topic</b>	<b>Alternative A (No-Action Alternative)</b>	<b>Alternative B Rehabilitate GWMP from Spout Run to Capital Beltway Including Route 123/GWMP Interchange Reconfiguration (Preferred Alternative)</b>
<b>Soils</b>	The No-Action Alternative would have minor adverse impacts on soils on the Parkway because erosion at outfall pipes would continue. Minor long-term adverse cumulative effects would occur.	Implementation of Alternative B would have long-term beneficial impacts to soils. A minor long-term and short-term adverse impact to soils would occur. Minor short-term adverse cumulative effects would occur.
<b>Vegetation</b>	The No-Action Alternative would have no adverse impact on vegetation because the NPS would not require removal of existing vegetation along the parkway. No cumulative effects would occur.	Implementing Alternative B would have a minor long-term adverse impact on vegetation because the reconfiguration of the Route 123/GWMP interchange and outfall repairs would require the removal of vegetation and create the potential for invasive species to colonize with ground disturbing activities. Minor long-term adverse cumulative effects would occur.
<b>Wildlife</b>	The No-Action Alternative would have no adverse impact on wildlife because the NPS would maintain the Parkway near its existing state and there would be no impact on wildlife habitat. No cumulative effect would occur.	The implementation of Alternative B would have a minor, long-term and short-term, adverse impact to wildlife because of the removal of habitat and temporary human-caused disturbances. Negligible adverse cumulative effects would occur.
<b>Rare, Threatened, and Endangered Species and Habitat</b>	The No-Action Alternative would have no adverse impact on rare, threatened, and endangered species and habitat because the NPS would maintain the Parkway near its existing condition. No cumulative effect would occur.	No impacts to Rare, Threatened, and Endangered Species or their habitats would result from the implementation of Alternative B. No cumulative effect would occur.
<b>Surface Waters</b>	The No-Action Alternative would have a negligible long-term adverse impact on surface waters because of existing soil erosion and roadway drainage patterns. Negligible long-term adverse cumulative effects would occur.	The implementation of Alternative B would have minor short-term and long-term adverse impact to surface waters. Negligible long-term adverse cumulative effects would occur.

<b>Water Quality</b>	The No-Action Alternative would have a negligible long-term adverse impact on water quality because of soil erosion and current roadway drainage patterns. Negligible long term adverse cumulative effects would occur.	Implementing Alternative B would have a long-term beneficial impact on water quality due to the reduction of impervious surface at the Route 123/GWMP Interchange. A minor short-term adverse impact would occur from construction activities. Minor short-term adverse cumulative effects would occur.
<b>Impact Topic</b>	<b>Alternative A (No-Action Alternative)</b>	<b>Alternative B Rehabilitate GWMP from Spout Run to Capital Beltway Including Route 123/GWMP Interchange Reconfiguration (Preferred Alternative)</b>
<b>Safety</b>	The No-Action Alternative would have a moderate long-term adverse impact on safety because the Parkway would not be upgraded to AASHTO safety guidelines, which would pose a slight increase in risk of incidents due to the projected increase in visitors. No cumulative effect would occur.	The implementation of Alternative B would have a long-term beneficial impact to safety due to infrastructure improvements on the GWMP. Negligible short-term adverse impacts to safety would occur from construction activities. The long-term cumulative effects would be beneficial. Short-term negligible adverse cumulative effects would occur.
<b>Transportation (Traffic)</b>	The No-Action Alternative would have a minor long-term adverse impact on transportation (traffic) because the parkway would not be milled and overlaid and the Route 123/GWMP interchange would continue to present operational concerns due to its tight geometric configuration. No cumulative effect would occur.	A long-term beneficial impact would occur due to better traffic flow at the acceleration/deceleration lanes and Route 123/GWMP interchange. There would be some moderate short-term adverse impact to traffic in the study area associated with construction and lane closures during the implementation of Alternative B. The cumulative effects would be long-term and beneficial.
<b>Visitor Use and Experience</b>	The No-Action Alternative would have a negligible long-term adverse impact on the visitor experience because of safety and roadway operational concerns. Negligible adverse cumulative effect would occur.	Implementation of Alternative B would have a long-term beneficial impact on visitor experience because visitors to the GWMP would feel an added sense of safety and comfort while traveling the roadway after construction is complete. There would be a moderate adverse impact on visitor experience of the viewsheds due to the increased height of the new stone masonry guardwalls. Visitors would experience a minor short-term adverse impact during construction from added delays and temporary changes to the Parkway setting. A long-term beneficial cumulative effect would occur overall, and a minor short-term adverse cumulative effect would occur due to construction activities.

**TABLE 3: COMPARATIVE SUMMARY OF THE ROUTE 123/GWMP INTERCHANGE OPTIONS**

Impact Topic	Route 123/GWMP Interchange Impacts				
	Option 1	Option 2	Option 3	Option 4	Option 5
<b>Historic Structures</b>	- Moderate Long-Term Adverse Impact	- Moderate Long-Term Adverse Impact	- Moderate Long-Term Adverse Impact	- Moderate Long-Term Adverse Impact	- Moderate Long-Term Adverse Impact
<b>Archeological Resources</b>	- Moderate Long-Term Adverse Impact	- Moderate Long-Term Adverse Impact	- No Impact	- No Impact	- No Impact
<b>Cultural Landscapes</b>	- Minor Long-Term Adverse Impact	- Minor Long-Term Adverse Impact	- Minor Long-Term Adverse Impact	- Minor Long-Term Adverse Impact	- Minor Long-Term Adverse Impact
<b>Aesthetics and Visual Resources</b>	- Moderate Long-Term Adverse Impact	- Moderate Long-Term Adverse Impact	- Minor Long-Term Adverse Impact	- Minor Long-Term Adverse Impact	- Minor Long-Term Adverse Impact
<b>Geological Resources</b>	- No Impact	- No Impact	- No Impact	- No Impact	- No Impact
<b>Soils</b>	- Minor Short-Term Adverse Impact	- Minor Short-Term Adverse Impact	- Minor Short-Term Adverse Impact	- Minor Short-Term Adverse Impact	- Minor Short-Term Adverse Impact
<b>Vegetation</b>	- Minor Long-Term Adverse Impact	- Minor Long-Term Adverse Impact	- Negligible Long-Term Adverse Impact	- Negligible Long-Term Adverse Impact	- Negligible Long-Term Adverse Impact
<b>Wildlife</b>	- Minor Long-Term Adverse Impact	- Minor Long-Term Adverse Impact	- Minor Long-Term Adverse Impact	- Minor Long-Term Adverse Impact	- Minor Long-Term Adverse Impact

Impact Topic	Route 123/GWMP Interchange Impacts				
	Option1	Option 2	Option 3	Option 4	Option 5
<b>Rare, Threatened, and Endangered Species and Habitat</b>	- No Impact	- No Impact	- No Impact	- No Impact	- No Impact
<b>Surface Water</b>	- Minor Long-Term Adverse Impact	- Minor Long-Term Adverse Impact	- No Impact	- No Impact	- No Impact
<b>Water Quality</b>	- Minor Short-Term Adverse Impact	- Minor Short-Term Adverse Impact	- Minor Short-Term Adverse Impact	- Minor Short-Term Adverse Impact	- Minor Short-Term Adverse Impact
<b>Safety</b>	- Long-Term Beneficial Impact	- Long-Term Beneficial Impact	- Long-Term Beneficial Impact	- Long-Term Beneficial Impact	- Long-Term Beneficial Impact
<b>Transportation</b>	- Long-Term Beneficial Impact	- Long-Term Beneficial Impact	- Long-Term Beneficial Impact	- Long-Term Beneficial Impact	- Minor Long-Term Adverse Impact
<b>Visitor Use and Experience</b>	- Minor Long-Term Adverse Impact	- Long-Term Beneficial Impact	- Long-Term Beneficial Impact	- Long-Term Beneficial Impact	- Moderate Long-Term Adverse Impact



## AFFECTED ENVIRONMENT

### CULTURAL RESOURCES

Cultural resources for the purposes of this Environmental Assessment are further characterized as historic structures, cultural landscapes, and archeological resources.

“Historic properties,” as defined by the implementing regulations of the National Historic Preservation Act (36 CFR 800), are defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. This term includes artifacts, records, and the remains that are related to and located within such properties, as well as traditional and culturally important Native American sites and historic landscapes. The term “eligible for inclusion in the National Register” includes both properties formally determined eligible and all other properties that meet National Register listing criteria.

The significance of historic properties is generally judged against a property's ability to meet at least one of the following four criteria for inclusion on the National Register of Historic Places (36 CFR 60):

- Association with events that have made a noteworthy contribution to the broad patterns of our history; or
- Association with the lives of persons important in our past; or
- That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent an important and distinguishable entity whose components may lack individual distinction; or
- That has yielded, or may be likely to yield, information important in prehistory or history.

Properties may be eligible for the National Register for contributions at the national, state, or local level. Ordinarily, properties achieving significance within the last 50 years are not considered eligible unless they are integral parts of historic districts or unless they are of exceptional importance. The most common types of properties less than 50 years old listed on the National Register are works of modern architecture or scientific facilities. Additionally, in order for a structure or building to be listed in the National Register, it must possess historic integrity of those features necessary to convey its significance (i.e., location, design, setting, workmanship, materials, feeling, and association). For more information see National Register Bulletin #15, *How to Apply the National Register Criteria for Evaluation* (NPS, 1990).

### HISTORIC STRUCTURES

The GWMP was established in 1930 by the U.S. Congress as a memorial to George Washington. Ownership of the Parkway was transferred from the Office of Public Buildings and Public Works of the National Capital to the NPS on August 10, 1933 (The National Parks: Index 2001-2003). The Mount Vernon Memorial Highway (constructed in 1932) is the initial portion of the GWMP that links the southwestern end of Arlington Memorial Bridge on Columbia Island, which was renamed Lady Bird Johnson Park in the 1970s, and Washington, DC, with Mount Vernon in Fairfax County, Virginia. The route roughly parallels the Potomac River. The highway was de-

signed and landscaped to maximize scenic, aesthetic, and commemorative qualities, and today it retains much of its intended character (NPS GWMP, 1981).

According to NPS publication *Landscape Lines #16, Historic Roads*, the NPS received New Deal money through the Civil Conservation Corps (CCC) during the 1930s. Workers in the CCC upgraded existing roadways, and constructed many new roadways for the NPS. While the GWMP was not constructed through the NPS, this period of history is regarded as the “Golden Age” of the national park road building history and sets the foundation and building tradition for the northern section of the Parkway. Evidence of this road-building tradition is illustrated through the use of the framed vista, curvilinear alignments, and attractive guardwall design. Throughout the National Park system, the use of stone walls reflected local materials, had a rugged appearance, and became an integral component of the park experience (NPS, 2005-a). Thus it is not surprising that these road-building elements were successfully used for the construction of the northern section of the GWMP.

The stone guardwalls along the northern section of the Parkway range in height from 9 to 18 inches, with an average height of 16-18 inches. The total length of 65 guardwalls planned for salvage and reconstruction is approximately 22,000 linear feet. The walls serve to delineate the Parkway and provide a barrier between the roadway and steep slopes where there are serious drop-offs into the Potomac River Gorge. The Parkway was constructed in stages, with the original section – the Mount Vernon Memorial Highway – opening in 1932. Construction continued from Rosslyn to Spout Run in the 1940s, from Spout Run to the CIA interchange in 1959, and the last section, from the CIA interchange to the Capital Beltway in 1962. The walls have a slight variation of aesthetics and craftsmanship based on the period of construction.

The original section of the GWMP, the Mount Vernon Memorial Highway, was listed in the National Register in 1981 under criterion B for its commemoration of George Washington and criterion C for landscape architecture (NPS, 1981). The north section of the GWMP was listed in the National Register in 1995 under the same criteria.

The GWMP is significant because it is the first parkway constructed and maintained by the U.S. government. The original section of the GWMP, historically known as the Mount Vernon Memorial Highway, opened in 1932 to commemorate the bicentennial of George Washington’s birth. Through its location paralleling the Potomac River, the GWMP contributed to the establishment of a regional park system, providing protection to the shorelines of the Potomac River Gorge from private encroachment, and preserved the lands for public enjoyment (NPS GWMP, 1992).

The GWMP was designed to incorporate vistas of many of the cultural and natural elements along the Parkway, such as the Potomac River, rocky outcrops along the Potomac River Gorge and the many monuments in Washington, DC.

The bridges, culverts, and guardwalls of the GWMP were faced or entirely constructed with materials such as rustic rough-cut stone masonry (See Figure 12). Such structures were meant to complement the natural environment and are contributing resources to the National Register-listed Parkway. Many sections of the stone walls on the Parkway between the Theodore Roosevelt Island Bridge and Spout Run on the Parkway have been replaced with higher walls that have a stone façade, but the stone walls between Spout Run and the Capital Beltway remain largely as originally constructed and thus retain their as-constructed integrity.



**Figure 12. Existing stone walls on north section**

A survey was undertaken in January 2006 to document the existing physical attributes and condition of each of the historic stone walls in the north section of the Parkway. The walls were measured and described by the presence of large boulders, depth of mortar, distance to the road, and the type of view present (see Appendices E and F). These historic stone walls have an average height of 16 to 18 inches and allow for views of the Potomac River Gorge, historic Georgetown, and the monuments of the National Mall.

The Parkway south of Spout Run is surrounded by a number of historic, commemorative, and cultural resources, while the north section of the Parkway is more natural, dominated by various hills, valleys, wooded areas, and views of the Potomac River Gorge. Many nationally significant buildings, and national historic resources, however, can be easily seen by motorists from the area between Spout Run and Pimmit Run. The most prominent of these include the Washington Monument, Kennedy Center, Georgetown University, and the Lincoln Memorial. The ability to view these historic resources, as well as the Potomac River Gorge, is an important aspect of the landscape characteristics of the Parkway as well as a crucial element of the visitor experience.

Fort Marcy is perched 275.4 feet above the Potomac River Gorge on the northbound side of the GWMP leading from Chain Bridge to Langley and McLean, Virginia. The diameter of the fort is 338 feet. When completed, the fort mounted 18 guns, a 10-inch mortar and two 24-pounder Coehorn mortars. The hill on which the fort is located was known as Prospect Hill. Fort Marcy was named in honor of a native of Massachusetts, the Honorable Randolph B. Marcy, a distinguished soldier, chief of state, and father-in-law to General McClellan of the Union Army. Originally, the fort was called Fort Baldy Smith, after General W.F. Smith, the troops of whose division began construction of the fort. His division crossed Chain Bridge on the night of September 24, 1861, and immediately commenced construction of Fort Marcy. The 79th New York Highlanders, the 141st Pennsylvania, and the Iron Brigade completed the fort in the fall of 1862. The fort is relatively undisturbed, and entrenchments are still in a very good state of preservation and are apparent in many locations at the fort (NPS, 2005).

## ARCHEOLOGICAL RESOURCES

The GWMP has considerable archeological value that can be dated back to prehistoric times. Sites have been discovered throughout the GWMP from various field investigations. The following paragraphs are a summarized version of the Historic Context section taken from the *Phase I Archeological Survey of the Route 123/GWMP Interchange* (Comer & Katz, 2005). A more thorough historical account can be found in this supporting document.

### Site History Summary

It is thought that humans have occupied this region since the last glacial retreat at the end of the Pleistocene approximately 15,000 B.C. During this time, sea levels were appreciably lower and so the Potomac River Gorge and Chesapeake Bay did not exist. Between 12,000 B.C. and 7,500 B.C., warming environments led to the increase of sea level and the inundation of coastal environments. Humans during this time period survived in small, mobile bands of hunter-gatherers and relocated often, following large game such as elk, caribou, and deer (Comer & Katz, 2005).

During the Archaic Period (7,500 to 1,000 B.C.), cultural change and exploitation of resources increased dramatically. Technologies for hunting, fishing, and food preparation became more sophisticated. The climate was warm and wet, and gradually, more riverine and estuarine environments developed which increased aquatic resources utilization. Populations were expanding and camps were becoming increasingly permanent with an emphasis on local resource exploitation and social hierarchy.

Humans during the Woodland Period (1,000 B.C. to 1,000 A.D.) continued to evolve culturally and technologically. Populations increased while social hierarchy became much more a reality and habitation sites became more permanent. Ceramics and crop cultivation became prevalent during this period. Diverse food sources were utilized and storage facilities were created for long-term use. Warfare between tribes is also evident.

Captain John Smith marked the beginning of European contact with the Potomac River area. During the early 17<sup>th</sup> century, European settlements became more prevalent and relations with natives were generally poor. Wars were fought but subsided as European settlement spread and Indian treaties and reservations were initiated. In 1649, King Charles II granted the land that is now northern Virginia to several of his supporters who then sold the land to settlers, establishing plantations and small villages. Thomas Fairfax was given approximately 5 million acres of land, which eventually was sold, to Thomas Lee by Fairfax's daughter, Lady Catherine. The land in and surrounding the proposed project area, some 2,862 acres, was described as the land of the Potomac between Great Falls and Little Falls. Tobacco was the staple crop during this settlement period, which was cultivated and sent overseas. Slaves and indentured laborers frequently provided the labor.

During the 18<sup>th</sup> century, more settlers moved into the area and lands owned by Thomas Lee were resurveyed and frequently farmed by tenant farmers or sold to other settlers. Tobacco was replaced by wheat as the primary crop by 1760 and experimentation of a variety of other crops was conducted by many tenant farmers. Wheat mills were erected shortly after the rise of wheat production in the area.

In 1791, Virginia ceded a portion of Fairfax County to the federal government to help create the District of Columbia. It was then given back in 1847 but became Arlington County and a portion of Alexandria, Virginia. During the late 18<sup>th</sup> and early 19<sup>th</sup> centuries, transportation improve-

ments increased throughout the area. New roads were being built to connect towns and nearby states. Canal systems were built to connect the Lower Potomac and the Ohio Valley. Bridges were built that crossed the Potomac River and other rivers and streams allowing for faster and more efficient travel.

During the 19<sup>th</sup> century, the emerging industrial economy caused a rise in population in the area and the older agricultural based economy decreased in productivity. Farmers moved to the area to participate in industry and many others moved into the area as well. Residents had very mixed opinions on slavery and the use of slaves as labor. During the Civil War, much of Northern Virginia found itself in the middle of both the Union and Confederate forces. No battles were fought in the area; however, both armies marched through the area and built temporary camps on private landowners' property. After the Civil War, small towns, agriculture, and its proximity to the Capitol, helped the area to prosper.

During the 20<sup>th</sup> century, population growth and expansion from nearby Washington and other counties quickly applied pressure to the agriculture of the area. Government buildings and residential areas replaced farms and the area soon became populated with commercial businesses. In 1932, the federal government was given land from a deceased Joseph Leiter and purchased more land in the 1940s totaling approximately 582 acres. The land is now used by Federal Highway Administration, CIA, and the GWMP.

#### Previous Surveys and Recorded Sites

Several archeological investigations have been conducted in or near the study area during the past several years. The previous investigations are discussed in more detail below.

- *George Washington Memorial Parkway Reconnaissance.* The Fairfax County archeology office conducted a reconnaissance of the GWMP in 1980 and 1981. The goal of the reconnaissance was to identify sites alongside the GWMP for county management and planning purposes. The county archeologists traversed large areas examining exposed surfaces and selectively excavated shovel test pits (STPs) and stream bank cuts. No artifacts were collected and no report was produced as part of the reconnaissance; however, site forms were completed (Comer & Katz, 2005).

The county archeologists reconnoitered areas in the northern portion of the Route 123/GWMP project area. Six STPs were excavated in the northwestern portion of the study area. One possible flake made of quartz was observed in the testing. Two STPs were excavated in the northeastern portion of the Route 123/GWMP interchange; no artifacts were observed in this area. Along the entire length of the GWMP in Fairfax County, the reconnaissance identified 66 archeological sites. The prehistoric sites were typically located on hill-tops and ridge tops as well as alongside perennial streams. One quartz quarry was also identified in the study, located to the west of the Route 123/GWMP project area. Historic archeological sites showed less topographic patterning, were clustered along historic roadways, such as Georgetown Pike (Route 193) and on the bank of the Potomac River (Kat Comer & Katz, 2005).

- *Langley Development Survey.* Thunderbird Archeological Associates conducted a Phase I survey of a five-acre parcel in Langley, Virginia, in 1997. The proposed project area was alongside Georgetown Pike (Route 193) and included floodplains along Turkey Run. The survey identified two prehistoric sites alongside Turkey Run. Both sites had low densities of

prehistoric materials and artifacts limited to the plow zone. A scatter of historic artifacts was also identified (19<sup>th</sup> to 20<sup>th</sup> century), with a concentration along Georgetown Pike. The historic scatter was not considered a site. Thunderbird Archeological Associates recommended no further archeological work for the undertaking (Comer & Katz, 2005).

- *UNISITE Communications Tower Survey.* A Phase I archeological investigation was conducted at the areas to be affected by the proposed development of a communications tower, known as the UNISITE tower, located on Georgetown Pike (Route 193) in McLean, Virginia. EAC/A conducted the survey in 1997. The proposed project area was in proximity to Turkey Run. The survey identified a light scatter of prehistoric and historic artifacts as well as modern finds. The prehistoric artifacts were not temporally diagnostic and the historic materials dated to the early to mid 19<sup>th</sup> century. There were no concentrations of materials. No further archeological work was recommended for the proposed project (Comer & Katz, 2005).
- *Chain Bridge Waterline Survey.* In the early 1980s, the Arlington County Department of Public Works proposed improvements to a waterline following Chain Bridge across the Potomac River in Arlington County and the District of Columbia. A Phase I archeological survey was conducted of the proposed impact area. The survey found extensive disturbance and no archeological deposits (Comer & Katz, 2005).
- *Investigations of the Gulf Branch Site (44AR5).* The Gulf Branch Site is a stratified prehistoric site near the confluence of Gulf Branch and the Potomac River, in Arlington County, Virginia. It is located to the east of the Route 123/GWMP project area. The site was excavated by members of the Archeological Society of Virginia in the early 1970s. The site produced evidence of Late Archaic through Late Woodland Period occupation, and was determined to be a re-used seasonal fishing camp. Soapstone was also worked on the site. As far as the authors are able to determine, this site has retained integrity (Comer & Katz, 2005).

#### Archeological Surveys: North Section of GWMP

Between 2004 and 2007, three different archeological surveys were conducted within selected portions of the GWMP North Section Rehabilitation project area, in order to determine archeological resources within the project area. The Phase I survey included archival research and systematic excavation of shovel test pits (STPs) within the project area. In some cases, Phase II surveys were performed to include one meter square excavations and additional archival research to determine the sites potential significance or likelihood to be impacted by compaction or ground disturbance. The following is a summary of each event.

#### Archeological Survey of 7.5 Miles of Roadway and Route 123/GWMP Interchange

For the roadway corridor, a total of 513 STPs were excavated in the area of archeological potential as part of the first survey effort in 2004. The survey confirmed the presence of two potentially important sites within the Limits of Disturbance (LOD) for the project, including one historic site and one multicomponent historic and prehistoric site. It was recommended that additional work at Fort Marcy (44FX017) be completed to determine the integrity and potential significance of the prehistoric component identified within the limits of disturbance. The option to extend the deceleration lane at Fort Marcy was dropped from the project scope and additional Phase II testing did not occur. Additional work was also recommended at 44FX3165, a late nineteenth and twentieth century domestic site south of Fort Marcy. In addition to this Phase I sur-

vey, a supplementary Phase I backhoe testing study of the Yucca Site (44FX2945) and a Phase II evaluation study of the Paw Paw Patch site (44FX2946) were performed pursuant to previous recommendations (Comer & Katz, 2005). The results of these investigations for the Route 123/GWMP interchange area are summarized below.

A Phase I archeological investigation was conducted for the limits of work associated with GWMP/Route 123 interchange (Comer & Katz, 2005). The investigation involved historical background research and an archeological survey of 28.5 acres along the Route 123/GWMP interchange. Research conducted for the proposed project determined that the area has undergone several stages of development over its documented history. The survey identified two archeological sites (one historic, one prehistoric), and an additional four archeological loci (non-site artifact concentrations) (Comer & Katz, 2005).

The Phase I archeological investigation was successful at identifying two archeological resources: the Yucca Site and the Paw Paw Patch Site. Both resources were found in favorable locations as determined through background research. Historic deposits in the area were found principally alongside Route 123, a historic roadway. The prehistoric deposits were identified both in proximity to streams and on the top of a hill or ridge (Comer & Katz, 2005).

The historic site, the Yucca Site, consists of redeposited architectural and domestic items. The Yucca Site was located to the northwest quadrant of the GWMP and Route 123 Interchange. The site is approximately 1.04 acres in size. The 1956 plans for GWMP construction indicate that a two-story frame structure stood within the site area. Historic maps suggest that a building was in the area in the 19<sup>th</sup> century (Comer & Katz, 2005). A supplementary Phase I backhoe testing study of the Yucca Site was conducted (April and May 2005), although mechanical trenches excavated at the Yucca site failed to encounter subsurface features.

The prehistoric site, the Paw Paw Patch Site, is a campsite with activities focused on lithic tool production. No temporally diagnostic materials were recovered from the site, but the site is thought to date to the Archaic Period. The Paw Paw Patch Site was located in the vicinity of the Route 123/GWMP interchange, on the western side of the GWMP corridor. The site is approximately 0.68 acres in size. The site is situated immediately to the north of an unnamed stream and includes the stream bank and south-facing hillside. The hillside has a steep slope, approximately 10 to 15 degrees, and is entirely wooded (Comer & Katz, 2005). Phase II excavations at the Paw Paw Patch site in April and May 2005 did not encounter any diagnostic prehistoric artifact or intact cultural features of any kind. The diffuse nature of the artifact deposits and an overall lack of integrity at these sites due to disturbance caused by modern construction lead to a recommendation that no further work would be necessary at these sites.

#### Archeological Survey: Drainage Outfall Locations

The Phase I survey for the drainage outfall locations was conducted in March 2006 (Comer, Dongarra & Harris, 2006). The Area of Potential Effects (APE) was defined as 50 feet in all directions from the outfall. This preliminary survey was conducted prior to the survey team being furnished with detailed information on outfall repairs. An area of concern would be the potential for rock shelters as they are known to be located along the banks of the Potomac River Gorge and into Turkey Run Park. A total of sixty-eight outfall locations were included in the initial examination and assessment phase. Many of the sites were examined and assessed as having no potential for intact archeological resources because the outfalls were built into the road berm,

located in previously disturbed areas, or in areas with steep slopes that would have eroded the soils.

During the 2005-06 survey, the Phase I survey identified resources at outfall location 57 and outfall location 69. It was previously determined that cultural resources exist at both locations. For outfall location 69, the access route to the site was relocated to avoid the potential site. Location 57 has a small historic artifact concentration noted between the existing access road and the outfall location, and falls within the boundaries of archeological site 44FX017. Excavations conducted as part of this field survey identified a small lithic scatter located within the APE north of the outfall (Comer, Dongarra & Harris, 2006). Through additional investigation, it was determined that no cultural materials were within the proposed limits of work at outfall location 57; however, the site work would transect the larger site. In both cases, careful control of the area accessed and disturbed during repair work would avoid the resources.

Two outfall locations (75 and 76) are on the property formerly known as the Rokeby Estate. Oral tradition states that a slave cemetery was located on this estate. It is unlikely that these sites would be impacted because of the anticipated depth of resources associated with a cemetery; however, contingency plans are recommended to be developed for these sites if there are unanticipated finds during construction.

#### Additional Phase I and Phase II Investigation along Outfall Access Routes

An additional Phase I and II survey was conducted along access routes and outfall structures following the receipt of design information for the repair of the outfalls. This survey focused on those areas with archeological potential and the results were documented in an interim management summary on August 22, 2007 for the purposes of updating the EA. The final archeological report (Comer, Harris & Fracchia, 2007) is pending submittal to the Virginia Department of Historic Resources. Phase II evaluation investigations were conducted between October 1st and October 17, 2007 at seven outfall locations previously identified as containing archaeological deposits. A total of twelve one meter square excavation units and seven supplementary shovel test locations were excavated during the Phase II evaluation study. These evaluation investigations were specifically designed not to fully evaluate the potential National Register eligibility of these archaeological resources, but rather to evaluate the potential indirect impact to the identified resources, and determine if the anticipated soil compaction would in fact represent an adverse effect to these resources. In some cases the Phase II study was also sufficient to provide a reasoned argument for or against significance and potential National Register eligibility. The interim management summary reports the Phase II study evaluation of impact, and provides recommendations for or against further consideration for each studied outfall location. From the Phase II investigation, one site at Outfall 123 was found to be potentially important. Phase II testing at this location consisted of two test units, and seven subsequent shovel test pits to help establish the site boundaries. This prehistoric site is situated on a thin flat terrace which is just slightly elevated above a wide stream valley basin associated with Dead Run.

### **CULTURAL LANDSCAPES**

A cultural landscape is a geographic area, including both cultural and natural resources and the wildlife and domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic value. There are four general kinds of cultural landscapes: Historic Sites, Historic Designed Landscapes, Historic Vernacular Landscapes and Ethnographic Landscapes (NPS, 2002).



Although cultural landscape studies have not yet been completed for the north section, the NPS as mitigation for the project is preparing a Cultural Landscape Inventory (CLI) for the north section of the GWMP. Existing conditions and more detail information from the CLI will be incorporated into subsequent design reviews and considerations for the project. Furthermore, the NPS prepared a detailed viewshed inventory for this project (See Appendix E) and a video simulation that documented views from a driver's perspective along the north section of the GWMP between Spout Run and the Capital Beltway.

The GWMP is a Historic Designed Landscape, and as such the Parkway was designed with regards for scenery, topography, and the existing landscape rather than for directness. Although cultural landscape studies have not yet been completed for the north section of the GWMP, the Cultural Landscape Report for the Mount Vernon Memorial Highway gives an appropriate description: "Roadway alignment, topography, planting, vistas, and Parkway structures were the landscape elements employed by the Highway designer to achieve the desired 'memorial character.' Through the manipulation of these elements, the Highway's designers were able to translate the vision of a half century into a commemorative landscape that was beautiful and functional, poetic and rational" (NPS, 2005a).

Both the National Register of Historic Places nomination and the Historic American Engineering Record echo these qualities as character-defining features. The features on the northern section of the GWMP include:

- the rolling topography and spatial alignment of northbound and southbound lanes having separate grades to enhance viewing opportunities;
- planned views and vistas of the Potomac Palisades, hardwood forests and deep ravines, and Washington's monumental core;
- small-scaled features such as stone walls; and
- native and ornamental vegetation planted to soften the geometry of the median and shoulders.

The northern section of the Parkway with its rolling topography, framed views of forested areas and the Potomac River Gorge, and extensive use of stone for walls contrasts sharply with the wide, flat, expansiveness of the original section of the Parkway.

Because descriptions of views often have intangible qualities that are hard to define, one of the presentations at the Choosing-By-Advantages workshop offered participants a methodology on analyzing the quality of the views. This methodology was formulated by the Bureau of Land Management and implemented to fit the circumstances of the GWMP. The analysis asks participants to focus on landform, vegetation, water, color, adjacent scenery, scarcity of the view, and cultural modifications. The viewer is to define these items in the foreground, middleground, and background of each view and then rate the view by looking at the above characteristics. Through this exercise, it was determined that the views along the Parkway are very complex – and like all landscapes, have the potential to change from season to season. Therefore, an inventory was completed in January 2006, which further refined the types of views found along the Parkway to include canopy views, filtered views, filtered views with open slots, and open vistas. This information was then put into GIS and maps can be found as Appendix E.

## AESTHETICS AND VISUAL RESOURCES

Aesthetics and visual resources are those natural and cultural features of the environment that elicit one or more sensory reactions and evaluations by the observer, particularly in regards to pleasurable effects (Canter, 1996). The GWMP has numerous views that were planned by designers to provide travelers with spectacular scenery, dramatic views, and symbolic vistas. The northern section of the GWMP offers motorists scenic framed vistas of the Potomac River Gorge and the various monuments and memorials. GWMP designers employed the framed vistas technique in dramatic fashion along the Potomac Palisades, where southbound motorists are treated to views of Washington, DC. Framed vistas are views that were designed to provide travelers with forward views of scenes off the main axis of the Parkway. As the automobile evolved, motorists began traveling at higher and higher speeds. As a result, Parkway designers frequently combined a bend in the road with a break in the bordering vegetation to emphasis scenic vistas. These planned views or “windows” were deliberately limited in width and number to avoid creating a prolonged distraction. Today, these views are integral to the feel and experience of the northern section of the GWMP and are contributing elements to the cultural landscape.

Scenic overlooks were constructed along the Parkway to provide an opportunity for travelers to pull safely off the roadway and enjoy the view. These overlooks provide many spectacular views of the Potomac River Gorge and various views of Washington, DC (NPS, 1994). Two such overlooks, the North Donaldson Run and the South Donaldson Run, can be found on the northern section of the Parkway.

The GWMP was designed in a manner that promotes vistas of many of the cultural and natural elements along the Parkway, such as the rocky outcrops along the Potomac River Gorge and the many monuments in Washington, DC. In the area between Spout Run and Pimmit Run, the low-lying historic stone walls provide good views to the Potomac River Gorge and nearby monuments. These views have been somewhat obscured by uncontrolled growth of natural and planted vegetation. In the area north of Pimmit Run, higher terrain and dense vegetation obscure most, but not all, views of the Potomac River Gorge and monuments on the other side of the Potomac River.



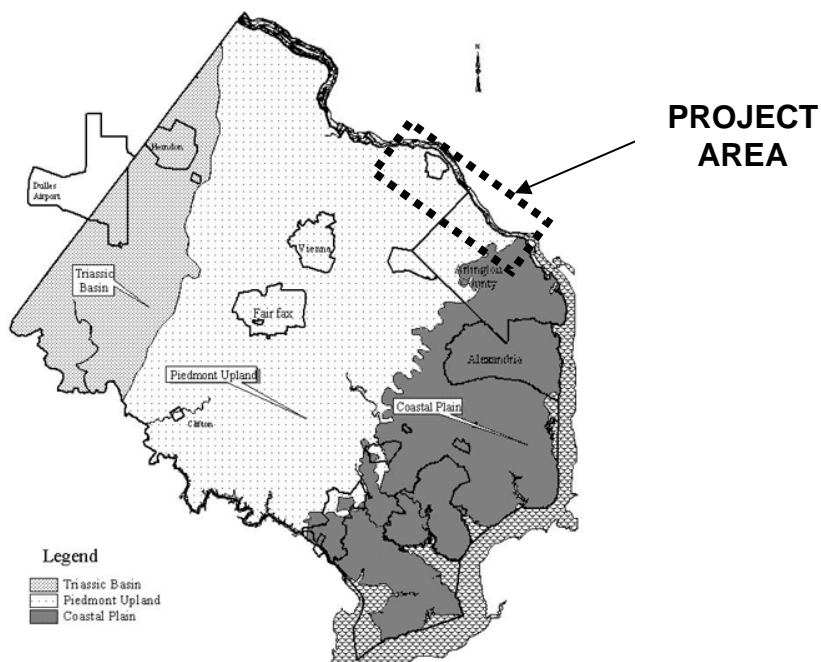
**Figure 13. View of Washington, DC, and the Potomac River Gorge from the southbound lanes on the GWMP**

Traveling southbound along the GWMP, western views include forest stands, residential areas, and views of Pimmit Run, Gulf Branch, Donaldson Run, and Windy Run. Eastern views of historic Washington, DC, include the Washington Monument, Lincoln Memorial, the Capitol, and the Potomac River Gorge (see Figure 13).

Because the aesthetic and visual experience that the GWMP offers those traveling on the roadway is exceptional, the project team devised a video-simulation of the Parkway with the different safety barrier options. The Parkway was filmed by a video camera mounted on a car, at eye-level, that captured views traveling northbound and southbound at 45 and 90 degree angles. The video was then used as the base for a computer-generated model of each wall option. This tool has and will continue to aid the project team in choosing the wall option that best mitigates the effects of replacing the existing stone walls.

## GEOLOGIC RESOURCES

The study area is located within the Piedmont Upland Physiographic Province (see Figure 14). The Piedmont of Virginia extends eastward from the Blue Ridge to the Fall Line, where Paleozoic-age and older igneous and metamorphic rocks (schist, granite, gneiss, etc.) are covered by unconsolidated sediments of the Atlantic Coastal Plain. The Virginia Piedmont is part of the greater southeastern Piedmont, which extends north from Alabama and into Maryland and southeastern Pennsylvania.



**Figure 14. Piedmont Upland Province where project site is located**

Source: Fairfax County, 2004

The Piedmont is characterized by deeply weathered, poorly exposed bedrock and a high degree of geological complexity (Fairfax County, 2005b). Relief of the Piedmont is low to moderate. A well-dissected, dendritic drainage pattern occurs throughout the province. The hilltops are typically fairly wide and rolling, except in places along the lower tributaries of large streams. Here,

V-shaped valleys with steep slopes and narrow ridge tops occur (Fairfax County, 2005b). There are no known faults or high-stream zones mapped in the area (Bailey, 2000).

## SOILS

The surface soils in the study area consist of moderately steep, very deep and well drained soils of the Glenelg and Manor series. Glenelg soils are characterized as fine-loamy and Manor soils are characterized as coarse-loamy. These soils have been formed in material weathered mainly from schist and gneiss and occur on strongly dissected areas in the Northern Piedmont. Areas of urban land covered by buildings, concrete, asphalt, or other impervious materials can also be found in this area (Arlington County, 1999).

Throughout the GWMP, outfall structures have heavily eroded the bank of the Potomac River. The outfalls are located high on the bank and no best management practices are in place to control the erosion of soil from the bank. This outfall erosion has also compromised the integrity of the outfalls, and landslides have become much more likely. Figure 15 is an example of undercutting that is occurring at several outfalls throughout the GWMP.



**Figure 15. Undercutting at storm drain outfall**

## VEGETATION

The vegetation of the GWMP includes a complex of upland, floodplain forest, and tidal marsh communities, as well as several rare plant species. Although disturbed, secondary forests are common in formerly cleared areas of the Parkway. Much of the contemporary forest consists of maturing second-growth stands that belong to the following ecological groups: basic mesic forest, mesic mixed hardwood forest, acidic oak-hickory forest, oak/heath forest, and Piedmont/Mountain floodplain forest. The project area surveyed consists mainly of upland, hardwood, and oak/heath forest habitat.

Turkey Run Park is considered one of the finest natural areas in the Potomac River Gorge because of its old-age forests and diverse flora. This area contains six upland forest communities, one non-alluvial wetland and seven riparian communities. A total of 290 acres in Turkey Run Park contain stands of ten forest community types that are valued because of their maturity, size, and/or overall quality. These forest communities cover areas on the north side of the GWMP and extend locally to the south side in the vicinities of Turkey Run and Dead Run. In addition, the understory and herbaceous vegetation of mature, mapped stands within this section are abundant with paw-paw (*Asimina triloba*) and numerous spring ephemeral wildflowers, and are considered to be among the highest quality stands of several community types in the Piedmont of Virginia. Similarly valued natural communities are found in the project area associated with Pimmit Run area, the strip of Parkway land southeast of Turkey Run Park, and the upland adjacent to the CIA interchange. *Phacelia covillei* has been observed in close proximity of the project site. This native vascular plant is considered a species of concern by the state of Virginia, and occurs on several rich slopes in the Turkey Run area. The American hazelnut is present within the Route 123/GWMP interchange. Although it is not a federal or state listed rare, threatened or endan-

gered species, the Route 123/GWMP interchange is the only known location of the species within the GWMP (NPS, 2005b).

Recognizing that the GWMP contains important natural resources, the NPS recommended vegetation surveys be conducted at locations where vegetation would be disturbed. Vegetation surveys were completed on July 13, 14, and 17, 2007 at a representative sample of existing stone masonry walls and existing outfalls that required reconstruction/repair. Both native and non-native vegetation was observed throughout the project area.

## **WILDLIFE**

The GWMP provides habitat for 243 species of birds, 24 mammals, 20 reptiles, 16 amphibians, 61 fish, 43 mollusks, 11 crustaceans, 76 butterflies, 722 moths, 420 beetles, 38 arachnids, 36 dragonflies and damselflies, and 28 caddisflies that have been documented as extant (NPS, 2007b). The north section of the GWMP is a relatively undeveloped area with a larger amount of natural habitat than other areas along the Parkway. Wildlife within the study area is typically that of hardwood and forest edge habitats. These habitats are common throughout the region and include many deciduous and coniferous tree species as well as a wide variety of birds, mammals, insects, etc. Species that are expected to be present within the study area include white-tailed deer (*Odocoileus virginianus*), northern gray squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), eastern cottontail (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), American robin (*Turdus migratorius*), American crow (*Corvus brachyrhynchos*), European starling (*Sturnus vulgaris*), mourning dove (*Zenaida macroura*), red-eyed vireo (*Vireo olivaceus*), wood thrush (*Hylocichla mustelina*), Pileated woodpecker (*Dryocopus pileatus*), house sparrow (*Passer domesticus*), northern cardinal (*Cardinalis cardinalis*), the eastern bluebird (*Sialia sialis*), and various species of small rodents.

## **RARE, THREATENED, AND ENDANGERED SPECIES AND CRITICAL HABITAT**

The 7,800 acres that comprise the GWMP provide habitat and protection for at least 64 species of plants and animals listed as rare, threatened, or endangered in the States of Virginia or Maryland by their Natural Heritage Programs. These include 49 species of vascular plants and 15 animals (5 vertebrates and 10 invertebrates). Important habitats for these species can be found at Great Falls Park, Turkey Run Park, and Dyke Marsh in Virginia; at Glen Echo Park in Maryland; and on Theodore Roosevelt Island in the District of Columbia. Turkey Run Park is the only known Virginia site for the spectacled nettle moth (*Abrostola urentis*). Many of these rare species are associated with rare plant communities of the Potomac River Gorge such as Bedrock Terrace Rim Xeric Forest and Bedrock Terrace Xeric Savanna. The natural areas within GWMP are so rich in biodiversity that the extent of species richness is not fully known (NPS, 2005b).

The 1973 Endangered Species Act, as amended, requires an examination of impacts to all federally listed rare, threatened, or endangered species. NPS policy requires examination of the impacts to state listed threatened or endangered species and Federal candidate species. The U.S. Fish and Wildlife Service (USFWS) and the Virginia Department of Conservation and Recreation were contacted to determine whether any known critical habitats or listed rare, threatened, or endangered species or species of concern have been documented on or adjacent to the project area. According to information received from the Virginia Department of Conservation and Recreation, the project area intersects three conservation sites. Turkey Run Park Slopes, Chain Bridge, and the Rosslyn Riverbank are conservation sites of significance. These sites support natural heritage resources and habitat as well as one or more rare plant, animal, or natural



communities (Virginia Department of Conservation and Recreation, 2005). The response letters are provided in Appendix C and list several rare species within the project vicinity.

According to a Rare Plant Survey performed by the Virginia Department of Conservation and Recreation in May 2005, several occurrences of the rare species *Phacelia covillei* were observed on the northern section of the Parkway (Virginia Department of Conservation and Recreation, 2005). *Phacelia covillei* is a native, annual, vascular dicotyledon belonging to the Waterleaf family (*Hydrophyllaceae*), and is listed as a species of concern by the state of Virginia.

Dr. David C. Culver of American University performed a groundwater invertebrate inventory of Gulf Branch, Donaldson Run, Windy Run, and Spout Run within the GWMP. Samples were taken from the hyporheic zone of Gulf Branch, Donaldson Run, and Windy Run. This zone is the saturated interstitial space within gravel, ranging from less than a meter to several meters beneath streams and rivers, and is an ecotone that is situated between surface waters and permanent groundwaters (Culver, 2005). Spout Run was not sampled due to inaccessibility.



**Figure 16. Example of Stygobromus species: *Stygobromus tenuis potomacus* (not to scale) Source: Culver, 2004**

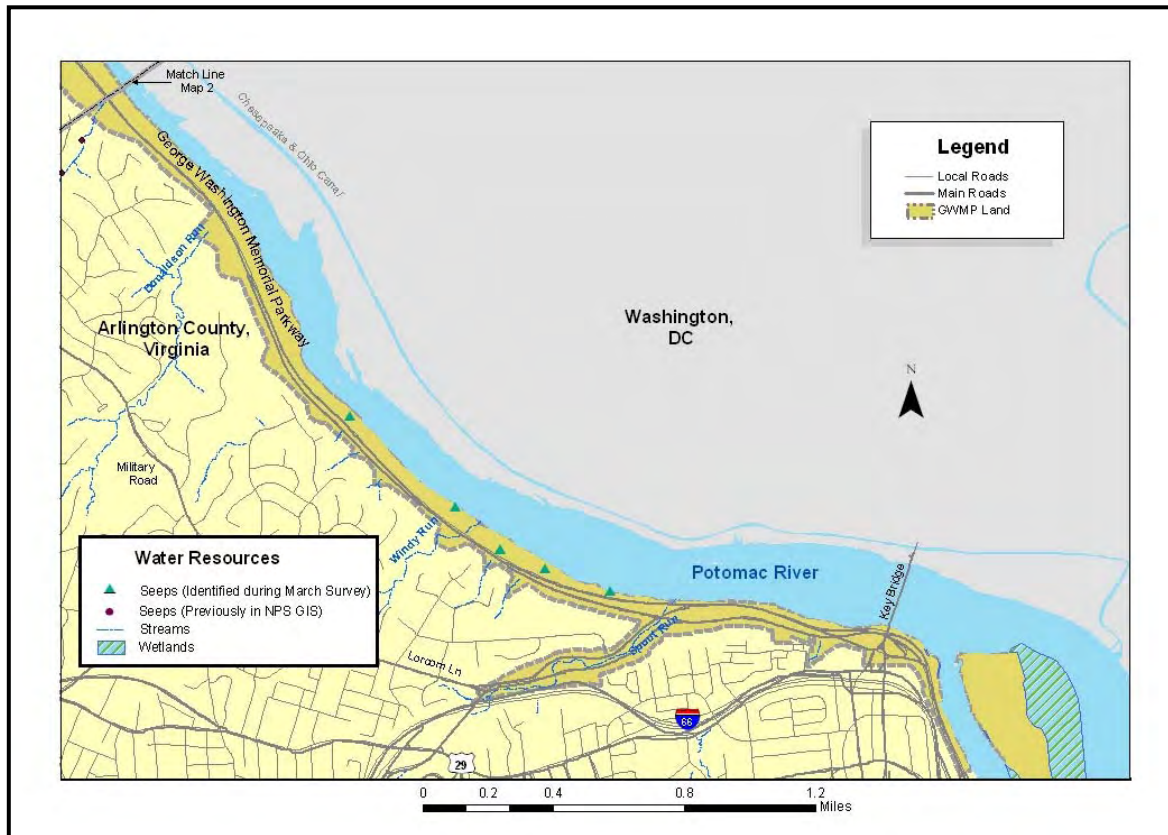
Six species of invertebrates were observed during sampling, two of which are classified as rare by the Virginia Department of Conservation and Recreation. *Stygobromus pizzinii* and *Stygobromus* sp. 15 (see Figure 16) were observed in samples taken from Windy Run and *Stygobromus* sp. 15 was found in samples taken from Gulf Branch (Culver, 2004). Both species of Amphipod were given an S1 ranking by Virginia Department of Conservation and Recreation, which defines these species as critically imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state (Virginia Department of Conservation and Recreation, 2005).

Additional field work was conducted along the north section of the GWMP corridor in March 2006; the purpose of which was to identify additional seeps and potential rare amphipod habitat, not already included in the NPS Geographic Information System (GIS) data and within and in the vicinity of the improvements identified in the action alternative. A total of eight new seeps were identified during this field study. An additional two seeps located near the GWMP/CIA interchange were previously documented by the NPS, but were rerecorded by using a Global Positioning System (GPS) unit for the purpose of this study due to their close proximity to the outfalls. Seep locations are presented in Figure 17.

The state rare snail *Striatura milium* (S1S3) was found in Turkey Run Park in 2004 (Hotopp, 2005). The state rare moths *Orthosia revicta* (Subdued Quaker Moth) S1S4, *Acronicta radcliffei* (Radcliffe's Dagger Moth) S2S4, *Anticlea vasiliata* (Variable Carpet) S1S3, *Metarranthis indeclinata* (Pale *Metarranthis*) S2S4, and *Oligia crytora* (Mantled Brocade) S1S3 were recently found in Turkey Run Park (Steury et al, 2007). The host plants for the larvae of these species are hawthorns and prunus sps. for *Acronicta radcliffei*, *Rubus* sps. for *Anticlea vasiliata*, persimmon, sassafras, cherry for *Metarranthis indeclinata*, and various trees including poplar and cherry for *Orthosia revicta*. The host plant species of *Oligia crytora* are not known.

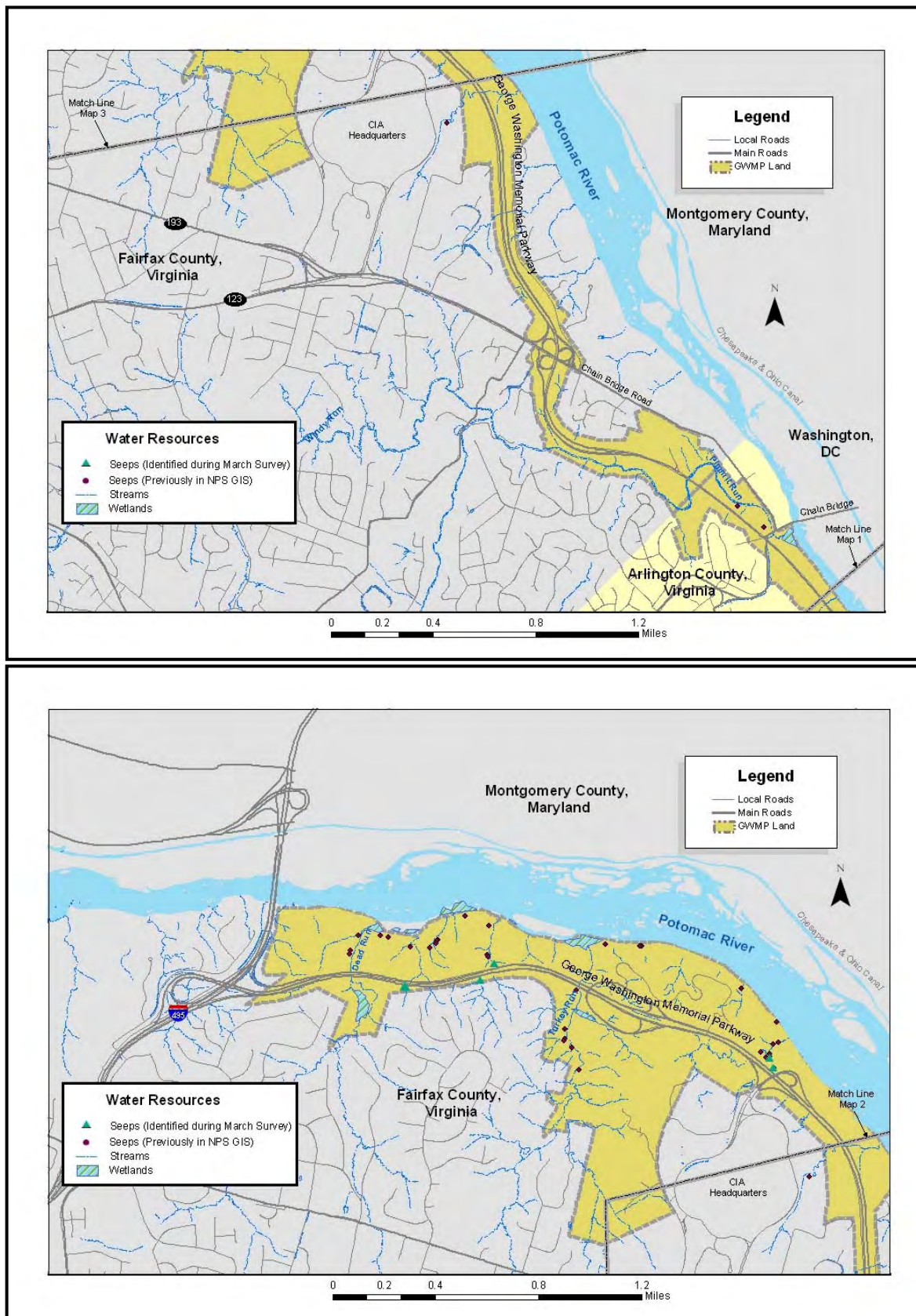
## SURFACE WATERS

There are numerous streams within the study area that feed into the Potomac River basin and the Chesapeake Bay estuarine system. Donaldson Run, Gulf Branch, Dead Run, Turkey Run, and Pimmit Run are all named perennial streams within the study area that feed the Potomac River (see Figure 17). The GWMP bridges each of these streams and the roadbed is approximately 25 to 30 feet above the streams.



NPS/DSC/SEPTEMBER/850/20057 1 of 2

Figure 17. Wetlands, Seeps, and Streams Locations, Map 1



NPS/DSC/SEPTEMBER/850/20057 2 of 2

Figure 17. Wetlands, Seeps, and Streams Locations, Maps 2 and 3



One unnamed stream is located in the vicinity of the Route 123/GWMP interchange. The stream in the vicinity of the study area begins at a culvert near the pumping station and flows towards the Potomac River to a concrete pipe where it flows under the Parkway mainline. Flowing water was observed within the streambed during field investigations. The stream is very shallow with good sinuosity and some straight sections. Leaf litter is present within the stream channel, which indicates slow stream flow. The presence of riffle-pool sequences and a weak presence of drift lines have also been observed. A small amount of green algae was observed within the stream channel and no rooted aquatic plants were noticed. No vertebrates were observed within the streambed during field investigations. Figure 18 shows two photographs of the stream near the Route 123/GWMP interchange.



**Figure 18. Unnamed stream northwest of the Route 123/GWMP interchange**

Throughout the GWMP, many of the existing outfall structures are highly degraded and in need of repair and/or replacement. Some of the pipes and outfalls convey jurisdictional waters of the U.S. (streams) from one side of the parkway to the other and eventually drain into the Potomac River. A Jurisdictional Determination by the U.S. Army Corps of Engineers will be necessary for pipes that convey streams (not drainage from the parkway) in order to determine the jurisdictional status of the associated waters. A Joint Federal/State Permit Application will have to be submitted to the Virginia Marine Resources Commission (VMRC) and permits received from VMRC, Virginia Department of Environmental Quality and U.S. Army Corps of Engineers for any work temporarily or permanently impacting waters of the U.S.

## **WATER QUALITY**

Development in Arlington and Fairfax Counties has impacted many of the perennial streams in both counties. More than half of the original stream network has been replaced by a dense network of underground storm sewers. During storm events, these sewers convey a large volume of runoff and pollutants to area streams at high velocities, causing stream bank erosion, water quality problems, and habitat degradation. Arlington and Fairfax Counties are highly urban jurisdictions, with approximately 30 to 40 percent of the land area covered by impervious surfaces such as streets, parking lots, and buildings, which do not allow rain to soak into the soil (Arlington County, 2005b, and Fairfax County, 2005b). Litter is a pervasive problem in streams because storm sewers serve as very efficient litter delivery systems. There is also evidence of recurring spills and leaks that adversely affect water quality. Also, bacteria levels in Four Mile Run, like most urban streams, routinely exceed water quality standards for primary contact recreation

(swimming, etc.). Unfortunately, a DNA study just completed by the Northern Virginia Regional Commission (NVRC) suggests that most sources of bacteria in Arlington streams are not readily controllable because they come from urban wildlife. Waterfowl, raccoon, and deer accounted for the majority of the bacterial DNA samples collected in the Four Mile Run watershed. In contrast, human and dog DNA were identified in about one-third of the samples (Arlington County, 2005b, and Fairfax County, 2005b).

In Arlington County, a stream inventory conducted in 1999 concluded that most county streams were in fair condition, with some severely degraded stream reaches. No county streams were evaluated to be in excellent condition. The inventory found 40 locations with active stream bank erosion and 70 locations where riparian buffers are in poor condition (Arlington County, 2005b). Fairfax County has designated many of the county's watersheds as either Watershed Protection or Watershed Restoration Areas. Watershed Restoration Areas have been prioritized using a level system, with Level II Watershed Restoration causing the most concern. Every watershed within the Fairfax County project area has been characterized as being in poor or very poor condition except Turkey Run, which has been characterized as being in excellent condition (Fairfax County, 2005b).

## **SAFETY**

There are several safety concerns that exist within the study area. The NPS is concerned with the acceleration/deceleration lanes at various areas along the north section of the Parkway. The acceleration/deceleration lanes at the Route 123/GWMP interchange, the CIA on and off ramps, and the park headquarters provide very little distance to accelerate/decelerate safely. Another safety concern along the Parkway is the drainage system, which is currently in the lane on the roadway. During storm events, ponding occurs at the drainage inlets and causes a roadway hazard.

An accident analysis was provided in the *George Washington Memorial Parkway North Section Improvements* report by Earth Tech (2005) that analyzed accident trends on the GWMP. Along the GWMP, rear-end collisions were recorded as the leading type of accident from January 1999 to September 30, 2004. A total of 659 accidents were recorded during this time period, and 321 of the 659 were rear-end collisions. Potential contributing factors to this type of collision is the number of intersections, including entrance and exit points at the Donaldson Run Overlooks, Fort Marcy Park, the Park Police/GWMP Headquarters, Spout Run Parkway, and the Route 123/GWMP interchange. In many cases, the entry and exit points along the GWMP have little or no acceleration/deceleration lanes to allow vehicles a transition to adjust their speeds. In cases where vehicles are exiting off the mainline, the traffic that follows could not anticipate a sudden decrease in speed and could end up in a collision. Vehicles entering the GWMP, where there is little room to merge, experience difficulty in finding acceptable gaps during periods of high traffic volumes, which would cause them to pull out in front of on-coming vehicles traveling at high speeds (Earth Tech, 2005).

Fixed object/animal collisions along the GWMP contributed to 211 of the 659 recorded accidents between January 1999 and September 30, 2004, making this type of collision the second leading collision type along the GWMP. Of the 211 fixed object/animal collisions, 73% were fixed object collisions. A potential contributing factor to this type of collision is the frequency of merging maneuvers during peak traffic periods. Vehicles attempting to merge onto the GWMP mainline from interchanges and intersections during peak traffic periods would more likely cause vehicles

driving along the GWMP to run off the road to avoid a collision with another vehicle (Earth Tech, 2005).

Information regarding vehicles vaulting the stone masonry guardwalls is not available. Statistical information gathered from the U.S. Park Police entitled “*Park Visitor Accidents by Location*” for FY 2005 provided that 455 crashes were documented along the GWMP. The report specifies if a fixed object was involved, characterizing these objects as a “tree,” “bridge structure,” “sign,” “guardrail barrier,” and “rock/stone wall.” Of the 455 accidents listed, 19 were linked to the “rock/stone wall, approximately 4%. The report also detailed the location of the accidents, with the bulk of these accidents occurring at intersections and bridges.

## TRANSPORTATION

Roadway Characteristics – Mainline GWMP. The north section of the GWMP is defined for this project as from the Capital Beltway to Spout Run. In the *Engineering Study for Roads and Bridges* prepared by the FHWA (FHWA, 2001), the north section of the Parkway is described as a four lane, divided highway, paved with asphalt. The roadway length is 7.1 miles, and the average roadway width is 24 feet. The posted speed limit is 50 miles per hour (mph) from the Capital Beltway to Windy Run, and 40 mph from Windy Run to Spout Run. The Parkway is striped with mountable concrete curbs in both directions with the exception of the median between Route 123 and the CIA ramps where there are no curbs.

The travel lanes are separated by a variable width grass median. From the interchange with the Capital Beltway to the Chain Bridge Road interchange, and from Donaldson Run to Spout Run, the grass median is more than 30 feet wide. From Chain Bridge Road interchange to Donaldson Run, the average median width is approximately 10 feet. This section has steel W-beam guardrails as temporary median barriers or stone-faced, concrete guardwalls to prevent crossover collision from occurring (FHWA, 2001). The asphalt was described in the engineering study as being in generally fair condition. Minor to moderate potholing and alligator cracking were noticed in some areas.

Route 123/GWMP Interchange. The Route 123/GWMP interchange crosses the GWMP approximately halfway between the Capital Beltway and the Spout Run Parkway. The interchange is a partial cloverleaf with loop ramps and directional ramps in three out of the four quadrants of the interchange. The Route 123/GWMP interchange serves as a connection between Washington, DC, to the southeast, and McLean, Virginia, to the west. As a result, two of the ramps carry traffic volumes that are five to ten times higher than the other ramps. The existing configuration at the interchange allows for a free-flow movement onto the GWMP for vehicles using these ramps; however, in order to accommodate this free-flow condition, the two southbound lanes of GWMP merge into one lane just north of the eastbound-to-southbound ramp terminal. During peak traffic periods, the reduction in southbound through lanes at the interchange can exacerbate congestion along the GWMP (Earth Tech, 2005).

Drainage Features. Curb inlets are located in the median and along the shoulders to aid in drainage of the Parkway road surface. Water from these curb inlets flows into pipe culvert systems that outlet onto the steep slopes facing the Potomac River. The roadside and median ditches are drained by field inlets tying into the same storm drain system. The drop inlets are slightly below the road surface and, as a result, have a similar effect on vehicles as potholes. The curbed sections with these inlets present a hazard to errant vehicles. Ponding often occurs at these inlets during rainfall events presenting another hazard for motorists on the Parkway.

Traffic Counts and Level of Service. The GWMP is a chief commuter route between northern Virginia and Washington, DC, that carries in excess of 50,000 vehicles per day and provides access to NPS recreational sites along the Parkway at Turkey Run Park and Fort Marcy Park, the Park Police/GWMP Headquarters, and two scenic overlook parking areas (Peccia, 1998)

Traffic capacity is defined as the maximum number of vehicles that a highway can accommodate with a reasonable margin of safety, within a specific amount of time. Capacity is measured by what is known as "Level of Service" (LOS). LOS qualifies traffic conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service, ranging from LOS A to LOS F, are used to define congestion and operating conditions on roadways. Each level represents a range of operating conditions, with LOS A representing the best operating conditions (free-flowing traffic) and LOS F the worst (extremely congested stop-and-go traffic). Additionally, specific LOS definitions vary by speed limits and roadway types (freeways, rural roads, arterials, etc.). Table 4 defines a typical LOS rating system for portions of the north section of the GWMP.

Traffic volume data is typically a good indicator of the vehicular utilization of the roadway. In 2004, a traffic analysis was performed by Earth Tech on the existing roadway network at key locations in the study area. The purpose of this analysis was to assess the current levels of service (LOS) for the existing conditions along the north section of the GWMP. The intersection of Pine Tree Road and Route 123, and the intersection of east GWMP with Route 123 have been determined to have the highest LOS (worst operating conditions) on the north section of the Parkway. During peak a.m. and p.m. traffic conditions, the LOS for these areas was LOS F. The intersection of Crest Lane with Route 123 experiences a LOS F level during peak p.m. hours (Earth Tech, 2005). During peak a.m. hours, traffic volumes along southbound GWMP south of Route 123 experiences a level of LOS E. In addition, during a.m. hours, traffic volumes on southbound GWMP at the CIA merge and diverge ramps experience a level of LOS E. Table 4 shows existing levels for several locations along the north section of the GWMP. The peak traffic volumes throughout the Parkway were the highest during the morning and evening rush hours as expected.

**TABLE 4: EXISTING LEVELS OF SERVICE ALONG THE NORTH SECTION OF THE GWMP**

Intersection or Ramp Junction	2005 Level of Service (LOS)	
	AM	PM
Intersection of Kirby Road with Route 123	C	B
Intersection of Pine Tree Road with Route 123	F	F
Intersection of East GWMP Ramps with Route 123	F	F
Intersection of Crest Lane with Route 123	C	F
Southbound GWMP Diverge Ramp to Westbound Route 123	D	C
Northbound GWMP Merge Ramp from Route 123	C	C
Northbound GWMP Diverge Ramp to Route 123	D	D
Southbound GWMP Weave between On Ramp & Off Ramp to Route 123	B	B
Southbound GWMP Mainline North of Route 123	D	C
Southbound GWMP Mainline South of Route 123	E	D
Northbound GWMP Mainline North of Route 123	C	C
Northbound GWMP Mainline South of Route 123	D	D
Northbound GWMP Diverge Ramp to Turkey Run Park	C	C
Northbound GWMP Merge Ramp to Turkey Run Park	C	C
Southbound GWMP Diverge Ramp from Turkey Run Park	D	B
Southbound GWMP Merge Ramp from Turkey Run Park	D	B
Northbound GWMP Mainline North of CIA Entrance	C	C
Southbound GWMP Mainline North of CIA Entrance	D	B

Source: Earth Tech, 2005

## VISITOR USE AND EXPERIENCE

In fiscal year 2004, the GWMP totaled 7,277,497 recreational visits (NPS, 2005). The Parkway is open year round, with the highest visitation in the spring and fall. The typical visitor experience includes travel to many of the historical, natural, or recreational areas along the Parkway either by automobile on the roadway or by foot or bicycle on the linear trail network. The travel is highlighted by the many scenic vistas. The GWMP provides visitors and residents of the area a scenic, historic, and recreational setting that offers a respite from the urban pressures of a metropolitan area. Recreational activities along the Parkway include, but are not limited to fishing, picnicking, bird watching, kayaking and canoeing, jogging, bicycling, hiking, educational nature walks, and auto touring.

The Potomac Heritage Trail (PHT) is a 10 mile segment of the Potomac Heritage National Scenic Trail that is located along the Potomac River and the GWMP. The PHT is a well-marked trail that has several access points and provides visitors with scenic views of natural and historical landscapes. The trail starts at the Capital Beltway and proceeds to the Theodore Roosevelt Island, just south of the Spout Run interchange. The PHT winds along steep, rocky hillsides, forested stream valleys, and sites like Fort Marcy, Turkey Run Park, and other areas of historic significance. The trail is adjacent to several masonry guardwalls and passes through the Route 123/GWMP interchange approximately 5½ miles north of the southern terminus of the Preferred Alternative.

## ENVIRONMENTAL CONSEQUENCES

### INTRODUCTION

This section describes the environmental consequences associated with each alternative. It is organized by impact topics, which refine the issues and concerns into distinct topics for discussion analysis. These topics allow a standardized comparison between the alternatives based on their impact to the environment. The National Environmental Policy Act of 1969 requires consideration of type, context, intensity, and duration of direct, indirect, and cumulative impacts plus measures to mitigate the impacts. Direct or indirect effects are assessed in this document, although they may not be specifically labeled as direct or indirect. Cumulative impacts are identified separately. NPS policy also requires that “impairment” of park resources be evaluated in all environmental documents.

### METHODOLOGY FOR ASSESSING IMPACTS

Potential impacts are described in terms of:

- Type - are the effects beneficial or adverse,
- Context - are the effects site-specific, local, or regional,
- Duration - are the effects short-term or long-term and
- Intensity - are the effects negligible, minor, moderate, or major.

Because definitions of intensity (negligible, minor, moderate, major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this Environmental Assessment. In addition, the duration of the impact is analyzed independently for each resource because the impact duration is dependent on the resource being analyzed. Depending on the resource, impacts would last as long as construction takes place or a single year or growing season or longer. In general, impacts were determined through the consultation and collaboration of a multidiscipline team of NPS, Federal Highway Administration and consultant professional staff. In addition, regulatory agency consultation and other existing sources such as any existing literature or park planning documents were used to assess the potential impact associated with each alternative.

### CUMULATIVE EFFECTS

The Council on Environmental Quality regulations, which implement the National Environmental Policy Act, require assessment of cumulative impacts in the decision-making process for federally funded projects. Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7). Cumulative effects can result from individually minor, but collectively moderate or major actions taking place over a period of time. Cumulative effects are considered for all alternatives and are presented at the end of each impact topic discussion analysis.

Cumulative effects were determined by combining the impacts of the alternatives with other past, present, and reasonable foreseeable future actions. Therefore, it was necessary to identify other past, ongoing, or foreseeable future projects within the GWMP and, if necessary, the surrounding

region. Cumulative effects are evaluated in a regional context, which varies for each impact topic; however, in general, the regional context is the Parkway, the Ronald Reagan Washington National Airport to the south, the Clara Barton Parkway to the north, the Capital Beltway to the west, and the properties abutting the Parkway to the south. Future projects that would have the potential to add to cumulative effects include the Humpback Bridge replacement, the new entrance to Columbia Island Marina, Clara Barton Parkway projects, the bridge rehabilitation at the north entrance to the airport, and holiday and special events on the Parkway.

## PROJECTS THAT MAKE UP THE CUMULATIVE EFFECTS SCENARIO

To determine potential cumulative impacts, projects in the area surrounding the north section of the GWMP were identified. The area included the section of the GWMP south of the study limits, the Clara Barton Parkway, and the nearby lands administered by the States of Virginia and Maryland. Projects were determined through both in-person meetings and phone calls with county and town governments and state land managers. Projects identified as having potential cumulative effects included any planning or development activities that have already been implemented or that would be implemented in the reasonably foreseeable future.

These cumulative actions were evaluated in the cumulative impact analysis in conjunction with the impacts of each alternative to determine if they would have any additive effects on a particular natural resource, cultural resource, visitor use, or the socio-economic environment.

As part of the analysis and consideration of potential cumulative impacts, other past, present, and reasonably foreseeable projects were identified. For each project the NPS considered the potential cumulative effect with the potential impacts of the GWMP North Section Rehabilitation. A brief description is provided of the proposed projects identified in the cumulative impact scenario. Projects that have the potential of contributing to cumulative effects are discussed further in the impact analysis.

### Past Actions

- **Rehabilitation of the South Section of the GWMP.** The NPS, in cooperation with the EFLHD, undertook a comprehensive rehabilitation project on the south section of the GWMP. The project was completed in 1997. The scope of the proposed project included rehabilitating the pavement, replacing existing guardwalls with stone-faced concrete core walls that meet AASHTO guidelines, and other safety related improvements.
- **Bridge Rehabilitation Projects on GWMP.** Over the past ten years, most of the bridges on the north section of the Parkway have been rehabilitated. The work included deck repair, pavement rehabilitation, painting, and extension and modification to the existing guardwalls.
- **George Washington Memorial Parkway, Rehabilitation of the Bridge over the North Entrance to Ronald Reagan Washington National Airport.** It was determined that the bridge to the north entrance of the airport was deteriorating, and rehabilitation was needed to restore aesthetics and to prolong the bridge's historical integrity. It was also decided that the Mount Vernon Trail was a safety concern because of its close proximity to the roadway, prompting the need for a realignment of the trail. In the Environmental Assessment, the NPS in cooperation with the EFLHD proposed to rehabilitate the historic bridge. Improvements included the replacement of the bridge decking, repair of guardrails and railings, and realignment of the Mount Vernon Trail farther away from the highway by either a bridge extension or a new trail bridge. The preferred alternative included the replacement of the



guardrails and railings, and the extension of the bridge in order to realign the trail farther away from the highway. The NPS completed construction in the fiscal year 2007.

### Current and Future Actions

- **Mount Vernon Trail Extension.** The NPS received a proposal by the Virginia Bicycling Federation and the Washington Area Bicyclist Association to conduct a feasibility study, to examine an extension of the Mount Vernon Trail. The NPS performed a study which examined the technical feasibility of placing a paved trail leading from the parking area at Theodore Roosevelt Island to the Capital Beltway at the American Legion Bridge. Presently, the NPS is studying the potential environmental consequences of extending the Mount Vernon Trail. This project would involve the possible construction of a 9-foot multiple-use trail on the GWMP to connect existing and/or future Fairfax and Arlington County trails.
- **Humpback Bridge Replacement and New Entrance to Columbia Island Marina.** A number of operational and design deficiencies have been identified in the 14<sup>th</sup> Street Bridge corridor. As a result of the deficiencies, this area experiences a high frequency of accidents. In March 2002, the Federal Highway Administration in cooperation with the NPS completed an Environmental Assessment for Roadway and Trail Safety Improvements on the GWMP. In the Environmental Assessment, both agencies proposed to modify the existing access ramps, roadway, pedestrian/bicycle trails, and parking area to correct the design deficiencies and satisfy safety concerns. The preferred alternative includes replacing the Humpback Bridge and making improvements to the entrance to the Columbia Island Marina (Federal Highway Administration, 2002). The construction of the Replacement of Humpback Bridge is anticipated to begin in January 2008.
- **Arlington County and Vicinity Boathouse.** In August 2002, the NPS released a study entitled *Facility and Site Analysis for a Boathouse on the Potomac River*. The study was initiated at the request of the U.S. Congress for assessing a potential site of a boathouse along the Potomac River within Arlington County. Presently, the NPS is preparing an Environmental Impact Statement for four project alternatives. The proposed project includes building a boathouse with indoor storage space and floating docks at four possible locations: two on the Rosslyn Waterfront, one south of the CSX/14<sup>th</sup> Street Bridges, and one on Daingerfield Island (NPS, 2004).

### IMPAIRMENT TO PARK RESOURCES AND VALUES

In addition to determining the environmental consequences of the preferred and other alternatives, the NPS's *Management Policies, 2006* (NPS, 2000) requires analysis of potential effects to determine whether or not actions would impair park resources. The fundamental purpose of the NPS, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. However, the laws do give the NPS the management discretion to allow impacts to park resources and values when necessary and as appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS the management discretion to allow certain impacts, that discretion is limited by the statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the NPS

manager, would harm the integrity of park resources or values, including opportunities that otherwise would be present for the enjoyment of those resources and values. An impact to any park resource or value may constitute an impairment, but an impact would be more likely to constitute an impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is as follows:

- necessary to fulfill specific purposes identified in the enabling legislation or proclamation of the park;
- key to the natural or cultural resources integrity of the park or to opportunities for enjoyment of the park; or
- identified as a goal in the park's General Management Plan or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. In this chapter, a determination on impairment is made in the conclusion statement of each alternative. The NPS does not analyze recreational values, visitor use and experience (unless impacts are resource based), socio-economics, or park operations for impairment.

## **IMPACTS TO CULTURAL RESOURCES AND SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT**

In this Environmental Assessment, impacts to historic structures, cultural landscapes, and archeological resources are described in terms of type, context, duration, and intensity, which is consistent with the Council on Environmental Quality regulations for implementing the National Environmental Policy Act. These impact analyses are intended to comply with the requirements of both the National Environmental Policy Act and Section 106 of the National Historic Preservation Act. In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 (36 CFR Part 800, *Protection of Historic Properties*), impacts to historic structures, cultural landscapes, and archeological resources were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the Advisory Council's regulations, a determination of either *adverse effect* or *no adverse effect* must be made for affected National Register eligible or listed cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the National Register (e.g., diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects of the preferred alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, *Assessment of Adverse Effects*). A determination of *no adverse effect* means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

The Council on Environmental Quality's regulations and the NPS's *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order #12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (e.g., major to moderate or minor impacts). Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under the National Environmental Policy Act only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Cultural resources are non-renewable resources; adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss of integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under Section 106 may be mitigated, the effect remains adverse.

A Section 106 summary is included in the impact analysis sections for historic structures, cultural landscapes, and archeological resources. The Section 106 summary is intended to meet the requirements of Section 106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based upon the criterion of effect and the criteria of adverse effect found in the Advisory Council's regulations.

## IMPACTS TO HISTORIC STRUCTURES

### DEFINITION OF INTENSITY LEVELS

In order for a structure or building to be listed in the National Register of Historic Places, it must be associated with an important historic context, i.e., possess significance—the meaning or value ascribed to the structure or building and have the integrity of those features necessary to convey its significance, i.e., location, design, setting, workmanship, materials, feeling, and association (see National Register Bulletin #15, *How to Apply the National Register Criteria for Evaluation*). For purposes of analyzing potential impacts to Historic Structures, the thresholds of change for the intensity of an impact are defined as follows:

- *negligible*: Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 would be *no adverse effect*.
- *minor*: Adverse impact - alteration of a feature(s) would not diminish the overall integrity of the resource. The determination of effect for Section 106 would be *no adverse effect*.
- *moderate*: Adverse impact - alteration of a feature(s) would diminish the overall integrity of the resource. The determination of effect Section 106 would be *adverse effect*. A memorandum of agreement (MOA) is executed among the NPS and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate
- *major*: Adverse impact - alteration of a feature(s) would diminish the overall integrity of the resource. The determination of effect for Section 106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the NPS and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

*Duration*: Impacts to historic structures are permanent and irreversible therefore there is no short-term or long-term impact level identified for these resources.

**ALTERNATIVE A - NO-ACTION ALTERNATIVE**

Under the No-Action Alternative, the NPS would continue management actions that would include minor repairs of the roadway to maintain the existing integrity and character of the Parkway. Implementing the No-Action Alternative would have no impact on historic structures because the NPS would maintain the Parkway similar to its existing condition through minimum rehabilitation and maintenance efforts. The No-Action Alternative would not affect nearby historic resources because only minor rehabilitation and maintenance projects would occur.

Cumulative Effects. No cumulative effect would occur because implementing the No-Action Alternative would have no impact on historic structures.

Conclusion. Under the No-Action Alternative, no impact on historic structures would occur because the NPS would continue to conduct only minor repairs to maintain existing integrity and historic character of the Parkway. No cumulative effect would occur.

Because there would be no major adverse impacts to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

Section 106 Summary. After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the NPS proposes that implementing Alternative A would have no impact to the character-defining features of the GWMP and there would be no effect under Section 106 of the National Historic Preservation Act.

**ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation. The resurfacing of the asphalt pavement would have no impact on the Parkway's historic character. The Parkway has been resurfaced on other occasions in the past and there was no loss of the road's character-defining features.

Shoulder Rehabilitation. The GWMP shoulders would be stabilized as part of the Alternative B, including the removal of fixed objects that present hazardous driving conditions. This action would be a slight modification to a feature of the GWMP, but the overall integrity would not be diminished. Therefore, the GWMP would incur physical impacts due to the shoulder stabilization that would result in minor long-term adverse impacts.

Drainage Improvements. As part of the drainage improvements to the GWMP, additional inlets would be installed along the Parkway corridor. Also, outfall structures would be repaired. During the survey work for the drainage improvements, two culverts were identified as contributing resources to the GWMP, Outfall 75 and Outfall 80. Because Outfall 80 was rated to be in "excellent" condition, no repair work is proposed for this particular outfall at this time. Once design plans are further developed, NPS Cultural Resources staff would review the plans and make recommendations regarding avoidance and/or minimization measures to protect the contributing historic resource according to the *Secretary of the Interiors Standards for the Treatment of Historic Properties*. Drainage improvements would require a slight modification of features of the Parkway, but the overall integrity of the GWMP would not be diminished. Therefore, drainage improvements would have minor long-term adverse impacts to the Parkway.

Roadside Barrier Modifications. Each option would require the removal of approximately 22,000 linear feet of stone guardwalls, varying in height from 9-18 inches and in length from 40-1,740 feet, and the subsequent replacement with a safety barrier that meets current AASHTO safety guidelines for crashworthiness. The stone guardwalls are an integral part of the Parkway, contributing to the historic character of the northern section. Removal of these contributing features would have an adverse physical and visual impact to the Parkway, resulting in a loss of integrity of materials, workmanship, design, feeling, and association.

Under Alternative B, the existing W-beam guardrail would be replaced with steel-backed timber guardrails. This replacement would be consistent with the existing PA between the NPS and the Virginia State Historic Preservation Office (SHPO). The W-beam guardrail was intended to be a temporary measure.

In the past, rehabilitation efforts on the Parkway have failed to replicate the exact texture and feel of the original stone walls, introducing a wall with a more uniform and finished look. The added height to the walls has also interrupted the viewsheds to the Potomac River Gorge. Special efforts have been taken during this study to ensure that the replacement guardwalls would retain as much of their historic materials, character, and association as possible.

The construction of higher, permanent, concrete core guardwalls has the potential to impact the historic character of the Parkway and hinder views. Therefore, the NPS considered two options for the replacement of the guardwalls.

- Option 1 – Concrete Core, Stone Masonry Guardwall

This option calls for the replacement of the existing stone masonry guardwalls with a 27-inch high, stone-faced, concrete-core guardwall that meets AASHTO safety guidelines for crashworthiness. Based on preliminary design plans, approximately 27,900 linear feet of wall would be constructed/reconstructed. The total length of the new stone masonry walls and guardrail would be expanded in length to flare at the ends for deflection purposes. Option 1 calls for the new walls to be crafted based on the *Secretary of the Interior's Standards for Rehabilitation*. Option 1 would use as much of the existing historic building materials as possible with consideration given to their characteristics. Design characteristics include the rough-cut shape (see Figure 19) and random pattern of massive stones to smaller stones, the range of colors in the stones from grays with hints of blues, browns, and tans, the spatial relationship (depth of mortar and space between stones), and the coarse texture of the mortar. The replacement walls would be within the same footprint and would only be expanded in length to flare at the ends for deflection purposes.



**Figure 19. Defining wall character: The backside of an existing stone wall illustrates the multi-colored stones, varied sizes, depth and width of mortar**

Under Option 1, the GWMP would incur moderate long-term adverse impacts. In addition to the loss of the character-defining (contributing) feature due to the dismantling of the stone guardwalls, the subsequent new safety barrier would be taller resulting in visual impacts to sensitive viewsheds to and from the Parkway. Another consideration of the 27-inch high concrete-core, stone-faced guardwalls is that the higher walls would create a “tunneling” effect in certain areas on the Parkway. In short, the road prism would appear physically narrower because of the increased height of the walls.

#### Option 2 – Combination Guardwall and Guardrail (Preferred)

The second barrier option would use a combination of a 27-inch high concrete-core wall with a stone masonry face and steel-backed timber guardrail. These barriers would meet the AASHTO’s safety guidelines for crashworthiness and the stone masonry would be crafted to comply with the *Secretary of the Interior’s Standards for Rehabilitation*. As in Option 1, consideration would be given to characteristics of the walls such as the rough-cut shape and random pattern of massive stones to smaller stones, the range of colors in the stones from grays with hints of blues, browns, and tans, the spatial relationship (depth of mortar and space between stones), and the course texture of the mortar. In locations where an increase in guardwall height would have an adverse impact on viewsheds, steel-backed timber guardrail would be installed in combination with the concrete-core stone masonry wall where the views are not as prevalent. Of approximately 60 historic stone guardwalls, it is estimated that portions of 6-12 historic stone guardwalls would be replaced with a combination stone guardwall and steel-backed timber guardrail. Option 2 provides an optimal methodology for the retention of historic building materials and retention of scenic views.

Under Option 2, the GWMP as a historic structure would incur moderate long-term adverse impacts. The removal of the stone guardwalls, features that contribute to the National Register eligibility, would result in a loss of design, setting, materials, workmanship, feeling, and association. Further details regarding impacts to the viewshed are discussed in the Aesthetics and Visual Resources section of this document.

Acceleration/Deceleration Lanes Extension. The extension of the acceleration and deceleration lanes at the GWMP Headquarters and the CIA interchange would add a new structural element different from the Parkway's original design. These changes would have a minor long-term adverse impact on the historic character because of the deviation from the original design.

Route 123/GWMP Interchange Reconfigurations. Each option under consideration for the reconfiguration of the Route 123/GWMP interchange would have similar impacts to historic structures and, therefore, they have been grouped together for impact discussion purposes. The reconfiguration of this interchange would change the layout of the intersection from the original design. The off ramp from the southbound lanes would be lengthened and relocated to a new intersection point on Route 123. These modifications would cause a physical impact to the GWMP resulting in a loss of integrity of design, setting, feeling, and association. These changes to the original plan and design would have a moderate long-term adverse impact on historic character of the Parkway.

Construction Activities. Construction activities associated with Alternative B would have adverse impacts on the GWMP as a historic resource because of the addition of construction equipment, temporary signage, and other non-conforming elements to the landscape for traffic control and construction. Impacts would be short-term minor and adverse, detectable but of little consequence to the resource.

Cumulative Effects. Other past, present, and reasonably foreseeable future actions have had adverse impacts on the historic character of the Parkway. For instance, the rehabilitation of the south section of the GWMP adversely affected the historic character of the Parkway by changing the architectural style and design features of the guardwalls in addition to raising the wall heights to AASHTO guidelines. Future actions such as the Humpback Bridge replacement, the new entrance to Columbia Island Marina, the Mount Vernon Trail Extension, and the Arlington County and Vicinity Boathouse projects would add non-conforming elements to the Parkway, change the viewsheds in their respective areas, and change the landscape of the GWMP. The rehabilitation of the northern section of the GWMP would add a moderate adverse increment to the cumulative effect for the reasons described previously. Overall, Alternative B would have a moderate adverse cumulative effect.

Conclusion. Alternative B/Guardwall Option 1 and 2 would have moderate long-term adverse impacts on the historic character of the Parkway because of changes to the design elements (i.e., guardwalls, Route 123/GWMP interchange) necessary to comply with current AASHTO safety guidelines. Under Alternative B, there would be no adverse impact on other nearby historic resources eligible for or listed in the National Register of Historic Places. A moderate adverse cumulative impact would occur.

The impact is an adverse effect under Section 106 and is determined to be a moderate long-term adverse impact under NEPA because the NPS is anticipating negotiating a revised PA/MOA with the SHPOs, ACHP, and interested parties to guide the rehabilitation and identify measures to minimize or mitigate the intensity of the impacts to the point that the impacts to historic structures could be considered moderate. Failure to negotiate a PA/MOA would indicate the impacts are determined to be major long-term adverse impacts under NEPA and the impact remains an adverse effect under Section 106.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation

of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

**Section 106 Summary.** After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the NPS proposes that implementing Alternative B would have an adverse effect on a property that meets National Register criteria. The current PA dated 1993 gives a sufficient framework in which to begin discussing adverse effects associated with this project. However, with the detailed studies that have been undertaken as part of this project, the NPS acknowledges that the 1997 temporary amendment to the PA has expired, and that a revised PA or an amendment to the 1993 PA would need to be formulated. A revised or amended PA would include coordination with the Virginia Department of Historic Resources, the Maryland Historical Trust, and the DC Historic Preservation Office, and the Advisory Council on Historic Preservation. The NPS is continuing consultation throughout the design process to identify appropriate mitigation for the adverse effect.

## IMPACTS TO ARCHEOLOGICAL RESOURCES

### DEFINITION OF INTENSITY LEVELS

Certain important research questions about human history can only be answered by the actual physical material of cultural resources. Archeological resources have the potential to answer, in whole or in part, such research questions. An archeological site(s) can be eligible to be listed in the National Register of Historic Places if the site(s) has yielded, or may be likely to yield, information important in prehistory or history. An archeological site(s) can be nominated to the National Register in one of three historic contexts or levels of significance: local, state, or national (see National Register Bulletin #15, *How to Apply the National Register Criteria for Evaluation*). For the purposes of analyzing impacts to archeological resources, thresholds of change for the intensity of an impact are based upon the potential of the site(s) to yield information important in prehistory or history, as well as the probable historic context of the affected site(s).

- *negligible*: Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 would be *no adverse effect*.
- *minor*: Adverse impact - disturbance of a site(s) results in little, if any, loss of integrity. The determination of effect for Section 106 would be *no adverse effect*.
- *moderate*: Adverse impact - disturbance of a site(s) results in loss of integrity. The determination of effect for Section 106 would be *adverse effect*. A memorandum of agreement is executed among the NPS and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.
- *major*: Adverse impact - disturbance of a site(s) results in loss of integrity. The determination of effect for Section 106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the NPS and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).



*Duration:* Impacts to archeological resources are permanent and irreversible therefore there is no short term or long-term impact level identified for these resources.

#### **ALTERNATIVE A - NO-ACTION ALTERNATIVE**

Under the No-Action Alternative, the NPS would continue with minimum rehabilitation of the roadway to maintain existing integrity and character of the Parkway. Implementing the No-Action Alternative would have no impact on archeological resources of the GWMP because the NPS, through minimum rehabilitation and maintenance efforts, would maintain the roadway near its existing condition, and no operations would occur that would disrupt archeological resources on or near the GWMP North Section.

Cumulative Effects. No cumulative effect would occur because implementing the No-Action Alternative would have no impact on archeological resources.

Conclusion. Under the No-Action Alternative, no impact on archeological resources would occur because the NPS would conduct minor repairs to maintain existing integrity and character of the archeological site. Also, there would be no cumulative effects to archeological resources.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

Section 106 Summary. After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the NPS proposes that implementing Alternative A would have no impact to archeological resources found within the GWMP and there would be no effect under Section 106 of the NHPA.

#### **ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation. Pavement rehabilitation would have no impact on archeological resources because there would be no new earth disturbance or excavations necessary to complete this work.

Shoulder Rehabilitation, Roadside Barrier Modifications, and Acceleration/Deceleration Lanes Extension. Phase I archeological investigations were completed for the areas that have archeological potential. Installing new curb, stabilizing the shoulders, constructing new concrete core guardwalls and extending acceleration/deceleration lanes would result in minor earth disturbance and excavation on the Parkway. The Area of Potential Effects (APE) for these actions was determined to be the limits of disturbance for the construction activities. Two sites have been identified as being in the APE – 44FX017 and 44FX3165. One of the sites (44FX3165), would require additional Phase II work if the site would be impacted by construction. As more detailed design is available, the NPS would determine appropriate investigation. Even minor earth activities such as the shoulder rehabilitation would impact these sensitive areas; therefore, they should be avoided during construction. Since the barrier wall options would occur largely within their existing footprint, replacing the barrier walls would have little potential to impact archeological resources as long as the two identified sites would be avoided. These actions would have negligible to minor long-term impacts on archeological resources.

Drainage Improvements. Areas of potential modification to the outfall pipes outside the 10-foot shoulder areas were surveyed in April 2006 with a Phase I survey and with an additional Phase II survey in 2007. Of the 68 outfall locations surveyed, it is recommended that two sites would need contingency plans if there are unanticipated finds during construction. Outfall 123 would require special consideration for the design of the outfall repair. The stabilization of the structure, pipe, and banks would help minimize future disturbance to archeological resources due to soil erosion downstream of the outfall. The NPS has considered potential impacts from ground disturbance as well as soil compaction in areas near known resources. Special protection fences and best management practices as described in the mitigation section would be utilized to minimize ground disturbance and potential impacts to resources. Some impacts are likely to occur; however, these would not result in adverse effects under Section 106. These impacts would be negligible to minor.

Route 123/GWMP Interchange Reconfiguration. Some options for the reconfiguration of the Route 123/GWMP interchange have the potential to have an adverse impact on archeological resources. For the Preferred Option 4, the realignment and construction of the southbound on and off ramps would avoid disturbing the two sites in the northwest quadrant of the Route 123/GWMP interchange. Furthermore, the archeological resources near the Route 123/GWMP have been determined not to be eligible for the National Register; therefore, there would be no impact to the two sites of previous concern. As a result, there would be no impact to archeological resources.

Construction Activities. Construction activities associated with all the build alternatives have the potential to have adverse impacts to archeological resources. As staging areas are refined during the design process, NPS staff would coordinate with project designers to ensure equipment staging and storage would be in places that are not archeologically sensitive. Since staging areas are loosely defined during the planning process, utilizing the already archeologically disturbed Turkey Run parking lot and the GWMP maintenance yard would have no to negligible impacts to archeological resources.

Cumulative Effects. With the preferred Route 123/GWMP Interchange Option 4, no cumulative effect would occur because implementing Alternative B would have no impact on archeological resources because the areas of known archeological resources would be avoided.

Conclusion. Pavement rehabilitation, shoulder rehabilitation, roadside barrier modifications, and acceleration/deceleration extensions would have no or negligible long-term adverse impact on archeological resources because the areas with known archeological resources would be avoided. Under Route 123/GWMP Interchange Option 4, no impacts would occur to archeological resources because the options would avoid the disturbance of two sites and the sites have been determined not to be eligible for the National Register. The Parkway in general has high archeological potential and through field surveys, the project is being designed in such a manner to avoid impacts to these resources. Outfall 123 would require special consideration for the design of the outfall repair. The stabilization of the structure, pipe, and banks would help minimize future loss of archeological resources due to soil erosion from the outfall. The NPS has considered potential impacts from ground disturbance as well as soil compaction in areas near known resources as negligible and minor. Several potential measures to avoid the adverse impacts have been suggested; the use of structural matting to reduce soil compaction has been discussed. NPS archaeological staff has also suggested restricting the work period near known resources to periods of soil freeze in the winter, to help minimize soil compression and movement. Use of the two me-

thods in tandem would be evaluated and discussed with VDHR during the Section 106 coordination and development of the PA.

The impact is an adverse effect under Section 106 and is determined to be a moderate long-term adverse impact under NEPA because the NPS is anticipating negotiating a revised PA/MOA with the SHPOs, ACHP, and interested parties to guide the rehabilitation and identify measures to minimize or mitigate the intensity of the impacts to the point that the impacts to archeological resources could be considered moderate. Failure to negotiate a PA/MOA would indicate the impacts are determined to be major long-term adverse impacts under NEPA and the impact remains an adverse effect under Section 106.

NPS would continue coordination with the Virginia Department of Historic Resources in accordance with Section 106 of the NHPA and have developed a list of mitigation measures to help protect archeological resources as outlined in the Mitigation Section of this EA. Special protection fences and best management practices to minimize ground disturbance would be utilized. In the event archeological resources are inadvertently discovered, ground disturbing activities would stop, appropriate NPS staff would be notified, and the Virginia Department of Historic Resources would be consulted in accordance with Section 106 of the NHPA. No cumulative effect would occur under Alternative B because known archeological resources would be avoided, resulting in negligible or minor impacts to archeological resources.

Because there would be no major adverse impacts to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

Section 106 Summary. After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the NPS proposes that implementing Alternative B would have no adverse effects on archeological resources that would meet National Register criteria as long as the identified sites are avoided. The current PA dated 1993 gives a sufficient framework in which to begin discussing adverse effects associated with this project. However, with the detailed studies that have been undertaken as part of this project, the NPS acknowledges that the 1997 temporary amendment to the PA has expired, and that a revised PA or an amendment to the 1993 PA would need to be formulated. A revised or amended PA would include coordination with the Virginia Department of Historic Resources, the Maryland Historical Trust, and the DC Historic Preservation Office, and the Advisory Council on Historic Preservation. The NPS is continuing consultation throughout the design process to identify appropriate protection and mitigation for the project.

## **IMPACTS TO CULTURAL LANDSCAPES**

### **DEFINITION OF INTENSITY LEVELS**

Cultural landscapes are the result of the long interaction between people and the land, the influence of human beliefs and actions over time upon the natural landscape. Shaped through time by historical land-use and management practices, as well as politics and property laws, levels of technology, and economic conditions, cultural landscapes provide a living record of an area's past, a visual chronicle of its history. The dynamic nature of modern human life, however, contributes to the continual reshaping of cultural landscapes, making them a good source of informa-

tion about specific times and places but at the same time rendering their long-term preservation a challenge.

In order for a cultural landscape to be listed in the National Register, it must possess significance (the meaning or value ascribed to the landscape) and have integrity of those features necessary to convey its significance. The character-defining features of a cultural landscape include spatial organization and land patterns; topography; vegetation; circulation patterns; water features; and structures/buildings, site furnishings and objects as described in *Secretary of the Interior's Standards for the Treatment of Historic Properties With Guidelines for the Treatment of Cultural Landscapes*, (NPS, 1996). For purposes of analyzing potential impacts to cultural landscapes, the thresholds of change for the intensity of an impact are defined as follows:

- *negligible*: Impact(s) is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 would be *no adverse effect*.
- *minor*: Adverse impact - alteration of a pattern(s) or feature(s) of the landscape would not diminish the overall integrity of the landscape. The determination of effect for Section 106 would be *no adverse effect*.
- *moderate*: Adverse impact - alteration of a pattern(s) or feature(s) of the landscape would diminish the overall integrity of the landscape. The determination of effect for Section 106 would be *adverse effect*. A memorandum of agreement is executed among the NPS and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.
- *major*: Adverse impact - alteration of a pattern(s) or feature(s) of the landscape would diminish the overall integrity of the landscape. The determination of effect for Section 106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the NPS and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

*Duration*: Short-term – Effects lasting for the duration of the construction activities (less than 3 years); Long-term – Effects lasting longer than the duration of the construction (longer than 3 years).

#### **ALTERNATIVE A - NO-ACTION ALTERNATIVE**

Under the No-Action Alternative, the NPS would continue with minimum rehabilitation of the roadway to maintain existing integrity and character of the Parkway. Implementing the No-Action Alternative would have no impact on the cultural landscape of the GWMP because the NPS, through minimum rehabilitation and maintenance efforts, would maintain the roadway near its existing state and no new nonconforming elements would be added to the cultural landscape.

Cumulative Effects. No cumulative effects would occur because implementing the No-Action Alternative would have no impact on the cultural landscape.

Conclusion. Under the No-Action Alternative, no impacts on the cultural landscape would occur because the NPS would maintain the roadway near its existing condition. No cumulative effects would occur because the No-Action Alternative would have no impact on the cultural landscape.

Because there would be no major adverse impacts to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

Section 106 Summary. After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the NPS proposes that implementing Alternative A would have no impact to the character-defining features of the GWMP and there would be no effect under Section 106 of the National Historic Preservation Act.

#### **ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation. The resurfacing of the asphalt pavement would have negligible impacts on the Parkway's cultural landscape. The Parkway has been resurfaced on other occasions in the past resulting in no change to the spatial relationship of the road corridor to the surrounding landscape.

Shoulder Rehabilitation. The GWMP shoulders, where possible, would be reconstructed and stabilized as part of the Alternative B and a desired shoulder width of up to 10 feet obtained. In areas of sensitive resources (i.e., archeology and vegetation), a 3-foot shoulder would be used to minimize impacts. The GWMP would incur physical impacts due to the shoulder stabilization and incur minor long-term adverse impacts because the spatial relationship of the road shoulder to the roadway would be slightly altered.

Drainage Improvements. As part of the drainage improvements to the GWMP, additional inlets would be installed along the Parkway corridor. Also, outfall structures would be repaired. As a planned landscape, the GWMP would incur a minor long-term adverse impact because vegetation impacts caused by access and drainage improvements, such as more inlets, would change the original design of the Parkway.

Roadside Barrier Modifications. The construction of higher, permanent, roadside barriers would impact the historic landscape design of the Parkway. New roadside barriers would affect cultural landscape contributing features: views to the Potomac River Gorge, the DC monumental core, and the existing stone guardwalls. Each option would replace the existing W-beam guardrail in the median with steel-backed timber guardrail. This replacement is consistent with the existing PA between the NPS and the Virginia SHPO, in that the W-beam was intended to be temporary. Each option would require the removal of the approximately 22,000 linear feet of historic stone guardwalls varying in height from 9-18 inches and in length from 40 to 1,740 feet, and their subsequent replacement and lengthening with 27-inch high barriers that meet current AASHTO safety guidelines for crashworthiness. The historic stone guardwalls are an integral part of the northern section of the Parkway, contributing to the historic landscape of the northern section; therefore, two roadside barrier options were evaluated.

- Option 1 – Concrete Core, Stone Masonry Guardwall

This option calls for the replacement of the existing stone guardwalls with a 27-inch high, stone-faced, concrete-core guardwall that meets AASHTO safety guidelines for crashworthiness. Based on preliminary design plans, approximately 27,900 linear feet of wall would be constructed/reconstructed. The total length of the new stone masonry walls and gua-

rdrail would be expanded in length to flare at the ends for deflection purposes. Option 1 specifies that the new walls be crafted to comply with the *Secretary of the Interior's Standards for Rehabilitation*. Option 1 would use as much of the historic building materials as possible with consideration given to replicating the original design character. Characteristics of the stone guardwalls include the rough-cut shape and random pattern of massive stones to smaller stones, the range of colors in the stones from grays with hints of blues, browns, and tans, the spatial relationship (depth of mortar and space between stones), and the coarse texture of the mortar. The replacement walls would be within the same footprint and would only be expanded in length to flare at the ends for deflection purposes.

Under Option 1, the GWMP as a cultural landscape would incur long-term moderate adverse impacts. Contrasting the northern and southern section of the Parkway, the southern portion, most notably the original Mount Vernon Memorial Highway, the GWMP is flat and there is a noticeable lack of stone walls, whereas the northern section of the Parkway with its expansive medians, sloping hillsides, and extraordinary views bring the walls into sharper focus to the visitor. The historic stone guardwalls evoke a sense of the rustic character of the northern section of the Parkway. According to *Landscape Lines No. 16*, stone walls are characteristics of the entire National Park System (NPS 2005-a). Therefore, dismantling the stone guardwalls would result in a physical impact and a loss of integrity of design, setting, materials, workmanship, feeling, and association. Additionally, the subsequent construction of a new, taller safety barrier would also result in impacts to the viewsheds, which are character-defining features of the cultural landscape.

- Option 2 – Combination Guardwall and Guardrail (Preferred)

The second barrier option would use a combination of the 27-inch concrete-core, stone masonry guardwall in conjunction with the steel-backed timber guardrail. This barrier would meet the AASHTO's safety guidelines for crashworthiness and the stone masonry would be crafted to comply with the *Secretary of the Interior's Standards for Rehabilitation*. Like Option 1, the new walls would use as much of the existing stone as possible, and careful consideration would be given to design features such as the rough-cut shape and random pattern of massive stones to smaller stones, the range of colors in the stones from grays with hints of blues, browns, and tans, the spatial relationship (depth of mortar and space between stones), and the coarse texture of the mortar. In locations where an increase in guardwall height or thickness would have an adverse impact on viewsheds, steel-backed timber guardrail would be installed in combination with the concrete-core stone masonry wall. This method opens some view under the timber rail. Furthermore, the depth of the steel-backed timber barrier is less than the stone masonry guardwall. The narrower barrier would increase views to the Potomac River Gorge at certain points along the Parkway where the road is close to the barriers and the motorist is looking down to the river. This technique of utilizing steel-backed timber guardrails would also serve to denote view areas. Of the approximate 60 existing stone guardwalls, it is estimated that portions of 6-12 historic stone guardwalls would be replaced with a combination stone guardwall and steel-backed timber guardrail. Based on early design plans approximately 27,900 linear feet of wall/rail would be constructed/reconstructed. Option 2 provides an optimal methodology for the retention of historic building materials and retention of scenic views.

Under Option 2, the GWMP as a cultural landscape would incur moderate long-term adverse impacts. The removal of the contributing stone guardwalls would result in a loss of

design, setting, materials, workmanship, feeling, and association. However, Option 2 does provide a middle ground for retaining the rustic character of the stone guardwalls and retaining viewsheds, as both the stone guardwalls and viewsheds are contributing features to the cultural landscape. Protection of the views to the Potomac is specific to the enabling legislation of the GWMP. As character-defining features of the cultural landscape, Option 2 would allow for the retention of historic materials through the use of the concrete-core stone masonry wall as well as minimize the impacts to critical views along the Parkway to the extent possible.

Acceleration/Deceleration Lanes Extension. The extension of the acceleration/deceleration lanes at the CIA interchange and the Park Police/GWMP Headquarters would have negligible long-term adverse impacts on the Parkway's cultural landscape. New sub base and pavement would be added at each location to extend the lanes. The new pavement would change the footprint of the Parkway but the change would barely be perceptible.

Route 123/GWMP Interchange Reconfiguration. The reconfiguration of this interchange would change the layout of the intersection from the original design and, in some cases, alter the cultural landscape. The off ramp from the southbound lanes would be lengthened and relocated to a new intersection point on Route 123. These changes to the design of the interchange would have a minor long-term adverse impact on the cultural landscape of the Parkway due to the change in the design, form, spatial organization and circulation pattern in relationship to the landscape. These changes are similar for all the options. The primary difference in each option is related to the level of impact to the landscape.

Option 1 would impact five large trees, Option 2, six large trees, Option 3, four large trees, Option 4, five large trees, and Option 5 would impact one large tree. In all instances, it is believed that these trees were part of the original landscaping plan of the Parkway. The reconfiguration of the Route 123/GWMP interchange would result in a loss of integrity of design and setting, through the modification of the overall design of the Parkway's spatial organization and circulation pattern.

Construction Activities. Construction activities associated with all the build alternatives would have adverse impacts on visual resources because of the addition of construction equipment, temporary signage, and other non-conforming elements to the landscape for traffic control and construction. Impacts would be short-term minor and adverse because the impact would be detectable but of little consequence to the resource.

Cumulative Effects. Other past, present, and reasonably foreseeable future actions have had adverse impacts on the Parkway's cultural landscape. For instance, the rehabilitation of the south section of the GWMP adversely affected the cultural landscape of the Parkway by raising the wall heights to guidelines and changing the architectural style of the guardwalls with a finished stone that was geometrically cut and finished. The recent rehabilitation of the north entrance to Ronald Reagan National Airport and future actions such as the Humpback Bridge replacement, the new entrance to Columbia Island Marina, Mount Vernon Trail Extension, and the Arlington County and Vicinity Boathouse would add elements to the cultural landscape and change the viewsheds in their respective areas. The rehabilitation of the northern section of the GWMP would add an appreciable adverse increment to the cumulative effect for the reasons described previously. Overall, Alternative B when added to other projects would have a moderate adverse cumulative effect to the cultural landscape.

**Conclusion.** Alternative B with Roadside Barrier Modification Option 1 and Option 2 would have a moderate long-term adverse impact on the cultural landscape because of the change in character of the barrier walls and other changes to the historically-designed landscape. The rehabilitation of the northern section of the GWMP would be conducted in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (NPS, 1996). Options 1-5 for the Route 123/GWMP interchange reconfiguration would have minor adverse impacts because of impacts to the landscape. Removed trees would be replaced in kind or with similar species consistent with the Parkway's designed landscape. Construction activities would have minor short-term adverse impacts. Alternative B would add an appreciable increment to the moderate adverse cumulative effect to the cultural landscape.

The impact is an adverse effect under Section 106 and is determined to be a moderate long-term adverse impact under NEPA because the NPS is anticipating negotiating a revised PA/MOA with the SHPOs, ACHP, and interested parties to guide the rehabilitation and identify measures to minimize or mitigate the intensity of the impacts to the point that the impacts to the cultural landscape could be considered moderate. Failure to negotiate a PA/MOA would indicate the impacts are determined to be major long-term adverse impacts under NEPA and the impact remains an adverse effect under Section 106.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

**Section 106 Summary.** After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the NPS proposes that implementing Alternative B would have an adverse effect on a property listed in the National Register of Historic Places as a cultural landscape. The current PA dated 1993 gives a sufficient framework in which to begin discussing adverse effects associated with this project. However, with the detailed studies that have been undertaken as part of this project, the NPS acknowledges that the 1997 temporary amendment to the PA has expired, and that a revised PA or an amendment to the 1993 PA would need to be formulated. A revised or amended PA would include coordination with the Virginia Department of Historic Resources, the Maryland Historical Trust, and the DC Historic Preservation Office, and the Advisory Council on Historic Preservation. The NPS is continuing consultation throughout the design process to identify and complete appropriate mitigation, such as an in-progress cultural landscape inventory, an amendment to the National Register nomination form, and expansion of the Historic American Engineering Record documentation for the adverse effect.

## IMPACTS TO AESTHETICS AND VISUAL RESOURCES

The GWMP was created in part to protect the views to the Potomac River Gorge as specifically stated in the enabling legislation. Therefore, the utmost care was taken when designers created the GWMP so that each aspect of the design, including the spatial arrangement, the circulation plan, and the landscape plan were all created purposefully to highlight these views. The original section of the GWMP, known as the Mount Vernon Memorial Highway, was completed in 1932. Construction in the 1940s began in the Rosslyn area and was completed to Spout Run. The next



segment, from Spout Run to the CIA interchange was completed in 1959, with the last segment terminating at the Capital Beltway completed in 1962. Areas south of Spout Run are flat, wide, and expansive, showcasing some of the most dramatic views to the Washington, DC monumental core, and then it travels through the heart of Alexandria, to terminate at Mount Vernon. The northern section of the Parkway provides a sharp contrast with its rolling topography, variable median widths, abundant use of rustic stone walls, and thick forested areas along the Parkway, which serve as a natural contrast to the bustle of metropolitan Washington, DC. Southbound motorists enjoy views to the Potomac Palisades, Georgetown and the Washington Monument. Northbound motorists have stunning views of the Potomac River Gorge and the forested areas along the Parkway. Throughout the GWMP, designers employed several techniques to highlight these views such as framed vistas, panoramic views, scenic pull-outs, and axial views. These views are enhanced through the landscape plantings. The landscape design also preserved and enhanced the natural scenery along the shoulders and medians, supplementing the forested edge and open median with a mostly native vegetation palette. The potential impacts in this section are described in terms of effects on these sensitive views and the Parkway's designed landscape.

#### **DEFINITION OF INTENSITY LEVELS**

Analyses of the potential intensity of impacts on aesthetic and visual resources were derived from the available information on the GWMP and the professional judgment of the park staff. The thresholds of change for the intensity of impacts on aesthetic and visual resources are defined as follows:

- *negligible*: An action that would introduce only the perception of some additional movement by cars or by people on bicycles or walking. The change to the viewshed would be so small or localized that it would have no measurable or perceptible effect on the viewshed.
- *minor*: An action that would introduce perceptible constructed additions to the viewshed. These actions would include structures that affect a relatively small portion of the viewshed, either the foreground, middleground, or background, and have barely perceptible visual consequences to the visitor experience of the viewshed.
- *moderate*: An action that would introduce perceptible constructed additions to the viewshed. These actions would include facilities, parking, and other constructed structures that would affect a moderate portion of the viewshed. This might include the foreground and middleground or the foreground and background. These actions would not completely alter the viewshed, but would be a visual addition to the existing conditions.
- *major*: An action that would introduce multiple and drastic constructed additions that affect the entire viewshed as experienced by the visitor. These actions would include major facilities and parking plus other constructed additions. These actions would completely alter the viewshed and would be a major impact to the existing conditions.

*Duration*: Short-term – Effects lasting for the duration of the construction activities (less than 3 years); Long-term – Effects lasting longer than the duration of the construction (longer than 3 years).

#### **ALTERNATIVE A - NO-ACTION ALTERNATIVE**

Implementing the No-Action Alternative would have no short-term or long-term impacts on the aesthetics and viewsheds of the Parkway because the NPS would continue management actions

that would include minimum rehabilitation of the roadway to maintain the aesthetics and existing vistas to the Potomac Palisades and the National Mall. The visual quality of the Parkway would not be affected because there would be no modifications or additions to the aesthetics and viewsheds of the Parkway.

Cumulative Effects. No cumulative effects would occur because implementing the No-Action Alternative would have no impact on the aesthetics and viewsheds.

Conclusion. Under the No-Action Alternative, no impacts to aesthetics and viewsheds would occur because the NPS would maintain the Parkway near its existing state. No cumulative effect would occur.

Because there would be no major adverse impacts to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

#### **ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation, Shoulder Rehabilitation, Drainage Improvements, Acceleration/Deceleration Lanes Extension. Under Alternative B, the major project components include the rehabilitation of the pavement/roadway; stabilization of the road shoulders, repairs to the drainage and outfalls, and the construction and/or extension of acceleration/deceleration lanes at various areas along the north section of the Parkway. The new pavement and striping would generally improve the appearance of the roadway surface on the Parkway. The drainage improvements are not expected to detract from the Parkway's visual quality. The extension of the acceleration/deceleration lanes would have negligible impacts to the aesthetics of the Parkway. As a result, Alternative B would generally have negligible long-term impacts on the Parkway's visual quality due to only slight changes to the Parkway.

Roadside Barrier Modifications. The construction of higher, permanent, roadside barriers has the potential to impact important vistas. Therefore, the NPS considered two options for replacement of the barrier walls. As part of the determination of the barrier wall options, various tools were developed to assist the team in the formation of these options and assessment of impacts.

During the Choosing-By-Advantages workshop held in December 2005, a presentation was made regarding viewshed analysis. This presentation focused on the methodology that the Bureau of Land Management has developed for assessing visual impacts. The Choosing-By-Advantages workshop presentation materials were modified from the Bureau of Land Management's Visual Assessment Tool to meet the needs of the GWMP. Emphasis was placed on assessing views along the Parkway and defining them into the foreground, middleground, and background. The team was provided several exercises to define these aspects of various snapshot views along the Parkway. The second aspect of the visual assessment tool required the team to rate the scenic quality on a scale of 1 to 5 based on these established factors of the landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications.

While the above exercise was useful, it was realized that the northern section of the Parkway is most often viewed from a motor vehicle. The views flow in sequence from one to the next, so

the team produced a video illustrating the existing wall from the height of an average driver, with simulations of the various barrier wall options.

Lastly, an inventory of the existing walls and the associated views to the Potomac was undertaken in January 2006. This inventory documented the physical characteristics of each wall including the height, length, color variations, random stone pattern, mortar composition and spacing. Traveling the project length, 29 stone walls were documented on the southbound side of the GWMP and 33 on the northbound side. Concurrently, the viewsheds were examined in relation to each wall. Viewsheds previously described in the Historic American Engineering Record documentation included framed views, panoramic views, axial views, and scenic pullouts. The January 2006 inventory worked from the classification of each view based on a circa 1950 landscape plan. Associated views were classified as open views, filtered views, filtered views with open slots, and canopy views. The results of this inventory were mapped as a GIS layer and the mapping is attached as Appendix E to this EA.

Since aesthetics and viewsheds are difficult to define, it is believed that each of these tools would provide further understanding of the composition of the views, the actual impacts to the views, and the overall aesthetic qualities the stone walls provide to the feeling and rustic character of the northern section of the Parkway.

- Option 1 – Concrete Core, Stone Masonry Guardwall

This option calls for the replacement of the existing stone masonry guardwalls with a 27-inch high, stone-faced, concrete-core guardwall that meets AASHTO safety guidelines for crashworthiness. Based on preliminary design plans, approximately 27,900 linear feet of wall would be constructed/reconstructed. The total length of the new stone masonry walls and guardrail would be expanded in length to flare at the ends for deflection purposes. Option 1 calls for the new walls to be crafted to comply with the *Secretary of the Interior's Standards for Rehabilitation*. Option 1 would use as much of the historic building materials as possible with consideration given to design features. Design characteristics include the rough-cut shape and random pattern of massive stones to smaller stones, the range of colors in the stones from grays with hints of blues, browns, and tans, the spatial relationship (depth of mortar and space between stones), and the coarse texture of the mortar. The replacement walls would be within the same footprint and would only be expanded in length to flare at the ends for deflection purposes.

The GWMP would incur moderate long-term adverse impacts to the visual and aesthetic aspects of the Parkway with implementation of Option 1. The stone walls are historic, character-defining features of the Parkway. Over the approximately 7-mile long stretch of Parkway from Spout Run to the Capital Beltway interchange, there are over 60 existing stone walls. These walls are visually pleasing as they illustrate and define the rustic style of the northern section of the Parkway, serve as visual recognition “tools” to the steep topography, and are often distinctive features of the foreground in many of the viewsheds. It is evident that the stone walls are intrinsic features of the foreground of many of the most treasured views to the Potomac River Gorge. Through the video simulation, it is evident that replacing the existing stone walls with a 27-inch high concrete core stone masonry wall would create a noticeable change to the viewshed, especially from a driver/passenger's perspective. The higher stone walls would be perceptible not only from places with sensitive viewsheds, but throughout the project length. The loss of the varied stone wall height,

and historic patina would be noticeable as one travels either northbound or southbound along the Parkway. In addition, the higher barrier walls would have a perceptible impact to middleground view of the Potomac River Gorge. From the driver/passenger's perspective of the Parkway, the viewshed includes the walls as the immediate foreground and the view to the Potomac River Gorge as the middleground. The higher barrier wall would block many of the smaller filtered views and portions of the open vistas to the Potomac River Gorge. Therefore, Option 1 would have moderate long-term adverse impacts to the viewshed and aesthetic resources of the GWMP.

- Option 2 – Combination Guardwall and Guardrail (Preferred)

The second barrier option would use a combination of a 27-inch high concrete-core wall with a stone masonry face and steel-backed timber guardrail. This barrier would meet the AASHTO's safety guidelines for crashworthiness and the stone masonry would be crafted to comply with the *Secretary of the Interior's Standards for Rehabilitation*. Like Option 1, careful consideration would be given to design characteristics such as the rough-cut shape and random pattern of massive stones to smaller stones, the range of colors in the stones from grays with hints of blues, browns, and tans, the spatial relationship (depth of mortar and space between stones), and the coarse texture of the mortar. In locations where an increase in guardwall height would have the most adverse impact on viewsheds, sections of steel-backed timber guardrail would be installed in combination with the concrete-core stone masonry wall. This method opens some view under the timber rail. Furthermore, the depth of the steel-backed timber barrier is less than the stone masonry guardwall. The narrower barrier would increase views to the Potomac River Gorge at certain points along the Parkway where the road is close to the barriers and the motorist is looking down to the river. This technique of utilizing steel-backed timber guardrails would also serve to denote view areas. Based on preliminary design plans, approximately 27,900 linear feet of wall/rail would be constructed/reconstructed. The total length of the new stone masonry walls and guardrail would be expanded in length to flare at the ends for deflection purposes. Option 2 provides a methodology for the retention of historic building materials and retention of scenic views.

The GWMP would incur long-term moderate adverse impacts to the viewshed with the implementation of Option 2. Using the combination of the concrete core, stone masonry walls in conjunction with sections of steel-backed timber guardrail allows the Park the greatest flexibility in retaining both the historic fabric and rustic feel of the northern section of the Parkway without compromising the loss of remarkable views to the Potomac River Gorge. The steel-backed timber guardrail would be used in the areas that have the most sensitive views (approximately 6-12 locations). Thus the foreground would change in the viewsheds from that of a stone barrier wall to a steel-backed timber wall, but with an increased view of the middleground. In other areas along the Parkway that do not have similarly sensitive views to the Potomac River Gorge (or areas where there would be no benefit to using the steel-backed timber guardrail, i.e. where dense woodland grows that would naturally block views), the Parkway would employ the 27-inch high concrete core, stone masonry barrier wall. The use of the 27-inch high stone masonry guardwall using original historic fabric in accordance with the design guidelines of the *Secretary of the Interior's Guidelines for Rehabilitation* would retain as much of the historic patina and original

craftsmanship as possible. Thus, the viewshed and the overall aesthetics of the GWMP would be retained as much as possible, resulting in perceptible changes to the views.

Route 123/GWMP Interchange Reconfiguration. Options 1 through 5 for the reconfiguration of the Route 123/GWMP interchange would have similar impacts on aesthetics and visual resources, but at different degrees. Each interchange option would affect existing natural vegetation and trees planted as part of the park's designed landscape. In addition, new signage and roadway markings would be added visual elements. Under Options 2 and 3, a new traffic light would be added. The addition of these visual elements to the aesthetics of the GWMP and impacts to existing plantings would have a long-term adverse impact on aesthetics. The impacts associated with Options 1 and 2 would be moderate and adverse due to the amount of vegetation that would be removed; either a new structure would be required or a substantial amount of fill would be necessary to cross the stream near the Route 123/GWMP interchange. Overall, the adverse impacts associated with Options 3 through 5 would be minor and long-term.

Construction Activities. Construction activities associated with Alternative B would have adverse impacts on visual resources because of the addition of construction equipment, temporary signage, and other non-conforming elements to the landscape for traffic control and construction. Impacts would be short-term minor and adverse, detectable only during construction but of little consequence to the resource.

Cumulative Effects. The recent rehabilitation of the north entrance to Ronald Reagan National Airport and future actions such as the Humpback Bridge replacement, the new entrance to Columbia Island Marina, Mount Vernon Trail Extension, and the Arlington County and Vicinity Boathouse project have the potential to adversely impact aesthetics and visual resources due to the addition of structures or modifications to the landscape. Furthermore, construction activities associated with each of these projects would have short-term adverse impacts due to the presence of construction equipment and signage. Alternative B would contribute an appreciable long-term adverse impact to the cumulative effect on aesthetics and visual resources. The installation of the permanent, concrete core guardwalls and the short-term impacts associated with construction activities would adversely affect the aesthetics and visual resources along the Parkway. Overall, the impacts of other past, present, and reasonably foreseeable future actions, in combination with the minor long-term impacts of Alternative B, would result in minor short and long-term adverse cumulative effects.

Conclusion. Alternative B with Barrier Modification Option 2 (the Preferred Alternative) would have a moderate long-term adverse impact from the noticeable changes to the designed landscape and the addition of new elements to the viewshed. A minor short-term adverse impact would occur during construction because of the equipment and signage necessary for construction activities. Minor short-term and long-term adverse cumulative effects would occur.

The impact is an adverse effect under Section 106 and is determined to be a moderate long-term adverse impact under NEPA because the NPS is anticipating negotiating a revised PA/MOA with the SHPOs, ACHP, and interested parties to guide the rehabilitation and identify measures to minimize or mitigate the intensity of the impacts to the point that the impacts to aesthetic and visual resources could be considered moderate. Failure to negotiate a PA/MOA would indicate the impacts are determined to be major long-term adverse impacts under NEPA and the impact remains an adverse effect under Section 106.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

## IMPACTS TO GEOLOGICAL RESOURCES

### DEFINITION OF INTENSITY LEVELS

The planning team based the impact analysis and the conclusions for possible impacts to geological resources on the on-site inspection of known and potential geological resources within the GWMP, review of existing literature, studies and information provided by experts in the NPS and other agencies, and GWMP staff insights and professional judgments. Where possible, map locations of geological resources were compared with locations of proposed development and modifications of existing facilities. Predictions about short-term and long-term site impacts were based on previous studies of impacts to geological resources from similar projects and recent scientific data; there are no short-term impacts to geological resources, all impacts are long-term. The thresholds of change for the intensity of an impact are defined as follows:

- *Negligible*: The action would result in a change to a natural physical resource, but the change would be so small that it would not be of any measurable or perceptible consequence.
- *Minor*: The action would result in a change to a natural physical resource, but the change would be small, localized and of little consequence.
- *Moderate*: The action would result in a change to a natural physical resource; the change would be measurable and of consequence.
- *Major*: An action that would result in a noticeable change to a natural physical resource; the change would be measurable and result in a severely adverse or beneficial impact.

*Duration*: Any change to geological resources is permanent. There are no temporary or short term changes to geological resources.

### ALTERNATIVE A - NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the NPS would continue management actions that would include minimum rehabilitation of the roadway to maintain existing integrity and character of the historic site. Implementing the No-Action Alternative would have no impact on geological resources from ground disturbance related to construction. However, under the No-Action Alternative, the erosive forces of stormwater runoff, which have caused bank failure in certain areas along the Parkway, would continue at the outfall structures and corrective measures to protect the parkway from future erosion would not occur. Therefore, the No-Action Alternative would have a minor long-term adverse impact on geological resources.

Cumulative Effects. The recent rehabilitation of the north entrance to Ronald Reagan National Airport and future projects such as the Mount Vernon Trail Extension and Arlington County and Vicinity Boathouse have the potential to have minor long-term adverse impacts on geological resources because of earth work necessary near the steep banks of the Potomac River. The No-Action Alternative would have an impact on geological resources for the reasons described previously. The No-Action Alternative, when added to these past, present, and reasonably foresee-

able future actions, would contribute a minor increment to the cumulative effect. Collectively, the cumulative effect on geological resources would be minor long-term and adverse.

Conclusion. Under the No-Action Alternative, a minor long-term adverse impact on geological resources would occur because of soil erosion and bank failure caused by the existing drainage system. A minor long-term adverse cumulative impact would occur.

Because there would be no major adverse impacts to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

#### **ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation, Shoulder Rehabilitation, Roadside Barrier Modifications and Acceleration/Deceleration Lanes Extension. The pavement and road rehabilitation, shoulder stabilization, the installation of permanent concrete guardwalls, and the extension of acceleration/deceleration lanes along the north section of the Parkway would have no impact on geological resources. Construction activities would not require deep excavation, pile driving, blasting, or drilling; therefore, bedrock or other geological resources would not be affected.

Drainage Improvements. The drainage improvements such as increased inlets on the road surface have the potential to increase erosion at the outfall locations due to increased discharge rates. However, the addition of modern stormwater facilities and practices would improve existing conditions and reduce the erosive forces of stormwater runoff by decreasing discharge velocities. Detailed design and hydraulic analysis at each structure would be conducted to determine how to best minimize impacts and in some cases to correct existing erosion and reduce stormwater runoff velocities. The installation of new infrastructure and modern stormwater management practices as well as stabilization measures would have a long-term beneficial impact on geological resources because it would reduce future erosion and bank failure caused by stormwater runoff.

Route 123/GWMP Interchange Reconfiguration (All Options). Under each of the Route 123/GWMP interchange options, geological resources would not be altered. It is not anticipated that construction would require deep excavation; therefore, bedrock or other geological resources below the surface would not be impacted. Construction activities would not require pile driving, blasting or drilling that would potentially impact bedrock or other geological resources.

Cumulative Effects. No past, present, and reasonably foreseeable future projects were identified in the cumulative impact scenario that would have a beneficial impact on geological resources. Therefore, no cumulative impact would occur.

Conclusion. Drainage improvements along the north section of the GWMP would be long-term and beneficial because of the installation of modern storm drainage infrastructure and practices and corrective actions to repair existing erosion. The installation of permanent concrete guardwalls, extending the acceleration/deceleration lanes, and the reconfiguring of the Route 123/GWMP interchange would have no impact to geologic resources. There would be no cumulative effect on geological resources.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

## IMPACTS TO SOILS

### DEFINITION OF INTENSITY LEVELS

All available information on soils that would be potentially impacted in various areas of the park was compiled. Where possible, map locations of sensitive soils were compared with locations of proposed developments and modifications of existing facilities. Predictions about short-term and long-term site impacts were based on previous projects with similar soils and recent studies. The thresholds of change for the intensity of an impact are defined as follows:

- *Negligible*: Soils would not be affected or the effects to soils would be below or at the lower levels of detection. Any effects to soils would be slight.
- *Minor*: The effects to soils would be detectable. Effects to soil area would be small. Mitigation may be needed to offset adverse effects and would be relatively simple to implement and likely be successful.
- *Moderate*: The effect on soil would be readily apparent and result in a change to the soil character over a relatively wide area. Mitigation measures would be necessary to offset adverse effects and likely be successful.
- *Major*: The effect on soil would be readily apparent and substantially change the character of the soils over a large area in and out of the park. Mitigation measures to offset adverse effects would be needed, extensive, and their success would not be guaranteed.

*Duration*: Short-term – Effects lasting for the duration of the construction activities (less than 1 year); Long-term – Effects lasting longer than the duration of the construction (longer than 1 year).

### ALTERNATIVE A - NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the NPS would continue management actions that would include minimum rehabilitation of the roadway to maintain the Parkway. No deep excavation or construction activities would occur at or near the study area. Implementing the No-Action Alternative would have minor long-term adverse impact on soils because drainage from the Parkway has resulted in small landslides on the steep banks of the Potomac River. This condition would be expected to continue under Alternative A.

Cumulative Effects. The recent rehabilitation of the north entrance to Ronald Reagan National Airport and future projects such as the Humpback Bridge replacement, the new entrance to the Columbia Island Marina, and the Mount Vernon Trail Extension have the potential to have minor long-term adverse impacts on soils because of earth work necessary for construction. The No-Action Alternative would have an impact on soils for the reasons described previously. The No-Action Alternative, when added to these past, present, and reasonably foreseeable future actions, would contribute a minor increment to the cumulative effect. Collectively, the cumulative effect on soils would be minor long-term and adverse.



Conclusion. Under the No-Action Alternative, there would be a minor long-term adverse impact to soils because existing drainage outfalls are causing soil loss (e.g. landslides). Minor long-term adverse cumulative effects would occur.

Because there would be no major adverse impacts to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

#### **ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation. The milling and overlaying would have no impacts to soils as there would be no new earth disturbance from these activities.

Shoulder Rehabilitation. Under Alternative B, the existing shoulder would be stabilized. This stabilization would reduce erosion and soil loss. A long-term beneficial impact would occur.

Drainage Improvements. The addition of modern stormwater facilities and practices would likely improve existing conditions and reduce the erosive forces of stormwater runoff. Detailed design and hydraulic analysis at each structure would be conducted to determine how to best minimize impacts and in some cases to correct existing erosion and reduce stormwater runoff velocities. Overall, it is anticipated that the installation of new infrastructure and modern stormwater management practices as well as stabilization measures would have a long-term beneficial impact to soils.

Roadside Barrier Modifications. The installation of permanent concrete core guardwalls along the north section of the Parkway would have a negligible long-term adverse impact to soils. The newly constructed guardwalls would not cause an increase in erosion.

Acceleration/Deceleration Lanes Extension. The extension of acceleration/deceleration lanes along the north section of the Parkway would have a minor long-term adverse impact to soils. Extending acceleration/deceleration lanes would increase the amount of impervious surface within the study area, which would cause increased drainage flow and soil erosion. During construction, extending acceleration/deceleration lanes would have a minor adverse impact.

Route 123/GWMP Interchange Reconfiguration. The reconfiguration of the Route 123/GWMP interchange would have a minor short-term adverse impact to soils from construction activities. Table 5 presents the areas of soil disturbance for each option being considered.

**TABLE 5: AREA OF GROUND DISTURBANCE FOR EACH  
ROUTE 123/GWMP INTERCHANGE OPTION**

<b>Interchange Option</b>	<b>Temporary Earth Disturbance (in square feet) (acres)</b>
Option 1	262,500 sq ft (6 acres)
Option 2	227,500 sq ft (5.2 acres)
Option 3	200,000 sq ft (4.6 acres)
Option 4	135,000 sq ft (3.1 acres)
Option 5	74,000 sq ft (1.7 acres)

Construction Activities. During construction, minor excavation and construction activities in the study area would cause increased soil disturbance and erosion. Erosion control measures would be implemented to decrease soil erosion within the proposed project area. The impacts on soils from construction activities would be minor, short-term, and adverse.

Cumulative Effects. The recent rehabilitation of the north entrance to Ronald Reagan National Airport and future projects such as the Humpback Bridge replacement, the new entrance to the Columbia Island Marina, and the Mount Vernon Trail Extension have the potential to have minor long-term adverse impacts on soils. Implementing Alternative B, when added to these reasonably foreseeable future actions, would contribute adversely to the cumulative effect on soils because the actions would increase soil erosion from the increase of impervious surfaces along the Parkway. Collectively, the adverse cumulative effect on soils would be anticipated to be minor and long-term.

Conclusion. The milling and overlaying would have no impacts to soils. The installation of permanent concrete core guardwalls along the north section of the Parkway would have a negligible long-term adverse impact to soils. The extension of acceleration/deceleration lanes along the north section of the Parkway would have a minor long-term adverse impact to soils. Drainage improvements and shoulder stabilization along the north section of the GWMP would have a long-term beneficial impact to soils. Construction activities would have minor short-term adverse impacts to soils. Reconfiguring the Route 123/GWMP interchange would have a minor short-term adverse impact to soils and a minor long-term adverse impact. The cumulative effect on soils would be minor, long-term and adverse.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

## IMPACTS TO VEGETATION

### DEFINITION OF INTENSITY LEVELS

Available information on vegetation and vegetative communities potentially impacted by the alternatives was compiled. Where possible, map locations of sensitive vegetation species, populations, and communities were identified and avoided. Predictions about short-term and long-term site impacts were based on previous projects with similar vegetation and recent studies. The thresholds of change for the intensity of impacts on vegetation are defined as follows:

- *Negligible*: No native vegetation would be affected or some individual native plants would be affected as a result of the alternative, but there would be no effect on native species populations. The effects would be on a small scale and no species of special concern would be affected.
- *Minor*: The alternative would affect some individual native plants and would also affect a relatively minor portion of that species population. Mitigation to offset adverse effects, including special measures to avoid affecting species of concern, would be required and would be effective.
- *Moderate*: The alternative would affect some individual native plants and would also affect a sizeable segment of the species population over a relatively large area. Mitigation to offset the adverse effects would be extensive, but would likely be successful. Some species of special concern would be affected.
- *Major*: The alternative would have a considerable effect on native plant populations, including species of special concern, and would affect a relatively large area in and outside of the park. Mitigation measures to offset the adverse effects would be required, extensive, and success of the mitigation measures would not be guaranteed.

*Duration*: Short-term – Effects lasting less than 3 years; Long-term – Effects lasting longer than 3 years.

### ALTERNATIVE A - NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the NPS would continue management actions that would include minimum rehabilitation of the roadway to maintain existing integrity and character of the historic site. Implementing the No-Action Alternative would have no impact on vegetation because no individual plant species or plantings would be removed or affected.

Cumulative Effects. There would be no cumulative effect because there would be no impact on vegetation under the No-Action Alternative.

Conclusion. Under the No-Action Alternative, there would be no direct or cumulative impacts to vegetation because vegetation would not be removed or adversely affected.

Because there would be no major adverse impacts to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

**ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation. The pavement and road rehabilitation would have no impact on vegetation because there would be no disturbance outside the existing roadway.

Drainage Improvements, Shoulder Rehabilitation, Acceleration/Deceleration Lanes Extension. Under Alternative B, the major project components include the installation of a curb, stabilization of the shoulder, the replacement of the roadside barriers, and the construction and/or extension of acceleration/deceleration lanes at various areas along the north section of the Parkway. These improvements to the Parkway would require selective removal of trees, shrubs, and ground cover. The impacts would be localized and involve very small areas.

Outfall Repair. Environmental Scientists from Greenhorne & O'Mara, Inc. (G&O) conducted vegetation surveys at the George Washington Memorial Parkway on July 13, 14, and 17, 2007, in order to assess impacts caused by proposed salvage and reconstruction of stone masonry guardwalls, and repairs to outfall structures throughout the parkway. Sampling points within the outfall access corridors provided in the Earth Tech, *Outfall Access and Repair Investigation Report* (April 2007) were chosen. Steep slopes in some areas of the northbound side of the Parkway were a limiting factor due to restrictive access. Sample plots were taken a minimum of 40 feet from the forest edge in order to calculate an accurate basal area using a 10 factor wedge prism. A prism is used in forestry to measure basal area. The 10 factor wedge prism generates a fixed angle that, when viewed through, shifts the image of part of the tree. Every tree that is wider than the fixed angle formed by the prism represents 10 square feet of basal area per acre. For example, if eight trees are wider than the shifted image, the basal area of the forest is 80 square feet per acre.

Using 1/100<sup>th</sup> acre plots (radius = 11.78 feet), the understory and herbaceous layers were inventoried within the sample plots, including average groundcover. The percentage of total herbaceous groundcover and the percent of that total which is invasive were also estimated. The diameter of each sample tree was measured at breast height (dbh = 4.5 feet) using diameter measuring tape. The number of trees per acre was also calculated based on the average basal area of the 13 representative sample plots. The percentage of canopy cover, downed woody debris and dead trees within the sample plots were also noted.

The results of these surveys were contained in a report released to the NPS in August 2007. Using the described methodology, a total of 13 outfall access points were surveyed throughout the north section of the George Washington Memorial Parkway, including five on the southbound side of the Parkway and eight on the northbound side. No noticeable trends were noted with regards to location of the sample plots and basal area. However, the percentage of overall groundcover tended to be lower in the areas north of the CIA interchange and within Turkey Run Park. Evidence of deer browsing was observed in the locations. The percent of non-native ground cover in ratio with total ground cover was also lower in these areas.

The mixed hardwood forest stands within the study area are typically dominated by native trees including tulip poplar intermixed with oaks, mockernut hickory, black walnut, red maple, and American beech. Typical understory species include American beech, red maple, and box elder throughout the study area, with paw paw also occurring on the northbound side. Average herbaceous ground cover of the forest floors within the 13 sample plots totaled 40%, with 46% of that cover being invasive. A number of native herbaceous/vine species occur within the project area,

with Virginia creeper and poison ivy found throughout. Non-native species found throughout the project area include Japanese honeysuckle, oriental bittersweet, and English ivy. Based on the 13 sample plots, average basal area within the study area is estimated at 117 square feet per acre, with an average of 174 trees per acre.

As stated in the *Outfall Access and Repair Investigation Report*, the total area of access routes proposed for the repair of 86 outfall structures is 4.51 acres. With appropriate mitigation measures, it is assumed that the area of disturbance would be greatly reduced. Based on field observations and the number of live trees per acre, it is estimated that approximately one third of the trees within these areas would be impacted. An estimated 265 trees ranging in size from 2.5 to 19 inches dbh, or approximately three trees per outfall, would be removed. It was estimated that fewer than 10 trees in size class 20 inches dbh or larger would be removed. In addition, impacts to herbaceous vegetation would also be reduced by utilizing mitigation measures.

Roadside Barrier Modifications. Environmental Scientists from Greenhorne & O'Mara, Inc. (G&O) conducted vegetation surveys at the George Washington Memorial Parkway on July 13, 14, and 17, 2007, in order to assess impacts caused by proposed reconstruction of existing stone masonry guardwalls, the extension and/or construction of new guardwalls, and repairs to outfall structures throughout the parkway.

The forest areas within and directly adjacent to the limit of disturbance identified in the 30 percent design plans for the GWMP North Section Rehabilitation Project were characterized and the potential impacts to vegetation, associated with stone masonry guardwall construction, were assessed. Vegetation was inventoried within the limits of disturbance for 30 percent of the linear feet of existing stone masonry guardwalls to be reconstructed as part of the GWMP North Section Rehabilitation Project. This information was then used to extrapolate impacts for the entire project.

The distance of each tree within 8 feet of the wall was measured. For each tree within 8 feet of the wall, the diameter at breast height (dbh = 4.5 feet) of each tree was measured using a tree diameter measuring tape. The distance from the back of the stone wall to the edge of the vegetation was measured including noting where the tree canopy exists. Assuming an eight-foot limit of disturbance behind the wall and the installation of silt fencing at 5 feet behind the wall, trees, saplings/shrubs, and herbaceous species behind each wall were identified. For the assessment, it was assumed that trees within 5 feet of the walls would be impacted and trees between 5 and 8 feet of the walls would be saved in most cases. Also, tree pruning would be necessary where the canopy comes within close proximity to the wall.

The results of these surveys were contained in a memorandum released to the NPS August 2007. In summary, this memo concluded that with an anticipated 8 feet of disturbance behind existing stone masonry guard walls it is estimated that approximately 5.11 acres (222,904 square feet) of land disturbance would occur due to the construction activities associated with the repair of existing stone masonry guard walls to comply with current AASHTO safety standards. It is anticipated that the impacts to large trees between 5 and 8 feet behind the stone masonry guardwalls can be prevented by the installation of silt fencing and the utilization of best management practices. For the purpose of the assessment, it was assumed that trees within 5 feet of the walls would be impacted. A total of 12 trees were observed within this 5-foot range during the survey of 6,841 linear feet of stone masonry guardwalls (13 walls). Based on the data collected during

these vegetation surveys, the number of trees within the 5-foot range of the proposed 22,505 linear feet was extrapolated to be 49 trees.

Route 123/GWMP Interchange Reconfiguration. The potential impact on vegetation for each Route 123/GWMP interchange option is described below and the impacts summarized in Table 6.

- Option 1 - The realignment and construction of new southbound off and on ramps under Option 1 would have an adverse impact on vegetation. Approximately 1.4 acres of hardwood forest would be destroyed in the southwest quadrant of the Route 123/GWMP interchange. The American hazelnut trees at this location would be impacted. In addition, five large trees would be removed in the northwest cloverleaf portion of the interchange: three eastern white pines and two pin oaks. The impact would be minor and long-term. Mitigation would be required.
- Option 2 - The realignment and construction of new southbound off and on ramps under Option 2 would have an adverse impact on vegetation. Approximately 1.2 acres of hardwood forest would be destroyed in the southwest quadrant of the Route 123/GWMP Interchange. The American hazelnut trees at this location would be impacted. In addition, six large trees would be removed in the northwest cloverleaf portion of the interchange: two eastern white pines, one eastern red cedar, two pin oaks, and one red maple. The impact would be long-term and minor. Mitigation would be required.
- Option 3 – The realignment and construction of new southbound off and on ramps under Option 3 would avoid impacts on the hardwood forest and American hazelnut to the northwest of the intersection. Four large trees would be removed in the southwest cloverleaf portion of the interchange: one eastern white pine, one eastern red cedar, and two red maples. The adverse impact would be long-term and negligible.
- Option 4 – The realignment and construction of new southbound off and on ramps under Option 4 would avoid impact on the hardwood forest and American hazelnut to the southwest of the intersection. Four large trees would be removed in the southwest cloverleaf portion of the interchange: one eastern white pine, one eastern red cedar, one pin oak, and two red maples. The adverse impact would be long-term and negligible.
- Option 5 – New southbound off and on ramps are not proposed under Option 5; therefore, there would be no impact on the hardwood forest and American hazelnut to the northwest of the intersection. One large pin oak would be impacted by this option. The adverse impact would be long-term and negligible.

Any native trees removed under Alternative B would be replaced with in-kind or similar native species. For instance, the white pines would be removed to construct the acceleration/deceleration lane extensions and to reconfigure the Route 123/GWMP interchange. Non-native trees and shrubs would be replaced by plantings of native species except in those instances where the species has cultural landscape value. The replacement planting would be placed close to the original location but an appropriate distance from the newly constructed roadway for safety purposes. A minor short-term adverse impact on vegetation would occur because of the temporary loss of vegetation during construction and the time required for the new plantings to mature. Long-term, the vegetation would be replaced and grow to provide similar habitat and aesthetic value. Another impact caused by the disturbance of soils includes the likely establishment

and spread of invasive exotic species. Soil disturbance allows the more opportunistic invasive species to colonize. Therefore, there would be minor long-term adverse impacts to vegetation.

**TABLE 6: IMPACTS TO FOREST LAND AND LARGE TREES FOR EACH ROUTE 123/GWMP INTERCHANGE OPTION**

<b>Interchange Option</b>	<b>Impact to Forest Land</b>	<b>Large Landscape Tree(s) Impacted</b>
Option 1	1.4 acres	3 eastern white pines 2 pin oaks
Option 2	1.2 acres	2 eastern white pines 1 eastern red cedar 2 pin oaks 1 red maple
Option 3	No impact	1 eastern white pine 1 eastern red cedar 2 red maples
Option 4	No impact	1 eastern white pine 1 eastern red cedar 2 red maples 1 pin oak
Option 5	No impact	1 pin oak

**Cumulative Effects.** Future projects such as the Humpback Bridge replacement, the new entrance to the Columbia Island Marina, and the Mount Vernon Trail Extension have the potential to have minor long-term adverse impacts on vegetation because of land clearing necessary to construct new facilities. Alternative B would have an impact on vegetation and require the removal and replacement of existing vegetation, such as the case at the Route 123/GWMP interchange. Implementing Alternative B, when added to these past, present, and reasonably foreseeable future actions, would contribute a small increment to the cumulative effect on vegetation. The amount of vegetation to be removed as a result of all the projects in the cumulative impact scenario is very small in comparison to the amount of vegetation on and near the Parkway. Therefore, collectively, the cumulative effect on vegetation would be minor long-term and adverse.

**Conclusion.** With each Route 123/GWMP interchange option or roadside barrier options, Alternative B would have minor long-term adverse impacts on vegetation because of the combination of the reconfiguration of the Route 123/GWMP interchange with other improvements that would require the removal of vegetation and potential for invasive species to colonize. To mitigate impacts on vegetation, the NPS would replace the vegetation at a 1:1 dbh (diameter at breast height) ratio in accordance with NPS sustainability practices and seed the area of disturbance. A minor long-term adverse cumulative impact would occur.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

## IMPACTS TO WILDLIFE

### DEFINITION OF INTENSITY LEVELS

The NPS Organic Act, which directs parks to conserve wildlife unimpaired for future generations, is interpreted by the agency to mean that native animal life should be protected and perpetuated as part of the park's natural ecosystem. Natural processes are relied on to control populations of native species to the greatest extent possible; otherwise, they are protected from harvest, harassment, or harm by human activities. According to NPS Management Policies 2001, the restoration of native species is a high priority (sec 4.1). Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including natural abundance, diversity, and the ecological integrity of plants and animals. Information on the GWMP wildlife was taken from park documents and records. The GWMP staff natural resource management staff, the USFWS, and the Virginia Department of Conservation and Recreation also provided wildlife information. The thresholds of change for the intensity of impacts on wildlife are defined as follows:

- *Negligible*: There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.
- *Minor*: Impacts would be detectable, but they would not be expected to be outside the natural range of variability of native species' populations, their habitats, or the natural processes sustaining them. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
- *Moderate*: Breeding animals of concern are present. Animals are present during particularly vulnerable life stages, such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis but is not expected to threaten the continued existence of the species in the park unit. Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they would be outside the natural range of variability. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
- *Major*: Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they would be expected to be outside the natural range of variability. Key ecosystem processes might be disrupted. Loss of habitat might affect the viability of at least some native species. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

*Duration*: Short-term – Recovers in less than 1 year; Long-term – Takes more than 1 year to recover.

### ALTERNATIVE A - NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the NPS would continue management actions that would include minimum rehabilitation of the roadway to maintain the Parkway near its existing state. The No-Action Alternative would not have an impact on wildlife because no wildlife species or habitats would be disturbed.

Cumulative Effects. There would be no cumulative effect because there would be no impact on wildlife under the No-Action Alternative.



Conclusion. Under the No-Action Alternative, there would be no impacts to wildlife because wildlife would not be affected. No cumulative effect would occur.

Because there would be no major adverse impacts to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

#### **ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation. The pavement and road rehabilitation would have no long-term impact on wildlife; there would be no loss of habitat because the road rehabilitation would be entirely within the existing roadway.

Drainage Improvements, Shoulder Rehabilitation, Roadside Barrier Modifications, and Acceleration/Deceleration Lanes Extension. Installation of a pre-cast curb, replacement of roadside barriers, and the construction of extended acceleration/deceleration lanes would have little effect on wildlife along the Parkway. The new curb and roadside barriers would be placed in the same location as the existing curb and walls. The shoulder stabilization and acceleration/deceleration lanes would result in a small loss of vegetation, which would cause a potential loss of habitat; however, these areas are very small and the long-term adverse impacts would be minor due to the abundance of similar habitats within the area for wildlife to migrate.

Route 123/GWMP Interchange Reconfiguration (All Options). The reconfiguration of the Route 123/GWMP interchange would impact wildlife due to the loss of habitat within the study area. Habitat fragmentation or compartmentalization, especially in relation to large forested tracts, is often a concern for transportation projects because new roadways cross habitats and form barriers to wildlife corridors. Impacts would be adverse and long-term due to the permanent loss of habitat; however, each interchange option is not expected to fragment the forested area.

Option 1 would compartmentalize a small area of hardwood forest habitat in the northwest area of the interchange. Option 2 would not encroach on the forest to the point where this would be a concern. There would be no impacts to the hardwood forest under Options 3, 4, and 5. Regardless, the long-term impact associated with all the options would be minor due to the abundance of similar habitats near the study area for wildlife to migrate and Route 123 already dissects the forested areas at the interchange.

Construction Activities. During construction, exposed soils would increase sediment loads to receiving waters. Increased sediment loads would destroy or damage aquatic habitat for macro-invertebrates and spawning fish. While the initial response to increased sediment due to construction-related activities is the reduction in species' numbers, they generally repopulate within 12 months of construction. Terrestrial animals use the forested areas for cover on the GWMP and temporary disturbances caused by construction would have short-term impacts on the terrestrial animals and nearby habitat. The temporary construction-related disturbances would cause species to move to other areas. There are similar suitable habitats in the area so that the impact would be minor. Construction activities would have minor short-term adverse impacts on wildlife because of potential sedimentation and temporary human-caused disturbances in or adjacent to known habitats.

**Cumulative Effects.** The rehabilitation of the north section of the GWMP and the reconfiguration of the Route 123/GWMP interchange would adversely impact wildlife as described previously. The Mount Vernon Trail Extension would also impact wildlife and their habitat, and the construction of the trail would destroy the habitat. The use of the trail would add temporary human-caused disturbances in or adjacent to known habitats. When combined with the Mount Vernon Trail Extension, the rehabilitation of the north section of the GWMP would have a minor adverse cumulative effect.

**Conclusion.** There would be minor long-term and short-term adverse impacts to wildlife in the proposed project area associated with the removal of habitat and temporary human-caused disturbances. Minor adverse cumulative effects would occur.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

## **IMPACTS TO RARE, THREATENED, AND ENDANGERED SPECIES AND HABITAT**

### **DEFINITION OF INTENSITY LEVELS**

The Endangered Species Act (16 USC 1531 et seq.) mandates that all federal agencies consider the potential effects of their actions on species listed as threatened or endangered. If the NPS determines that an action would adversely affect a federally listed species, consultation with the USFWS is required to ensure that the action would not jeopardize the species' continued existence or result in the destruction or adverse modification of critical habitat. The NPS's *Management Policies, 2006*, states that potential effects of agency actions would also be considered for state or locally listed species. The NPS is required to control access to critical habitat of such species and to perpetuate the natural distribution and abundance of these species and the ecosystems upon which they depend. The USFWS was contacted for a list of special status species and designated critical habitats that would be within the proposed project area or affected by any of the alternatives (See Appendix 1 for the USFWS list). Information on possible threatened, endangered, candidate species, and species of special concern was gathered from park resource information and consultation with the Virginia Department of Conservation and Recreation, Division of Natural Heritage. Information from prior surveys at GWMP was also incorporated. Map locations of habitat associated with threatened, endangered, candidate species, and species of special concern were compared with locations of proposed developments and existing facilities. Known impacts caused by development and human use were also considered. The thresholds of change for the intensity of an impact are defined as follows:

- *Negligible:* The action would result in a change to a population, individuals of a species, or designated critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence.
- *Minor:* The action would result in a change to a population, individuals of a species, or designated critical habitat. The change would be measurable but small and localized and of little consequence.

- *Moderate*: The action would result in a change to a population, individuals of a species, or designated critical habitat. The change would be measurable and of consequence.
- *Major*: The action would result in a noticeable change to a population, individuals of a species, resource, or designated critical habitat.

*Duration*: Short-term – Recovers in less than 3 years; Long-term – Recovers in more than 3 years.

#### **ALTERNATIVE A - NO-ACTION ALTERNATIVE**

Under the No-Action Alternative, the NPS would continue management actions that would include minimum rehabilitation of the roadway to maintain the Parkway near its existing state. The No-Action Alternative would have no impact on rare, threatened, and endangered species because no species or their habitats would be affected.

Cumulative Effects. There would be no cumulative effect because there would be no impact on rare, threatened, and endangered species or their habitats under the No-Action Alternative.

Conclusion. Under the No-Action Alternative, there would be no impacts to rare, threatened, and endangered species because potential species or their habitats would not be removed or adversely affected. No cumulative effect would occur.

Because there would be no major adverse impacts to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

#### **ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation, Shoulder Rehabilitation, Roadside Barrier Modifications, and Acceleration/Deceleration Lanes Extension. Under Alternative B, the major project components include the rehabilitation of the pavement/roadway, shoulder stabilization, installation of a new curb, the replacement roadside barriers, and the construction and/or extension of acceleration/deceleration lanes at various areas along the northern section of the Parkway. These improvements would have no impacts on known rare, threatened, or endangered species on the Parkway because they would occur within the existing maintained roadway area.

Drainage Improvements. The drainage improvements (repair to outfalls) would occur near the GWMP/CIA Interchange, where populations of two species of rare amphipod, *Stygobromus piz-zinii* and *Stygobromus* sp., have been observed in nearby spring seeps (Virginia Department of Conservation and Recreation, 2005). Both species are designated S1 ranking by Virginia Department of Conservation and Recreation, which defines these species as critically imperiled in the State because of extreme rarity or because one or more factors make them especially vulnerable to extirpation from the state (Virginia Department of Conservation and Recreation, 2005). Disturbance of soils during construction in the near vicinity can degrade these habitats and result in a reduction of population numbers. These seeps have been surveyed and their locations identified. The seeps would be avoided to the extent possible. During repair of the outfalls near known seeps, more stringent erosion and sediment control measures and high visibility construction fencing would be specified to the contractor to avoid seeps. In areas of known rare amphipod

species or other rare species, biological monitoring would be performed during construction to help monitor water quality and minimize disturbance to the stream channel and bed. As more information is available during the detailed design, the design and construction methods would be evaluated for environmental consideration by a natural resources specialist familiar with the conditions on the GWMP. With best management practices, avoidance during design, and monitoring during construction, no impacts to rare species would occur.

Based on previous surveys and additional investigation completed by a Virginia Department of Conservation and Recreation botanist on May 9 and 10, 2005, some outfall locations are close to known populations of the globally rare eastern buttercup phacelia (*Phacelia covillei*) (Virginia Department of Conservation and Recreation, 2005). Repair of the outfall would cause ground disturbance that would adversely impact this species by potentially destroying populations or by disrupting their habitat. Introduction of exotic or invasive species is also a concern. Since more information is needed for the design of corrective measures at each outfall, the exact limits of disturbance cannot be identified at this time. Each outfall structure would have to be evaluated on a case-by-case basis once more detailed design is available. Furthermore, some outfalls would have to be accessed from the Potomac River and its floodplain. This area has an abundance of rare plant species. In the event that construction equipment would have to access outfalls from the floodplain, additional investigation and rare plant surveys would be needed to determine the presence of rare species and appropriate avoidance and mitigation measures.

Route 123/GWMP Interchange Reconfiguration. The reconfiguration of the Route 123/GWMP interchange would have no impacts to rare, threatened, and endangered species. No rare species or their habitats are known to exist within the limits of disturbance for all five interchange options. No impact to rare species or their habitats would occur.

Construction Activities. During construction, exposed soils would increase sediment loads to receiving waters. Increased sediment loads would destroy or damage the aquatic habitat for macroinvertebrates. Because the earth disturbance on this project is localized to small strips of areas adjacent to the roadway, the increased sediment loads would not be expected to affect the rare amphipods in streams. However, if work is needed along the banks of Gulf Branch, Windy Run, and Spout Run, precautions should be taken to make certain that impacts to the stream channels are avoided. Construction activities would have no adverse impacts on rare species.

It should be noted that Turkey Run Park is the only known Virginia site of the spectacled nettle moth (*Abrostola urentis*) (NPS, 2005b). Alternative B would not impact potential habitat for the moth. Furthermore, on the banks of the Potomac River in the northern section of the Parkway by Little Falls, a bald eagles' nest is known to exist. Alternative B would not affect this nest because the improvements are restricted to areas near the existing roadway, which is more than a quarter mile from the nest.

Cumulative Effects. The rehabilitation of the north section of the GWMP and the reconfiguration of the Route 123/GWMP interchange would have no impact to rare, threatened, and endangered species; therefore, no cumulative effect would occur.

Conclusion. No impact to rare, threatened, and endangered species or their habitats would occur. No cumulative effect would occur.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation

of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

## IMPACTS TO SURFACE WATERS

### DEFINITION OF INTENSITY LEVELS

Analyses of the potential intensity of impacts on surface waters were derived from the available information on the Parkway and the professional judgment of the park staff. The thresholds of change for the intensity of impacts on surface waters are defined as follows:

- *Negligible*: Surface waters would not be affected or the effects would be at the lowest levels of detection and not have an appreciable effect on surface waters.
- *Minor*: The effects would be detectable but would not have an appreciable effect on surface waters. If mitigation were needed, it would be relatively simple and would likely be successful.
- *Moderate*: The effects would be readily apparent and would result in substantial, noticeable effects to surface waters on a local scale. Mitigation measures would probably be necessary and would likely be successful.
- *Major*: The effects would be readily apparent and would result in substantial, noticeable effects to surface waters on a regional scale. Extensive mitigation measures would be needed, and success would not be guaranteed.

*Duration*: Short-term – Effects last 3 years or less; Long-term – Effects last longer than 3 years.

### ALTERNATIVE A - NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the NPS would continue management actions that would include minimum rehabilitation of the roadway to maintain the Parkway near its existing state. The No-Action Alternative would have a negligible adverse impact on surface waters because of soils erosion at outfall structures. The existing drainage system has very small and localized impacts on nearby surface waters from increased sediment deposition from bank erosion.

Cumulative Effects. Future projects such as the Humpback Bridge replacement, the Mount Vernon Trail extension and Arlington County and Vicinity Boathouse have the potential to have long-term adverse impacts on surface waters because of impacts to surface waters from construction of the new bridge, the trails, and the boathouse. The No-Action Alternative, when added to these reasonably foreseeable future actions, would contribute a very small increment to the cumulative effects on surface waters because the impact is very small and localized when compared to the length of perennial streams on the Parkway. Collectively, the adverse cumulative effects on surface waters would be negligible.

Conclusion. Under the No-Action Alternative, there would be negligible long-term adverse impacts on surface waters. There would be negligible adverse cumulative effects on surface waters.

Because there would be no major adverse impacts to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in

the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

**ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation, Shoulder Rehabilitation, Roadside Barrier Modifications, and Acceleration/Deceleration Lanes Extension. Under Alternative B, the major project components of the rehabilitation of the pavement/roadway, stabilization of the road shoulder, installation of a new pre-cast curb, modification to the existing roadside barriers, and the construction and/or extension of acceleration/deceleration lanes would have no direct impacts to surface waters. Indirect impacts are described in the water quality analysis.

Drainage Improvements. The majority of the outfall structures on the parkway convey stormwater from the roadway surface. There are a few instances where repair to pipes would be required for drainage pipes that convey streams under the Parkway. Repair of these outfall structures would have minor adverse impacts to the Surface Waters from in-stream construction activities. The primary concern would be physical impacts to the streams and streambanks during construction. It is anticipated that impacts would be temporary during construction. Long-term, the outfall repairs would have a beneficial impact to the stream and other receiving waters by reducing future channel erosion and sediment deposition.

A detailed outfall survey was completed and preliminary recommendations for stabilization were made by FHWA. The outfall survey rated each outfall channel condition on a scale of 1 to 5 as well as the pipe condition. Table 7 presents the outfalls where corrective measures are proposed in perennial or intermittent streams. For these streams, the NPS would comply with Section 404 of the Clean Water Act and applicable state regulation for waters of the U.S. Appendix F shows the locations of the outfalls by number and roadway stationing.

**TABLE 7: PROPOSED OUTFALL REPAIRS IN PERENNIAL/INTERMITTENT STREAMS**

Outfall #	Approx. Station	Roadway	Outfall Channel Condition Rating	Corrective Measures
9	980+50	NBL	4	5'x10' riprap at outfall
18	953+00	NBL	4	12'x12' riprap at outfall
61	321+75	SBL	1	10'x40'x8' deep outfall channel fill
64	312+75	SBL	3	8'x20'x3' deep outfall channel fill
66	308+25	SBL	1	20'x40'x3' deep outfall channel fill
74	783+50	NBL	2	10'x10' riprap at outfall; reset end section
77	776+25	NBL	1	15'x15' riprap at outfall
82	759+75	NBL	3	20'x50'x3' deep outfall channel fill
83	750+25	NBL	4	8'x8' riprap at outfall
85	737+50	NBL	3	8'x 20'x3' deep outfall channel fill
86	735+00	NBL	4	24'x24' riprap at outfall
90	114+75	CIA	4	20'x20' riprap at outfall
91	114+50	CIA	3	20'x20' riprap at outfall; patch concrete end-wall; fill 6'x6'x3' area behind wingwall
97	708+50	NBL	3	30'x30' riprap at outfall
109	671+00	NBL	4	8'x8' riprap at outfall
118	650+00	NBL	3	18'x18' riprap at outfall
119	637+75	NBL	4	9'x9' riprap at outfall; replace 36" end section
120	635+50	NBL	4	9'x9' riprap at outfall; replace 36" end section

\* Outfall Channel Ratings from George Washington Memorial Parkway North Section Improvements Hydraulics Report, 2006. (Rating Scheme: **1** Poor: Severe erosion, channel is far below original grade, sides are very steep; **2** Substandard: Sizable erosion, channel appears to be very erodible; **3** Fair: Some erosion, channel appears to be below original bed elevations; **4** Good: minor erosion, channel does not appear to be erosion-prone; **5** Excellent: little to no erosion).

Route 123/GWMP Interchange Reconfiguration. An intermittent stream exists in the southwest quadrant of the Route 123/GWMP interchange. Some of the interchange options considered would have a direct impact to the stream channel. The length and area of stream impact for each option are presented in Table 7.

**TABLE 8: IMPACT TO STREAM FOR EACH  
ROUTE 123/GWMP INTERCHANGE OPTION**

<b>Interchange Option</b>	<b>Impact to Stream (linear feet)</b>	<b>Impact to Stream (square feet)</b>
Option 1	300 lf	3,000 sq ft
Option 2	50 lf	500 sq ft
Option 3	No impact	No impact
Option 4	No impact	No impact
Option 5	No impact	No impact

Options 1 and 2 would have minor, long-term adverse impacts to surface waters because the off ramp would cross the stream. For Option 2, the stream would be impacted from the culvert under the GWMP mainline to the culvert near the Arlington County pump station. Options 3, 4 and 5 would avoid the stream and, therefore, have no direct impact to surface waters.

Construction Activities. During construction, exposed soils would increase sediment loads to receiving waters. Increased sediment loads would destroy or damage aquatic habitat for macro-invertebrates and spawning fish. While the initial response to increased sediment due to construction-related activities is the reduction of a species' numbers, they generally repopulate within 12 months of construction. Construction activities would have minor short-term adverse impacts on surface waters.

Cumulative Effects. Future projects such as the Humpback Bridge replacement, the Mount Vernon Trail Extension and Arlington County and Vicinity Boathouse have the potential to have long-term adverse impacts on surface waters because of impacts to surface waters from construction of the new bridge, the trails, and the boathouse. Alternative B, when added to these reasonably foreseeable future actions, would contribute a very small increment to the cumulative effects on surface waters because the impact to streams is very small and localized when compared to the length of perennial streams on the Parkway. Collectively, the adverse cumulative effects on surface waters would be negligible.

Conclusion. Alternative B would have minor short term adverse impacts during construction because of outfall repairs. Route 123/GWMP Interchange Options 3, 4 (Preferred Alternative) and 5 would have no impact on surface waters and Options 1 and 2 would have minor short-term and long-term impacts. Negligible long-term adverse cumulative effects on surface waters would occur. Indirect impacts to water quality are discussed in more detail in the water quality section.



Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

## IMPACTS TO WATER QUALITY

### DEFINITION OF INTENSITY LEVELS

The NPS's *Management Policies, 2006*, state that the NPS would "take all necessary actions to maintain or restore the quality of surface waters and ground waters within the parks consistent with the Clean Water Act and all other applicable federal, state, and local laws and regulations" (sec. 4.6.3).

A water quality standard defines the water quality goals of a water body by designating uses to be made of the water, setting minimum criteria to protect the uses, and preventing degradation of water quality through antidegradation provisions. The antidegradation policy is only one portion of a water quality standard. Part of this policy (40 CFR 131.12(a)(2)) strives to maintain existing water quality levels if it is already better than the minimum criteria. Antidegradation should not be interpreted to mean that "no degradation" can or would occur, as even in the most pristine waters degradation may be allowed for certain pollutants as long as it is temporary and short-term.

Other considerations in assessing the magnitude of water quality impacts are the effects on those resources dependent on a certain quality or condition of water. Sensitive aquatic organisms, submerged aquatic vegetation, riparian areas, and wetlands are affected by changes in water quality from direct and indirect sources.

In order to assess the magnitude of water quality impacts to park waters under the various alternatives, state water quality standards governing the waters of the park were examined and compared to baseline water quality data.

Given the above water quality issues, methodology and assumptions, the following impact thresholds were established in order to describe the relative changes in water quality (overall, localized, short and long-term, cumulatively, adverse and beneficial) under the management alternatives.

- *Negligible:* Impacts are chemical, physical, or biological effects that would not be detectable, well below water quality standards or criteria, and within historical or desired water quality conditions.
- *Minor:* Impacts (chemical, physical, or biological effects) would be detectable but well below water quality standards or criteria and within historical or desired water quality conditions.
- *Moderate:* Impacts (chemical, physical, or biological effects) would be detectable but at or below water quality standards or criteria; however, historical baseline or desired water quality conditions would be temporally altered.
- *Major:* Impacts (chemical, physical, or biological effects) would be detectable and frequently altered from the historical baseline or desired water quality conditions; chemical, physical, or

biological water quality standards or criteria would temporarily be slightly and singularly exceeded.

*Duration:* Short-term – Following treatment, recovery would take less than 1 year; Long-term – Following treatment, recovery would take longer than 1 year.

#### **ALTERNATIVE A - NO-ACTION ALTERNATIVE**

Under the No-Action Alternative, the NPS would continue management actions that would include minimum rehabilitation of the roadway to maintain the Parkway near its existing state. The No-Action Alternative would have a negligible long-term adverse impact on water quality from limited stormwater management facilities to treat runoff, and bank scour from roadway drainage.

Cumulative Effects. Future projects such as the Humpback Bridge replacement, the Mount Vernon Trail Extension and Arlington County and Vicinity Boathouse have the potential to have long-term adverse impacts on water quality because the construction of the new bridge, the trails, and the boathouse in or near surface waters. The No-Action Alternative, when added to these reasonably foreseeable future actions, would contribute a very small increment to the cumulative effects because the change in water quality would be very small and localized. Collectively, the adverse cumulative effects on water quality would be long-term and negligible.

Conclusion. Under the No-Action Alternative, there would be a negligible long-term adverse impact on water quality due to soil erosion and current roadway drainage patterns. Negligible long-term adverse cumulative effects on water quality would occur.

Because there would be no major adverse impacts to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

#### **ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation and Shoulder Rehabilitation. The milling and overlaying would have no impact on water quality. There would be no ground disturbance associated with these activities. Ground disturbance associated with the shoulder stabilization would be linear affecting a small area. With erosion and sediment control, there would be negligible short-term adverse impacts to water quality.

Drainage Improvements. It is anticipated that the installation of new stormwater infrastructure and outfall repairs would have a long-term beneficial impact on water quality from reduction of erosion at outfalls.

Roadside Barrier Modifications. The installation of permanent concrete guardwalls along the north section of the Parkway would have a negligible long-term adverse impact to water quality because the new guardwalls would result in a slight increase in the amount of impervious surface. Also, the new walls would be placed in the locations of the existing walls so little excavation or land disturbance would be needed for construction.

Acceleration/Deceleration Lanes Extension. The extension of acceleration/deceleration lanes along the north section of the Parkway would have a negligible long-term adverse impact to water quality. Extending acceleration/deceleration lanes would increase the amount of impervious

surface within the study area, which would cause increased drainage flow and soil erosion. Water quality within local streams would potentially be affected by increased erosion and drainage from the roadway. Erosion control measures would be implemented to decrease soil erosion within the proposed project area.

Route 123/GWMP Interchange Reconfiguration. The reconfiguration of the Route 123/GWMP interchange would have a minor short-term adverse impact to water quality. Construction of ramps would cause increased soil disturbance and erosion that would potentially drain into local streams, affecting the water quality of these water bodies. Erosion control measures would be implemented to decrease soil erosion. The reconfiguration of the Route 123/GWMP interchange would have a minor long-term adverse impact. The reconfiguration would potentially increase impervious surface area, which would cause increased drainage from the roadway and soil erosion into local streams and the Potomac River. Table 8 shows the difference in impervious surface and limits of disturbance for each interchange option.

**TABLE 9: AREA OF IMPERVIOUS SURFACE AND LIMITS OF DISTURBANCE  
FOR EACH ROUTE 123/GWMP INTERCHANGE OPTION**

<b>Interchange Option</b>	<b>Impervious Surface (square feet) (acres)*</b>	<b>Earth Disturbance (square feet) (acres)</b>
Option 1	Adds 19,800 sq ft (0.5 acre)	262,500 sq ft (6 acres)
Option 2	Adds 8,600 sq ft (0.2 acre)	227,500 sq ft (5.2 acres)
Option 3	Removes 2,600 sq ft (0.01 acre)	200,000 sq ft (4.6 acres)
Option 4	Removes 22,500 sq ft (0.5 acre)	135,000 sq ft (3.1 acres)
Option 5	Removes 3,000 sq ft (0.7 acre)	74,000 sq ft (1.7 acres)

\* Areas were calculated using the length of the new and existing roadway for each option multiplied by an average width for a single or double lane and limits of disturbance for each option based on conceptual interchange layouts as presented in the Candidates Alternative Report (Earth Tech, 2005).

Cumulative Effects. The Humpback Bridge replacement, the new entrance to the Columbia Island and Marina, and the Mount Vernon Trail Extension have the potential to have minor short-term adverse impacts on water quality. The impact would occur from earth disturbance from construction activities. Alternative B, when added to these reasonably foreseeable future actions, would contribute adversely to the cumulative effect on water quality because the actions would increase soil erosion from construction, thus, potentially affecting water quality. Erosion control measures would be implemented to decrease soil erosion within the proposed project area; therefore, collectively, the adverse cumulative effect on water quality is anticipated to be minor and short-term.

Conclusion. Drainage improvements along the north section of the GWMP would have long-term beneficial impacts to water quality. Construction activities would have minor short-term adverse impacts to water quality. The cumulative effect on water quality would be minor short-term and adverse.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

## IMPACTS TO SAFETY

### DEFINITION OF INTENSITY LEVELS

Analyses of the potential intensity of impacts on safety were derived from the available information on the parkway and the professional judgment of the park staff. The thresholds of change for the intensity of impacts on health and safety are defined as follows:

- *negligible*: Safety would be affected but at the lowest levels of detection. No mitigation measures would be required.
- *minor*: The effects would be detectable on safety. If mitigation were needed, it would be relatively simple and likely be successful.
- *moderate*: The effects would be readily apparent and would result in substantial effects to safety on a park scale. Mitigation measures would be needed and would likely be successful.
- *major*: The effects would be readily apparent and would result in substantial, noticeable effects to safety on a regional scale. Extensive mitigation measures would be needed, and success would not be guaranteed.

*Duration*: Short-term – Effects last 1 year or less; Long-term – Effects last longer than 1 year.

### ALTERNATIVE A - NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the NPS would continue management actions that would include minimum rehabilitation of the roadway to maintain the Parkway near its existing state. Implementing the No-Action Alternative would have a moderate long-term adverse impact on safety because of the following:

- The ponding of water on the road surface during storm events would continue to present a safety hazard because of the risk of the vehicle hydroplaning ;
- The tight geometry of the southbound off ramp at the Route 123/GWMP interchange would remain a safety concern because motorists have a short distance to stop prior Route123;
- Short acceleration and deceleration lanes would continue to increase the likelihood of accidents for motorists entering or existing the two overlooks and park headquarters;
- The existing guardwalls would continue to be below AASHTO guidelines, which causes an added risk of mounting the wall during impact; and
- Existing erosion at the outfall structures would continue to present a safety hazard for visitors hiking in the Parkway because of potential landslides.

Cumulative Effects. No projects were identified in the cumulative impact scenario that would have short-term or long-term adverse impacts on safety; therefore, no cumulative effect would occur on safety.

**Conclusion.** Under the No-Action Alternative, impacts would be moderate long-term and adverse because of existing conditions, which present a safety concern to visitors using the Parkway. No cumulative effects would occur.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

#### **ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation, Shoulder Rehabilitation, Drainage Improvements, Acceleration/Deceleration Lanes Extension. The rehabilitation of the pavement/roadway, stabilization of the road shoulders, installation of a new pre-cast curb, addition of additional inlets, repair of the outfall structures, and the construction of extended acceleration/deceleration lanes would have long-term beneficial impact on safety. The pavement rehabilitation would maintain the road surface to minimize safety hazards, such as potholes. Rehabilitation of the shoulder would allow for a stabilized shoulder for cars to pull off onto and in some cases, would remove fixed objects that create safety concerns. The installation of additional inlets would reduce ponding from being a driving hazard in the travel lanes. In addition, corrective actions to repair outfall structures would reduce erosion areas. Therefore, it reduces the potential hazard of landslides on the banks of the Potomac River and near outfalls. Extending the acceleration and deceleration lanes would provide visitors more distance to enter and exit the Parkway at the two overlooks and the GWMP Headquarters and therefore, reduce the risk of rear-end collisions. These improvements would have a long-term beneficial impact on safety.

Roadside Barrier Modifications. The existing guardwalls would be replaced with 27-inch high, roadside barriers in accordance with AASHTO guidelines. Regardless of the roadside barrier modifications options being considered, both options are crashworthy and offer equal safety benefits. The 27-inch high standard is the design height recommended to deflect the vehicle during collision. This height reduces the likelihood of a vehicle topping or mounting the wall. Barrier end treatments presently do not exist and would offer added benefits to redirect errant vehicles and/or abrupt impacts during a collision. Replacement of the existing stone walls with 27-inch high roadside barriers would have long-term beneficial impacts on safety.

#### Route 123/GWMP Interchange Reconfiguration.

- Option 1 - The elimination of the traffic weave on southbound GWMP between the on and off ramps to Route 123 would have a beneficial impact on safety. Although this weave does not involve large traffic volumes, the short weave length (550 feet) is presently undesirable because it creates a conflict between motorists. Option 1 would have a long-term beneficial impact.
- Option 2 - The advantage of improving safety on southbound GWMP with respect to eliminating the weaves and improving the merges would be the same as Option 1. Option 2 would have a long-term beneficial impact.
- Option 3 - In addition to the safety advantages to the southbound mainline traffic flow cited under Option 1, all exiting traffic from southbound GWMP would occur at a single diverge

point, and all traffic entering southbound GWMP traffic would enter at a single merge point. Also all weaving movements on both GWMP and Route 123 would be eliminated, and all traffic to and from the GWMP on and off ramps would be signal controlled. For the reasons stated above, Option 3 would have a long-term beneficial impact on safety.

- Option 4 - The advantage of improving safety on southbound GWMP with respect to eliminating the weaves and improving the merges would be the same as Options 1, 2 and 3. Furthermore, relocating the ramp from southbound GWMP to westbound Route 123 would increase the distance between the ramp tie-in point and the Kirby Road intersection, making it easier and safer to make the maneuver to turn left at Kirby Road. Option 4 would have long-term beneficial impact on safety.
- Option 5 – This option reduces the amount of merging situations by one, thus eliminating the number of weaving and merging situations. Option 5 would have a long-term beneficial impact.

Construction Activities. During construction, a traffic control plan would be implemented to provide visitors with safe driving conditions during construction. This traffic control plan would include temporary closing of lanes, sequencing of construction events to minimize impacts to traffic, and restricting contractor work. Visitors would be notified of changes in traffic patterns, detours, and traffic delays through the use of vehicle messenger signs and public notifications. All of these actions would be designed to reduce short-term impacts on safety. With these measures, a negligible short-term adverse impact on safety would occur from changes in traffic patterns and construction activities on the Parkway.

Cumulative Effects. Future projects such as the Humpback Bridge replacement and the new entrance to the Columbia Island Marina would have long-term beneficial impacts on safety. Implementing Alternative B would contribute a noticeable beneficial increment to the cumulative effect on safety because the actions upgrade existing infrastructure to meet highway safety standards. Collectively, the beneficial cumulative effect on safety would be moderate and long-term. The reasonable foreseeable future projects are programmed for construction so that the short-term cumulative impact would be negligible and adverse.

Conclusion. Long-term beneficial impacts on safety would occur due to infrastructure improvements on the GWMP, including the Route 123/GWMP interchange. Negligible short-term adverse impacts to safety would occur from construction activities. The overall cumulative effects would be long-term and beneficial. The short-term cumulative effect would be negligible and adverse.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

## **IMPACTS TO TRANSPORTATION**

### **DEFINITION OF INTENSITY LEVELS**

Analyses of the potential intensity of impacts on transportation were derived from the available information on the GWMP and the professional judgment of the park staff. Construction would

occur over a three year period. The thresholds of change for the intensity of impacts on transportation are defined as follows:

- *negligible*: The impact would be a change that would not be perceptible or barely perceptible by most motorists.
- *minor*: The impact would have an adverse or beneficial change to levels of services or commute times. The effect would be noticeable but would result in little inconvenience or benefit to commuters.
- *moderate*: The impact would affect the commute of a large number of motorists and would result in a noticeable change in commute time, convenience or benefit, and level of service.
- *major*: The impact has a substantial effect on the commute of a large number of motorists. The result would be highly noticeable and have a considerable effect on commute times to the extent that the use of the Parkway is undesirable to motorists.

*Duration*: Short-term – Effects lasting up to one year beyond the year of construction activities (less than 1 year); Long-term – Effects lasting beyond one year after the year of construction activities (longer than 1 year).

#### **ALTERNATIVE A - NO-ACTION ALTERNATIVE**

Under the No-Action Alternative, the NPS would continue management actions that would include minimum rehabilitation of the roadway. The existing conditions such as the tight roadway curvature on the Route 123 off ramp and the short acceleration/deceleration lanes have an adverse impact on the transportation. Long-term, the impact would be minor and adverse because certain parts of the roadway would continue to not meet current transportation design standards.

Cumulative Effects. The impacts to traffic associated with the No-Action Alternative are minor, long-term, and adverse. No future projects in the cumulative impact scenario were identified that would have long-term adverse impacts on traffic; therefore, there would be no cumulative effects on traffic.

Conclusion. Under the No-Action Alternative, impacts would be minor, long-term, and adverse because certain parts of the roadway would not meet current transportation design standards. There would be no cumulative effect on transportation.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

#### **ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation, Shoulder Rehabilitation, Drainage Improvements, Roadside Barrier Modifications, and Acceleration/Deceleration Lanes Extension. The rehabilitation of the pavement/roadway includes the stabilization of the shoulders, installation of a new curb and additional inlets, repair of the outfall structures, installation of 27-inch high roadside barriers, and the construction of extended acceleration/deceleration lanes would have long-term beneficial impacts on transportation. The infrastructure improvement would generally improve conditions for

motorists/visitors by improving traffic operations. The improvement would not have an effect on roadway capacity or traffic volumes.

Route 123/GWMP Interchange Reconfiguration. The reconfiguration of the Route 123/GWMP interchange would have a long-term beneficial impact to traffic because it would improve traffic flow.

- Option 1 - The primary advantage to this option is the re-establishment of two continuous southbound through lanes on GWMP in the interchange area to eliminate the lane reduction and more equitably distribute the higher volume of through traffic to two lanes, and require the smaller on ramp traffic volumes to merge. A second advantage is it would eliminate the traffic weave on southbound GWMP between the on and off ramps to Route 123. Although this weave does not involve large traffic volumes, the short weave length (550 feet) does not meet AASHTO guidelines. Another advantage is that providing a direct connection to Kirby Road from the GWMP off ramp would eliminate a difficult traffic movement between these two facilities that currently requires circuitous travel, usually involving U-turns (Earth Tech, 2005).

A disadvantage of Option 1 is relocating the off ramp from the southbound GWMP to tie into Route 123 directly opposite Kirby Road. The traffic signal at this expanded intersection would require an additional phase, resulting in a worse level-of-service than if the Route 123/GWMP interchange was not reconfigured (Earth Tech, 2005). Overall, the impact on traffic would be long-term and beneficial.

- Option 2 - The advantage of improving traffic flow on the southbound GWMP with respect to eliminating the weaves and improving the merges would be the same as Option 1. An advantage of this concept over Option 1 is that the Kirby Road intersection would remain a three-legged intersection, which would result in a better level-of-service than under Option 1. While the southbound GWMP off ramp would not be located directly opposite Kirby Road as under Option 1, access would still be improved by traffic signals to allow traffic to enter Route 123 and turn left at Kirby Road under controlled conditions (Earth Tech, 2005).

A disadvantage of an additional, closely-spaced signalized intersection at the Route 123 and Pine Tree Road intersection is impeded access to the GWMP on ramps in both directions. For example, the eastbound traffic currently has a free-flow movement to the northbound GWMP ramp after leaving the Kirby Road signalized intersection. Option 2 would impose a new signalized intersection to pass through. In the westbound direction during peak periods, traffic queues from the new signalized intersection at Pine Tree Road would block traffic wishing to make a right turn to access the southbound GWMP on ramp (Earth Tech, 2005). Overall, the impact on traffic would be long-term and beneficial.

- Option 3 - In addition to the advantages to the GWMP southbound mainline traffic flow cited under Option 1, all traffic exiting from southbound GWMP would occur at a single diverge point, and all traffic entering the southbound GWMP would do so at a single merge point. Also, all weaving movements on both GWMP and Route 123 would be eliminated, and all traffic to and from the GWMP on and off ramps would be signal controlled.



A disadvantage would be the placement of a new traffic signal required on Route 123 approximately 500 feet east of the Kirby Road signalized intersection. A major traffic movement from southbound GWMP to eastbound Route 123 that currently operates as a free-flow movement on a loop ramp would now be required to turn left at the new traffic signal. Similar to Option 2, traffic traveling in the eastbound direction on Route 123 destined for southbound GWMP must pass through a signalized intersection to gain access to the GWMP on ramp while the existing interchange allows a free-flow movement. Overall, the impact on traffic would be long-term and beneficial.

- Option 4 - Among the advantages of this option are that a stop control sign would not be added but the free-flow ramp from southbound GWMP to eastbound Route 123 would be retained, as would the eastbound Route 123 right-turn, free-flow movement to the northbound GWMP ramp. Relocating the ramp from southbound GWMP to westbound Route 123 would increase the distance between the ramp tie-in point and the Kirby Road intersection, making it easier to make the left-turn maneuver at Kirby Road. A final advantage is that no additional traffic signal would be required for Option 4, as well as the advantage of adding only a stop control sign and no new signal (Earth Tech, 2005).

A disadvantage is that the traffic movement from westbound Route 123 to southbound GWMP currently served by a loop ramp would have to turn left onto Route 123 against a considerable amount of opposing traffic; however, this is a low-volume ramp (Earth Tech, 2005). Overall, the impact on traffic would be long-term and beneficial.

- Option 5 – The advantage of improving traffic flow on southbound GWMP with respect to eliminating the weaves and improving the merges would be the same as Option 1.

The disadvantage is that all southbound traffic proposing to go eastbound or westbound onto Route 123 would have to use the same ramp. Two off ramps now carry this traffic, and would be similar to the northbound GWMP; therefore, there would be the potential for queuing onto the GWMP. Overall, the impact on traffic would be minor, long-term, and adverse due to potential queuing on the Parkway.

Construction Activities. During construction, a traffic control plan would be implemented. This plan would include temporary closing of lanes, sequencing of construction events to minimize impacts to traffic, and restricting contractor work. All of these actions would be designed to reduce the impact to traffic. With these measures, a moderate short-term adverse impact on traffic would occur.

Cumulative Effects. The rehabilitation of the north section of the GWMP and the reconfiguration of the Route 123/GWMP interchange would beneficially impact traffic. Future projects such as the Humpback Bridge replacement, the new entrance to the Columbia Island Marina, and the Mount Vernon Trail Extension would have the potential to have long-term beneficial impacts on transportation. Implementing Alternative B, when added to these reasonably foreseeable future actions, would contribute noticeably and beneficially to the cumulative effect on traffic by providing a better flow of traffic.

Conclusion. There would be moderate short-term adverse impacts to traffic under Alternative B associated with the proposed project area associated with construction and lane closures. Under Alternative B and the preferred Route 123/GWMP Interchange Option, there would be long-term beneficial impacts on transportation. The cumulative effect would be long-term and beneficial.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

## IMPACTS TO VISITOR USE AND EXPERIENCE

### DEFINITION OF INTENSITY LEVELS

The NPS's *Management Policies, 2006*, state that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks.

Part of the purpose of the GWMP is to offer opportunities for recreation, education, inspiration, and enjoyment. Consequently, one of the park's management goals is to ensure that visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of park facilities, services, and appropriate recreational opportunities.

Both public scoping input and observations of visitation patterns combined with an assessment of available visitor resources under current management were used to estimate the potential effects of the various alternative actions in this document. The impact on the ability of the visitor to experience a full range of the GWMP resources was analyzed by examining resources and objectives presented in the GWMP's significance statement. The potential for changes in visitor use and experience proposed by the alternatives was evaluated by 1) identifying the proposed projected increases or decreases in traffic and other visitor uses, 2) determining whether or how these projected changes would affect the desired visitor experience, and 3) determining to what degree and for how long these changes would affect the visitor experience. The thresholds of change for the intensity of impacts on visitor use and experience are defined as follows:

- *negligible*: Changes in visitor use and/or experience would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.
- *minor*: Changes in visitor use and/or experience would be detectable, although the changes would be slight. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.
- *moderate*: Changes in visitor use and/or experience would be readily apparent. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.
- *major*: Changes in visitor use and/or experience would be readily apparent and severely adverse or exceptionally beneficial. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

*Duration*: Short-term – Occurs only during the construction; Long-term – Occurs after the construction.

### ALTERNATIVE A - NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the NPS would continue management actions that would include minor rehabilitation of the roadway to maintain the Parkway near its existing state. There are existing conditions such as poor drainage on the Parkway surface, short accelera-

tion/deceleration lanes, and tight roadway curvature at the off ramp of the Route 123/GWMP interchange that have a negligible long-term adverse impact on the visitor experience. These existing conditions detract from the visitor experience by creating an unwanted concern that removes the visitor's enjoyment. These impacts are negligible because the impact would not be noticeable to most visitors. These conditions would continue to occur under the No-Action Alternative.

Cumulative Effects. Certain elements of past projects have had minor adverse impacts on the visitor experience; however, these projects have overall resulted in a net beneficial impact on the visitor experience. One example is the change to the barrier walls from the rehabilitation of the south section of the GWMP that had an adverse impact on the visitor experience by obstructing certain views to the Potomac River and changing the character of the barrier walls. The impact on the visitor experience was minor and long-term. The No-Action Alternative would contribute a detectable increment to the cumulative impact scenario on visitor use and experience because of existing conditions that detract from the visitor experience by creating an unwanted safety concern that reduces the visitor's enjoyment. The No-Action Alternative, when added to other past projects such as the south rehabilitation, would have a negligible long-term adverse cumulative effect.

Conclusion. Under the No-Action Alternative, negligible long-term adverse impacts on visitor experience would occur because the visitor's enjoyment would continue to be affected by existing conditions on the north section of the Parkway. Negligible adverse cumulative effects would occur.

Because there would be no major adverse impacts to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

#### **ALTERNATIVE B - REHABILITATE GWMP FROM SPOUT RUN TO CAPITAL BELTWAY (PREFERRED ALTERNATIVE)**

Pavement/Road Rehabilitation, Drainage Improvements, and Acceleration/Deceleration Lanes Extension. The rehabilitation of the north section of the GWMP would have a long-term beneficial impact to visitor use and experience. Visitors using the Parkway would be able to better and more safely enjoy the Parkway's aesthetics and cultural landscape from improvements to the road surface and added road safety elements.

Roadside Barrier Modifications. The potential impact of each option being considered is described below.

- Option 1. Raising the walls to 27 inches high would obstruct certain scenic vistas and, thus, adversely impact the visitor experience. Visitors driving on the Parkway would have their views altered due to the partially obstructed view of Potomac River Gorge that has an effect on the visitor experience. Also, the change in the wall character would have a slight change in the visitor experience. The construction of higher, permanent, stone-faced, concrete core guardwalls would change the rustic feel and character of the walls on the north section of the Parkway. Under Option 1, the changes to the walls would be

slight but noticed by most visitors. Option 1 would have a minor long-term adverse impact on the visitor experience.

- Option 2. Raising the walls to 27 inches high would obstruct certain scenic vistas and, thus, adversely impact the visitor experience. In areas with steep slopes, the steel-backed timber guardrail would create new views to the Potomac River Gorge, which would help lessen the loss of views to the Potomac River Gorge. Changes to the wall character would have an adverse impact on the visitor experience. The adverse impact would be minor and long-term because the changes to the walls would be slight but noticed by most visitors

Route 123/GWMP Interchange Reconfiguration. The visitor experience is a combination of resources that make up how visitors feel when using the Parkway. The impacts for each option are explained below.

- Option 1 - Under Option 1, the visitor would experience added safety from improved geometrics, longer stopping distance, and removal of the weave condition; however, the impact to the park resources (vegetation, water resources, and archeology) would be an adverse impact on the visitor experience as well. Overall, Option 1 would have minor long-term adverse effects on the visitor experience.
- Option 2 – Under Option 2, the visitor would experience added safety from improved geometrics, longer stopping distance, and removal of the weave condition; however, the impact to the park resources (vegetation, water resources, and archeology) would also be an adverse impact on the visitor experience. The impacts to the environment would be less noticeable to visitors than Option 1 because a smaller area of forest would be removed. Overall, the impact would be long-term and beneficial.
- Option 3 and 4 – Under Options 3 and 4, the visitor experience would be improved because of added safety resulting from improved geometrics, longer stopping distance, and removal of the weave condition. Overall, the impact would be long-term and beneficial.
- Option 5 – Option 5 would not handle the capacity of the traffic volumes existing on the Parkway at Route 123 and potentially would result in queuing onto the mainline. Safety would also be compromised by this layout because it would be difficult for motorists making left-hand turns to go westbound on Route 123. These conditions would adversely affect traffic on the Parkway and, therefore, Option 5 would have a moderate long-term adverse impact on the visitor experience.

Construction Activities. Short-term impacts to visitor experience are interrelated with the short-term impacts described for transportation, cultural landscape, and visual resources that occur during construction activities. Visitors would experience an inconvenience from temporary delays and roadway closures. The impacts would be minimized by implementing a detailed traffic control plan and construction sequencing. Impacts to the cultural landscape and aesthetics would occur during construction from equipment and temporary traffic barriers used for traffic control, which would impact visitor experience. Construction signage and automated vehicular messenger signs would also detract from the setting. As a result, implementing Alternative B would have a minor short-term adverse impact on the visitor experience and minor long-term adverse or long-term beneficial impacts depending on which option is implemented.

Cumulative Effects. Future projects such as the Humpback Bridge replacement, the new entrance to the Columbia Island Marina, and the Mount Vernon Trail Extension have the potential to have long-term beneficial impacts on visitor use and experience. Implementing Alternative B, when added to these reasonably foreseeable future actions, would contribute noticeably to the cumulative effect on the visitor experience. These actions would provide a better flow of traffic and create a more aesthetically pleasing and safe roadway, thus enhancing the visitor experience. Collectively, a long-term beneficial cumulative effect on the visitor experience would occur.

Short-term impacts related to other future projects on visitor use and experience are interrelated with the short-term impacts described for transportation, cultural landscape, and visual resources that occur during construction activities. Visitors would experience an inconvenience from temporary delays; roadway closures; construction activities; and construction equipment and signage would detract from the Parkway setting. Yet, the impacts are temporary and minor. Collectively, the cumulative effect would be short-term, minor and adverse. Impacts would be minimized by implementing a detailed traffic control plan, phasing construction, and coordinating with other on-going construction projects on the Parkway.

Conclusion. Under Alternative B, visitors would experience an added sense of protection and comfort while traveling the roadway after construction is complete. The long-term impact would be beneficial. Roadside Barrier Options 1 and 2 would have minor short-term and long-term adverse impacts on the visitor experience from the change to the viewsheds and changes to the wall appearance. Short-term, visitors would experience minor adverse impacts on the visitor experience from added delays and temporary changes to the Parkway during construction. Minor long-term adverse impacts would occur from Route 123/GWMP Interchange Option 1 and moderate long-term impacts from Route 123/GWMP Interchange Option 5. Impacts associated with Route 123/GWMP Interchange Options 2, 3, and 4 would be long-term and beneficial. Overall, a long-term beneficial cumulative effect and a minor short-term adverse cumulative effect would occur from construction activities.

Because there would be no major adverse impact to resources or values whose conservation are (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the GWMP; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's General Management Plan or other relevant NPS planning document, there would be no impairment of the park's resources or values.

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## CONSULTATION AND COORDINATION

### SCOPING

Scoping is the effort to involve agencies and the general public in determining the scope of issues to be addressed in the environmental document. Among other tasks, scoping determines important issues; eliminates issues that are not important; allocates assignments among the interdisciplinary team members and/or other participating agencies; identifies related projects and associated documents; and identifies other permits, surveys, consultations, etc., required by other agencies. Internal scoping at the park level creates a schedule that allows adequate time to prepare and distribute the environmental document for public review and comment before a final decision is made.

The NPS conducted two public scoping informational open houses for the GWMP North Section Rehabilitation. On July 20, 2005, an informational scoping open house was held at Key Elementary School in Arlington County and on July 21, 2005, an informational scoping open house was held at the McLean Community Center in Fairfax County. Approximately 50 people attended the two meetings. The meeting was held jointly with another Parkway project (Mount Vernon Trail Extension) to maximize citizen turnout. At the meeting, the public offered comments on the alternatives and expressed their concerns or support for each. This information was used to aid in the development of the environmental assessment and scope of the investigation.

Nine written comments were received at the open houses. The comments were in favor of improving the North Section with concerns for safety, preservation of the cultural and natural environment (specifically the preservation of the stone guardwalls), and other environmental impacts.

In addition, NPS conducted an on-site informational scoping open house at the parking lot of the GWMP Headquarters/Park Police on September 14, 2005 and approximately 25 people attended. The third meeting was designed to give the commuting public an additional opportunity to learn more about the two projects and provide comments. Project information was also posted to the GWMP website.

### AGENCY COORDINATION

In accordance with Section 106 of the National Historic Preservation Act, the NPS sent a package of information to the Virginia Department of Historic Resources in December 2005 following the Choosing-by-Advantages workshop on December 6 and 7, 2005. The NPS invited representatives from Virginia Department of Historic Resources and the Advisory Council on Historic Preservation to attend the workshop, but due to weather and schedule conflicts only the Advisory Council on Historic Preservation could attend. The NPS letter requested initial review and comment on the options considered at the Choosing-By-Advantages workshop. The Virginia Department of Historic Resources sent a letter response on January 17, 2006. Virginia Department of Historic Resources expressed concern that the safety requirements would likely result in an adverse effect on historic resources and Virginia Department of Historic Resources commented that the last parkway rehabilitation project did a poor job of mimicking the appearance of the historic walls and their increased heights eliminated the very views and vistas that the Parkway was designed to display. NPS issued letters dated, July 26, 2006, to Virginia Department of Historic Resources, the State Historic Preservation Officer of Maryland Historical Trust, and the Deputy State Historic Preservation Officer of the District of Columbia Historic

Preservation Office. Each of these letters described prior Section 106 consultation and invited the corresponding agency to attend a meeting at GWMP Headquarters in McLean, Virginia on August 17, 2006. A response letter from Virginia Department of Historic Resources, dated August 14, 2006, proposed a later meeting at Virginia Department of Historic Resources facilities, citing concern that NPS has not fully considered alternatives to the replacement of GWMP's historic stone walls. A meeting was scheduled and took place November 30, 2006 at Virginia Department of Historic Resources' Richmond office. By letter dated January 10, 2007, NPS thanked Virginia Department of Historic Resources for the prior meeting. Further, NPS explained the compromises made between FHWA and NPS in an effort to encourage Virginia Department of Historic Resources to consider these compromises while continuing consultation with NPS. Compromises include replacing the stone walls to meet safety standards but FHWA would specify existing stone be used for the wall façade and the walls' appearance be matched to the extent possible. These letters are provided in Appendix D. The NPS would continue to coordinate with the Virginia Department of Historic Resources and Advisory Council on Historic Preservation and it is anticipated that a new or amended PA would be executed with stipulations for mitigation.

In accordance with Section 7 of the Endangered Species Act of 1973, the GWMP solicited comments from the U.S. Fish and Wildlife Service and the Virginia Department of Conservation and Recreation as it relates to known occurrences of rare, threatened, and endangered species within the proposed project area that would be adversely impacted by the alternatives. According to information received from the Virginia Department of Conservation and Recreation, the proposed project area intersects three conservation sites of significance: Turkey Run Park Slopes, Chain Bridge, and the Rosslyn Riverbank. These sites support natural heritage resources and habitat as well as one or more rare plant, animal, or natural communities (Virginia Department of Conservation and Recreation, 2004). The response letters are provided in Appendix C and list several species of concern within the proposed project vicinity. Virginia Department of Conservation and Recreation recommended additional rare plant surveys and identification of seeps near the limits of disturbance for the alternatives. Additional rare plant surveys were completed and seeps identified and locations surveyed. Information on these surveys can be found in Chapter 3 Affected Environment. This Environmental Assessment would be sent to the Virginia Department of Conservation and Recreation as part of the Virginia Department of Environmental Quality environmental review process for Environmental Assessments.

This Environmental Assessment is being distributed for public and agency review with a comment period of 45 days. Two Public Informational Meetings will be held during the review period for the EA. One of the meetings will be held at the McLean Community Center and the other at GWMP Headquarters at Turkey Run Park. Information on the time and date of each meeting can be found on the GWMP and PEPC websites and will be posted in the local newspapers. The NPS would consider the comments prior to determining the final decision document that would be sent to the Regional Director of the National Capital Region for approval and signature.



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