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## **APPENDIX B: FLOODPLAINS STATEMENT OF FINDINGS**

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# Floodplain Statement of Findings

## *For Proposed Reconstruction and Rehabilitation of Rock Creek and Potomac Parkway Southbound*

### *At Waterside Drive*

#### *Rock Creek Park*

Washington, D.C.

July 2012

Recommended: \_\_\_\_\_

Tara Morrison  
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Date

Concurred: \_\_\_\_\_

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Date

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## **Introduction**

Rock Creek Park is a 2,896-acre park in Washington, D.C., extending from the Maryland border to the Potomac River. It consists primarily of a wooded valley, with some associated tributaries and uplands. The major landscape feature is Rock Creek, a perennially flowing stream that bisects the length of the park before flowing into the Potomac River south of the park. The park is completely surrounded by the heavily urbanized metropolitan area of Washington, D.C. Rock Creek and Potomac Parkway (the parkway) is a travel corridor between Beach Drive, NW to the north and the Lincoln Memorial to the south. The parkway runs north to south along Rock Creek and has two lanes in both directions.

There are currently traffic flow and safety problems where the southbound parkway and Waterside Drive, NW merge, immediately alongside Rock Creek. There has been a high number of accidents in the area that need to be addressed to ensure a safe roadway. The purpose of the proposed action is to improve traffic flow and to minimize the number of accidents along the parkway in the vicinity of Waterside Drive, NW. The proposed action would use a combination of improvements to increase the merge area and improve sight lines by including a new acceleration lane along the parkway where the southbound ramp from Waterside Drive, NW merges and by adding other traffic calming features. The proposed action would also address severe erosion that has occurred along the stream banks of Rock Creek in the vicinity of Waterside Drive, NW that resulted from flooding after Hurricane Irene and Tropical Storm Lee moved through the Washington, D.C. area in consecutive weeks in the summer of 2011.

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## **Project History**

The NPS prepared an environmental assessment in 2006 that looked at safety improvements for the parkway, including proposed safety improvements at Waterside Drive, NW. Soon after construction began on the Waterside Drive, NW section of the project in July of 2011, the NPS determined that the project design was not following the preferred alternative contained in the 2006 environmental assessment. A cofferdam had already been placed within Rock Creek and the stream bank had been prepared for the construction of a retaining wall to support an additional merge lane and improvements. Fourteen large trees had also been removed from the area adjacent to the stream bank. The NPS stopped construction in this specific section of the overall project in order to reinitiate the planning and compliance for this specific component of the overall project.

In August of 2011, severe erosion took place in the section of Rock Creek in the project area as a result of the flooding that occurred after Hurricane Irene and Tropical Storm Lee moved through the area in consecutive weeks. The erosion of the stream banks was made worse because the cofferdam was still in Rock Creek. This erosion, which was affecting the stability of the Rock Creek Multi-use Trail, has been temporarily stabilized with gabion baskets pending a more permanent solution. The proposed action would address the severe erosion that has occurred along the stream banks of Rock Creek, in the vicinity of Waterside Drive, NW that has impacted Rock Creek and its floodplain, and would compensate for the functional and temporal loss of riparian areas as a result of construction activities in 2011.

The entirety of the project area is within Rock Creek's mapped 100-year floodplain (Figure 1). The 2011 storms caused flooding in the area and resulted in approximately 350 linear feet of erosion along both sides of Rock Creek's banks, which threatened to undercut both the road and the multi-use trail on the opposite bank. Gabion baskets were installed as an emergency measure to stop the erosion in the short-term.

The floodplain in the project area is characterized by ribbons of road running along Rock Creek through a combination of turfgrass and forest. Rock Creek is generally in a natural state, although the high level of urbanization around the park and in the Rock Creek watershed has caused erosion and bank incision. The floodplain in the project area, other than the parkway, serves its function as floodplain to help lessen runoff volume and velocity by absorbing stormwater from the urbanized areas beyond the floodplain and the park's boundaries.

Executive Order 11988 (Floodplain Management) requires the NPS and other federal agencies to evaluate the likely impacts of actions that could affect the natural resources and functions of floodplains or increase flood risks. NPS Director's Order 77-2: *Floodplain Management* and Procedural Manual 77-2 provide the NPS procedures for complying with Executive Order 11988. This Statement of Findings documents compliance with the NPS floodplain protection procedures.

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### **Justification for Use of the Floodplain**

The proposed project requires the use of the floodplain because 1) there are safety issues with the existing parkway configuration and 2) the parkway is entirely within the 100-year floodplain in the project area. The park in this area is relatively narrow and there are homes, embassies, and apartment buildings immediately outside the park at the top of Rock Creek's ravine, making it infeasible to move the parkway out of the floodplain.

Under the preferred alternative the southbound parkway at Waterside Drive, NW would be realigned toward the median between northbound and southbound parkway and a merge lane added. The existing gabion baskets installed along the creek banks would be replaced with a permanently bioengineered slope, in particular vegetated reinforced stabilized slope (VRSS).

### **Road Realignment**

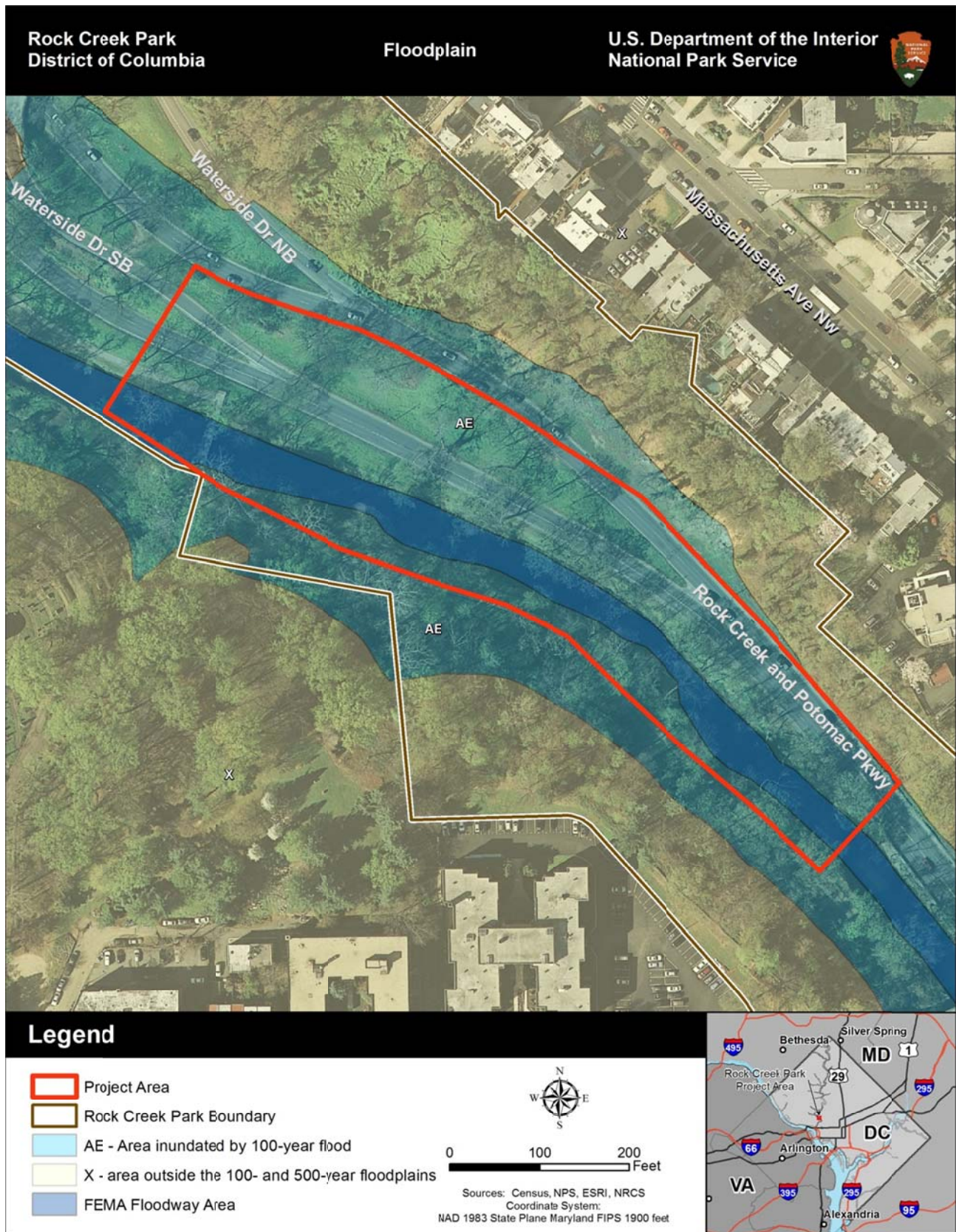
Approximately 350 feet of Rock Creek and Potomac Parkway southbound at Waterside Drive, NW would be realigned 12 feet (from the original, pre-2011 alignment) toward the median between northbound and southbound Rock Creek and Potomac Parkway and a merge lane of approximately 150 feet (150 feet plus 270 feet of taper) would be added. As a result of the road realignment, up to seven large diameter trees would be either removed or impacted by construction. The largest caliper trees for the site would be replanted. A steel-backed timber guardrail, similar to others found along the parkway, would be constructed along the length of the newly realigned road between the road and the creek to serve as a roadside barrier for vehicles.

Road widening (from pre-July 2011 conditions) toward the median side would result in the disturbance of approximately 17,500 square feet (0.40 acre) of land, of which approximately 10,100 square feet (0.23 acre) are previously undisturbed areas. Approximately 4,600 square feet (0.11 acre) of new impervious surface would be added by the footprint of the asphalt concrete added for the road realignment and merge lane.

Two light poles in the median would be relocated and would require trenching of an area approximately 2.5 feet long (30 inches) by 2.5 feet wide and no more than seven feet deep. In addition, new inlets and a pipe for drainage would be installed, requiring the disturbance of an area approximately six feet long by 3.5 feet wide by four feet deep for the inlets and approximately 90 feet long by three feet wide and three feet deep for the pipe.

Under the preferred alternative, safety would be improved by the addition of an acceleration lane and taper for merging traffic from Waterside Drive, NW. The merging vehicles would have a dedicated merging lane and would be able to sufficiently accelerate and potentially avoid traffic accidents with through traffic. As a result of the new acceleration lane and road realignment, the sight distance for merging traffic from Waterside Drive, NW would be increased from 180 feet to 410 feet, a 230-foot increase. Through traffic on southbound Rock Creek and Potomac Parkway would be able to see the merging traffic from farther away and would potentially have enough time to switch lanes or stop to avoid merging vehicles. The merging traffic would see through traffic from farther away better and would have enough time to find a sufficient gap to safely merge.

Figure 1. Floodplain within the Project Area



## **Stream bank Restoration**

Under the preferred alternative, the gabion baskets that are currently stabilizing sections of Rock Creek's banks would be replaced with a permanently bioengineered slope. Stream bank soil bioengineering is a broad category of treatments that is often used to include any stabilization technique that includes some plant material. The treatments that fall under this broad definition generally include the use of living, riparian plants as part of the design (Fripp, Hoag, and Moody 2008). Soil bioengineering components would be used to recreate the natural stream bank conditions in the impacted areas. Several bioengineering alternatives were considered, but during the value analysis it was determined that the VRSS method would be the most effective and therefore the most appropriate bioengineering approach.

A VRSS is a soil bioengineering technique that combines the use of woody, living vegetation purposefully embedded into a slope to help stabilize the soil, prevent erosion, and bind together the installed reinforcements. Heavy geotextile material would be used as the primary reinforcement to stabilize the slope. A shorter secondary reinforcement wrap with a special mixture of soil and organic materials that help to promote the establishment of vegetation and growth would be used on the face of the overall system. Approximately 250 feet of the east bank and 100 feet of the west bank would receive this treatment. The width of the VRSS on both banks would be approximately 25 feet each, for a total of 6,250 square feet disturbed on the east bank and 2,500 square feet disturbed on the west bank.

## **Revegetation of Riparian Areas**

During the course of road construction in 2011 (as part of the 2006 environmental assessment that covered larger safety improvements for the parkway, including proposed safety improvements at Waterside Drive, construction of the retaining wall caused impacts to the riparian areas along the stream bank of Rock Creek near Waterside Drive, NW by 1) removal of 14 trees that provided ecological functions to Rock Creek; 2) removal of soil and vegetation along the roadside bank; and 3) exacerbating trailside bank erosion by the placement of a coffer dam within Rock Creek.

As a response to these riparian zone impacts, the NPS conducted an assessment to determine appropriate compensation for the unavoidable wetland impacts as required by the U.S. Army Corps of Engineers (USACE) for Section 404 permits and by the NPS for compliance with Director's Order 77-1: *Wetland Protection*. As a result, a wetland delineation investigation was conducted on October 21, 2011. The findings of the impact assessment concluded that approximately 0.3 acres of riparian area was impacted by the construction.

The NPS has prepared a *Draft Revegetation Plan for the Rock Creek Park Riparian Area* (NPS 2012a) to address the approximately 0.3 acre of riparian area that was impacted by road construction activities not specified in the preferred alternative contained in the 2006 environmental assessment. The NPS will provide compensation through the restoration of six areas along Rock Creek near the project area to total no less than 0.6 acre. The increased acreage to mitigate the disturbance is based on a 2:1 ratio intended to off-set the temporal loss of mature riparian vegetation. The restored areas will provide riparian areas equivalent to those that were impacted by the previous construction activities.

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## **Site Specific Flood Risk**

The project area lies at a low elevation and the floodplain terrace in the project area is relatively flat, although it is bounded by slopes up to the top of the ravine. Floodzone AE, or the 100-year floodplain, extends to just outside the parkway and Waterside Drive, NW. Modeling shows that the pedestrian bridge at the upstream side of the project area would be overtopped during a 10-year storm, although it was not overtopped in the 2011 storms, which were thought to be 10-year storm events. Flood risk is present but would not be greater than it is currently. The NPS monitors the situation and closes the roadways, if needed, along Rock Creek during major storm events.

Geomorphic considerations in this area include erosion and sedimentation as well as channel adjustments. The storms in 2011 caused severe erosion in the project area that encroached toward the roadway and



delivered sediments downstream. Furthermore, the emergency stabilization measures that have been taken would not dissipate flow or energy from future storms and could exacerbate erosion and flooding downstream.

The preferred alternative would add approximately 4,600 square feet of impervious surface, which would slightly reduce floodplain functions by increasing sheet flow runoff in the floodplain and reducing the ability of the floodplain to recharge and infiltrate stormwater. This is a relatively small amount of new impervious surface and reduced function compared to the existing roadway and floodplain in the project area. The replacement of the gabion baskets with VRSS and riparian area plantings would serve to attenuate both channel velocity and water surface elevations during flooding, and would restore several of the floodplain values present before the 2011 storm events.

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## **Flood Mitigation Plans**

As noted above, the replacement of the gabion baskets with VRSS and riparian area plantings would slightly improve upon floodplain values and functions. Moving the road alignment away from the stream would slightly increase the distance of the road from the creek, and therefore slightly increase the time it would take for floodwaters to reach the roadway. The realignment would also increase the available space to install the VRSS, which would also provide improvement to floodplain functions. Hydraulic modeling (NPS 2012b) indicated that the preferred alternative would decrease the water surface elevation for several of the modeled floods over conditions that existed before the gabion baskets were installed.

The NPS will continue to monitor road conditions during storms and close the roadway if it is likely to flood.

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## **Summary**

There are traffic safety problems at Waterside Drive, NW and southbound Rock Creek and Potomac Parkway that would be addressed through the addition of a merge lane that increases merge time and sight lines for drivers. The parkway runs along Rock Creek, a large tributary of the Potomac River, and the project area is entirely within the creek's 100-year floodplain, therefore work in the floodplain is required. The preferred alternative would add approximately 4,600 square feet of impervious surfaces but would also replace gabion baskets that are providing emergency stabilization of the stream banks with VRSS that would restore floodplain values and functions and reduce water surface elevation for most flood events over the pre-gabion basket conditions.

The NPS would continue to monitor storms and close the road in the likelihood of flooding.

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## **References**

Directors Order 77-2: *Floodplain Management*. September 8, 2003

NPS Procedural Manual 77-2: *Floodplain Management Procedural Manual*. No date. Accessed at: <http://www.nature.nps.gov/rm77/floodplain.cfm>

NPS 2012a. *Draft Revegetation Plan for the Rock Creek Park Riparian Area*. June 2012. Rock Creek Park, Washington D.C.

NPS 2012b. *Hydraulic Modeling Report. Reconstruction and Rehabilitation of Rock Creek and Potomac Parkway at Waterside Drive*. May 2012. Rock Creek Park, Washington D.C. PMIS 082798.

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