PREPARED FOR:
DISTRICT DIVISION OF TRANSPORTATION

Klingle Road

FEASIBILITY STUDY

AUGUST 2001

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Washington, D.C.

District Division of Transportation

Executive Summary

EXECUTIVE SUMMARY

Throughout the preparation of this feasibility study, the District of Columbia, Department of Public Works, District Division of Transportation (DDOT) considered all correspondence, and other indications of interest or concern on the part of the public regarding the proposed project. Discussions were held with federal, state, and local officials to define project tasks. The resulting scope of study is indicated by the foregoing Table of Contents and the materials presented in the subsequent sections of the document and its incorporations by reference.

The scope of the project involved evaluating seven options for the future management of the approximately 0.7-miles-long Klingle Road right-of-way (ROW) located between Cortland Place and Porter Street. Since 1991, this section of Klingle Road has been closed to vehicular traffic. The Council of the District of Columbia never administratively closed it, however. The need to perform a feasibility study evolved when plans were developed in 1991 to reconstruct the roadway and stormwater and drainage system.

In August 1999, The Louis Berger Group, Inc. (Berger) was tasked by the DDOT to perform a traffic assessment and a feasibility study for the closed portion of Klingle Road. As part of this process, Berger identified potential uses, or options, for the Klingle Road ROW, which are:

- Option A: No Action
- Option B: No Build
- Option C: Green Space
- Option D: Bicycle, Recreation and Facility Management
- Option E: Rebuild Klingle Road to its Original Alignment
- Option F: Build Klingle Road to Accommodate Vehicular, Pedestrian and Bicycle Uses
- Option G: Build Klingle Road as a One-Lane (One-Way) Road with a Pedestrian/Bicycle Lane

These proposed options were evaluated based on their potential impacts on various environmental attributes, such as biology, water resources, traffic, socioeconomics, and cultural resources. A summary of the conclusions reached in this feasibility study for those site attributes found to potentially affect or be affected by the proposed options follows.

Geology, Topography, Soils

All of the proposed options include the repair of the existing retaining walls. Additionally, all of the proposed options, excluding the No Action Option, include the repair or the replacement of the stormwater and drainage system. Repairing the existing retaining walls and the existing stormwater and drainage system would afford short-term, minor impacts from construction activities, but would provide long-term benefits to the geology, topography, and soils in the project area. During construction, soil would be temporarily displaced to access the existing system. Appropriate sedimentation and erosion controls would be maintained at all times during construction. The repair of the existing system would result in long-term benefits to the geology, topography, and soils through the reduction of erosion and sedimentation into the valley from uncontrolled stormwater runoff. These short-term, minor impacts and long-term benefits would result under all of the options excluding the No Action Option.

Biological Resources

In assessing the environmental consequences of the proposed options to vegetation, wetlands, and wildlife, several areas were defined within the project area as “critical.” These critical areas include any location where trees greater or equal to 24-inches diameter breast height (dbh) occur; wetlands exist; or threatened and endangered species have been documented. No wetlands or threatened and endangered species occur within the project area. Locations where trees with a dbh of greater or equal to 24-inches occur are shown in Exhibit 3-6. Any construction activities in portions where large dbh trees are documented to occur should avoid the trees where possible and should incorporate best management practices (BMPs) into construction plans to minimize potential impacts.

All of the proposed actions, excluding the No Action Option, include repairs to the existing stormwater and drainage system. Repairing the existing system would create short-term, minor impacts, but would provide long-term benefits to the flora and fauna communities in the project area. Activities to repair the system would result in short-term, minor impacts by displacing vegetation and by disturbing wildlife during construction. Repair of the existing stormwater and drainage system would result in long-term benefits to the biological resources by reducing the adverse effects associated with high-flow events that have been magnified by the highly urbanized character of the surrounding area. Repair of the existing system should help to reduce erosion and subsequent sedimentation associated with high-flow storm events. On-going habitat degradation or loss associated with erosion, sedimentation, and degraded water quality would be reduced, resulting in an overall improvement in habitat quality within the project area. These short-term, minor impacts and long-term benefits would result under all of the following options excluding the No Action Option.

Water Resources

All of the proposed options include the repair of the existing retaining walls. Additionally, all of the proposed options, excluding the No Action Option include the repair or the replacement of the stormwater and drainage system. Repairing the existing retaining walls and the stormwater and drainage system would afford short-term, minor impacts from construction activities to water resources in the area, but would provide long-term benefits through the reduction of erosion and sedimentation into the valley from uncontrolled stormwater runoff. In addition, uncontrolled, untreated stormwater runoff would be effectively reduced, thus improving the overall water quality of the Klingle Creek. Reintroduction of vehicular traffic would potentially impact water resources, introducing oils and greases, and other pollutants into the system.

Floodplain Encroachment

Executive Order (EO) 11988 requires federal agencies to take action to minimize occupancy and modification of the floodplain. Specifically, EO 11988 prohibits federal agencies from funding construction in the 100-year floodplain unless there are no practicable options. Approximately half of the currently closed portion of Klingle Road is within the 100-year floodplain as indicated by the Flood Insurance Rate Maps, Community-Panel Numbers 110001-0010 and 110001-0020 and Federal Emergency Management Agency (FEMA) Q3 Flood Data for Washington, D.C. For all of the proposed options, design standards and construction activities would be prepared and would be conducted to minimize potential harm to or within the floodplain. The floodplain has been altered and would be altered no matter the Option chosen due to the need to rehabilitate the existing retaining wall. Increases in impervious surfaces within the drainage area have permanently altered the flows entering the system, thus affecting the drainage patterns.

Hazardous Materials

An Environmental Data Resources (EDR) Report was utilized for this feasibility study to search available databases relating to hazardous waste materials and storage within a 1.5-mile radius of the center point of the closed portion of Klingle Road. According to the EDR report, several contaminated or possibly contaminated sites with in the 1.5 mile radius have been included in federal and state databases, although most have been removed from critical status lists. Any of these options chosen, excluding the No Action Option would require a that a Phase I Environmental Assessment be conducted within the project area.

Air Quality

Air quality in the Washington metropolitan region (which includes Washington, D.C. has been improving steadily over the last ten years. The region exceeds the federal air quality standard for ozone. It is unlikely, that any build option would increase traffic, rather existing traffic patterns would shift, and therefore would not produce adverse short-term or long-term impacts on air quality. Ozone, one of the most serious pollutants, must be evaluated from a regional standpoint and is therefore not evaluated in this feasibility study.

Noise

Noise is one of the most-noticed environmental pollutants; therefore potential noise impacts should be carefully evaluated with special

consideration given to sensitive noise receptors, such as residences, businesses, schools, and parks in the project area. Klingle Road operated as a collector roadway until 1990 and no new construction of areas that might be considered sensitive noise receptors has occurred during the period of closure. All of the proposed options would produce short-term impacts from construction noise associated with the repair of retaining walls; Options C-G would produce short-term impacts from construction noise associated with and removal of the asphalt. Options E-G, which include the rebuilding of Klingle Road and its reopening to vehicular traffic, would have noise impacts on the adjacent areas, which are primarily residential and commercial and would necessitate additional noise analysis in accordance with FHWA regulations.

Land Use

None of the proposed options would impact current land use in the project study area. In the neighborhoods surrounding the project area, land use designations are not expected to be directly or indirectly altered by any of the proposed options.

Zoning

None of the proposed options would impact current zoning in the project study area. The majority of land in the area is zoned for residential and community business uses. In the neighborhoods surrounding the project area, current zoning is not expected to be directly or indirectly altered by any of the proposed options.

Socioeconomic Issues

It is unlikely that any of the proposed options would have any effect on businesses or migration in or out of the area. Permanent closure of the road would not have short-term or long-term impacts on economic development because the road has been closed since 1991 and surrounding businesses have had time to adjust to the resulting traffic patterns.

Eight census tracts within the study boundary were identified and used to build a community profile of the area surrounding Klingle Road (see Appendix B for Methodology). Census tracts are defined as small, locally delineated statistical areas, generally having stable boundaries and designed to have relatively homogeneous demographic characteristics. The population in the entire study area is predominantly white and higher in income level when compared to the citywide population. There are differences in income and racial composition between the tracts within the study area, however, based on the project's options, none of the tracts would experience short-term or long-term adverse impacts on minority and/or low-income residents in the study area.

Public Services and Utilities

The proposed options would have varying degrees of impact on services and utilities in the area. Failure to correct drainage problems, as proposed in the No Action Option, would result in further erosion and lack of ground coverage of existing underground storm, sewer and gas lines. Removal of the existing asphalt, as proposed in Options C and D, would also impact storm, sewer and gas lines, since it would lessen the ground coverage and support for such lines. Any design and construction activities for any of the proposed options would require close coordination with representatives from all utilities and services in the area. Options C and D, which involve the removal of the existing road bed may have long-term adverse impacts to both scheduled and emergency maintenance of several major utilities. WASA, WMATA and Washington Gas have stated their need to "access" utilities located in Klingle Valley and in the ROW. Design of access routes or feasibility of complete relocation of these utilities was not part of the scope of work for this study but should be taken into future consideration when deciding feasibility of any of the road removal option.

Traffic Circulation and Access to Residential and Commercial Areas

Klingle Road is listed as a collector for vehicular traffic on the District of Columbia's Functional Classification Map. Reopening Klingle Road would produce negligible long-term beneficial impacts to traffic congestion or safety at surrounding intersections. Given the limited size of the ROW, reopening Klingle Road would only lead to minor improvements in relieving congestion at surrounding intersections. A more detailed traffic study, including new

traffic count, would be necessary to fully determine impacts of reopening Klingle Road.

Cultural Resources

No fieldwork was conducted for this analysis. All information used was either archival in nature or readily available from the State Historic Preservation Office (SHPO) or the National Park Service. Review of the existing information indicates that three historic districts listed in the National Register of Historic Places bound the study area. If it were determined, through further analyses, that any of the proposed options would have an adverse effect on a historic district, the DDOT would develop a plan to mitigate the adverse effect, again in consultation with the SHPO and interested parties. The DDOT would fulfill this responsibility under Section 106 of the National Historic Preservation Act, in accordance with the Advisory Council on Historic Preservation Procedures for Protection of Historic Properties (36 CFR 800).

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Introduction

1.0 INTRODUCTION

1.1 BACKGROUND AND OVERVIEW

Klingle Road is located in northwest Washington, D.C. and runs west to northeast from the Washington National Cathedral to Beach Drive in Rock Creek Park (Exhibits 1-1 and 1-2). Klingle Road is listed as a collector for vehicular traffic on the District of Columbia's Functional Classification Map. Collectors serve to collect and to distribute traffic in residential and commercial areas with average daily traffic ranging between 2,000 and 8,000 vehicles per day and to provide direct access to a major traffic generator such as a Washington Metropolitan Area Transit Authority (WMATA) Metro station or a large complex of apartments.

The segment of Klingle Road between Porter Street and Cortland Place (approximate designations) was closed to vehicular traffic in 1991 because of deterioration of the roadway related to drainage failure. Failure of the drainage system has resulted in severe deterioration of the roadway, retaining walls, and underlying stormwater system (Exhibit 1-3). In August 1991, the U.S. Department of Transportation, Federal Highway Administration (FHWA) issued a Final Programmatic Section 4(f) Evaluation and Approval for Klingle Road from Woodley Road to Porter Street in anticipation of a reconstruction project for the closed portion of Klingle Road. A plan for reconstruction of the roadway and associated infrastructure was initiated at that time, but later was cancelled.

Klingle Road remains a right of way (ROW) on the federal-aid system and has not been administratively closed by the Council of the District of Columbia. Exhibit 1-4 shows the ROW. The District Division of Transportation (DDOT), under the District of Columbia Department of Public Works, is responsible for the maintenance of Klingle Road. Klingle Valley is the stream valley through which Klingle Creek flows before converging with Rock Creek. It includes the ROW and land owned by the National Park Service.

This document, together with its appendices and incorporations by reference, constitutes a feasibility study to be utilized in the transportation planning process. Its purpose is to present an analysis of the environmental consequences of a proposed strategy by the DDOT to determine the appropriate management of the Klingle Road ROW.

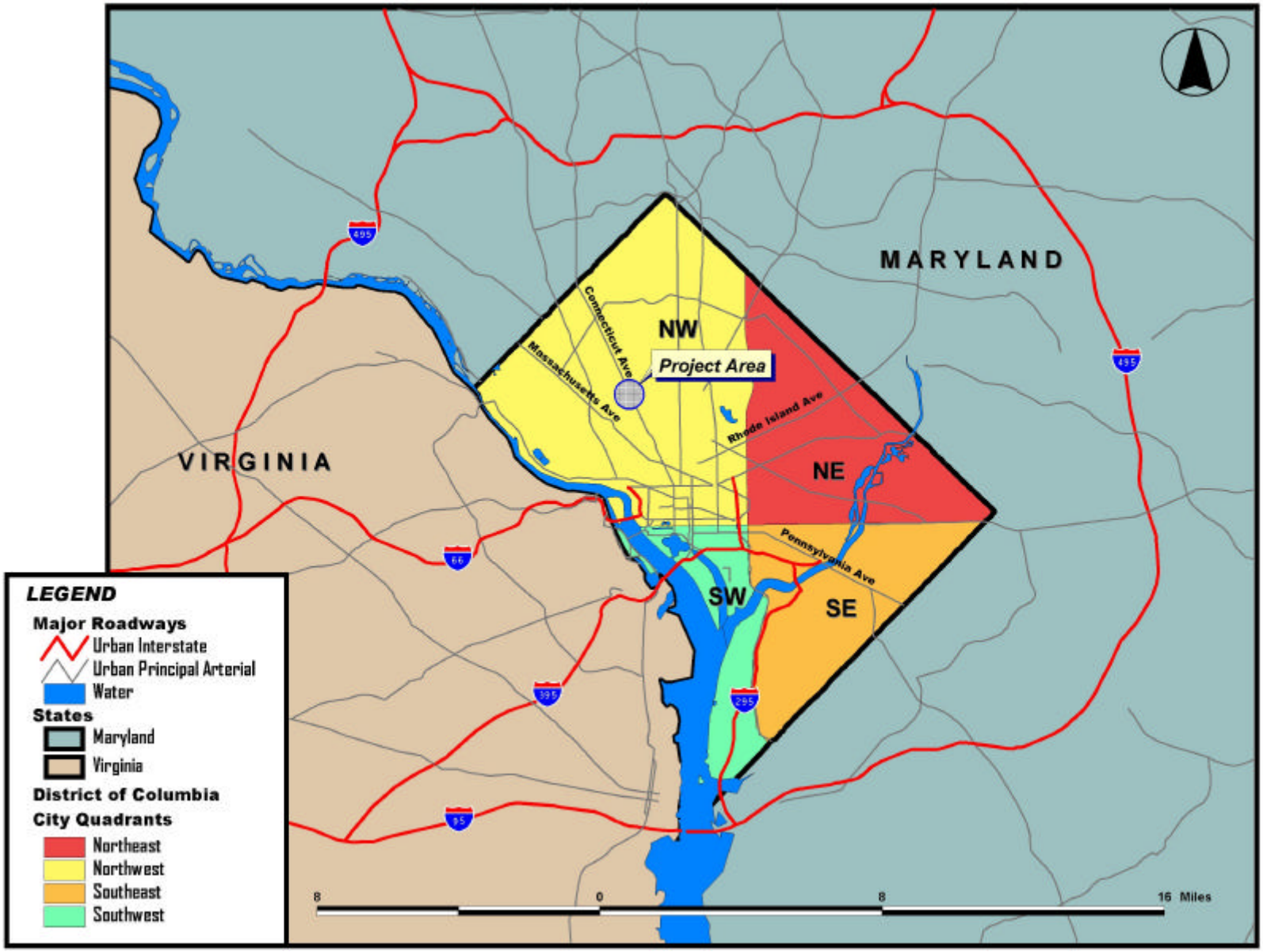
The need to perform this analysis evolved when plans were developed in 1991 to reconstruct the roadway and drainage system.

1.2 PROBLEM STATEMENT

A preferred option has not been identified by the DDOT as several options are under consideration. The purpose of the options under consideration is to determine the future management and use of the segment of Klingle Road that is currently closed to traffic between Porter Street and Cortland Place. The need for the study is to ensure proper management and maintenance of the closed portion of roadway on the federal-aid system as well as to address the deteriorating infrastructure associated with the roadway and the possible reopening of Klingle road as an east-west connection for vehicular traffic. All proposed options will address the environmental deterioration resulting from stormwater runoff and erosion.

EXHIBIT 1-1

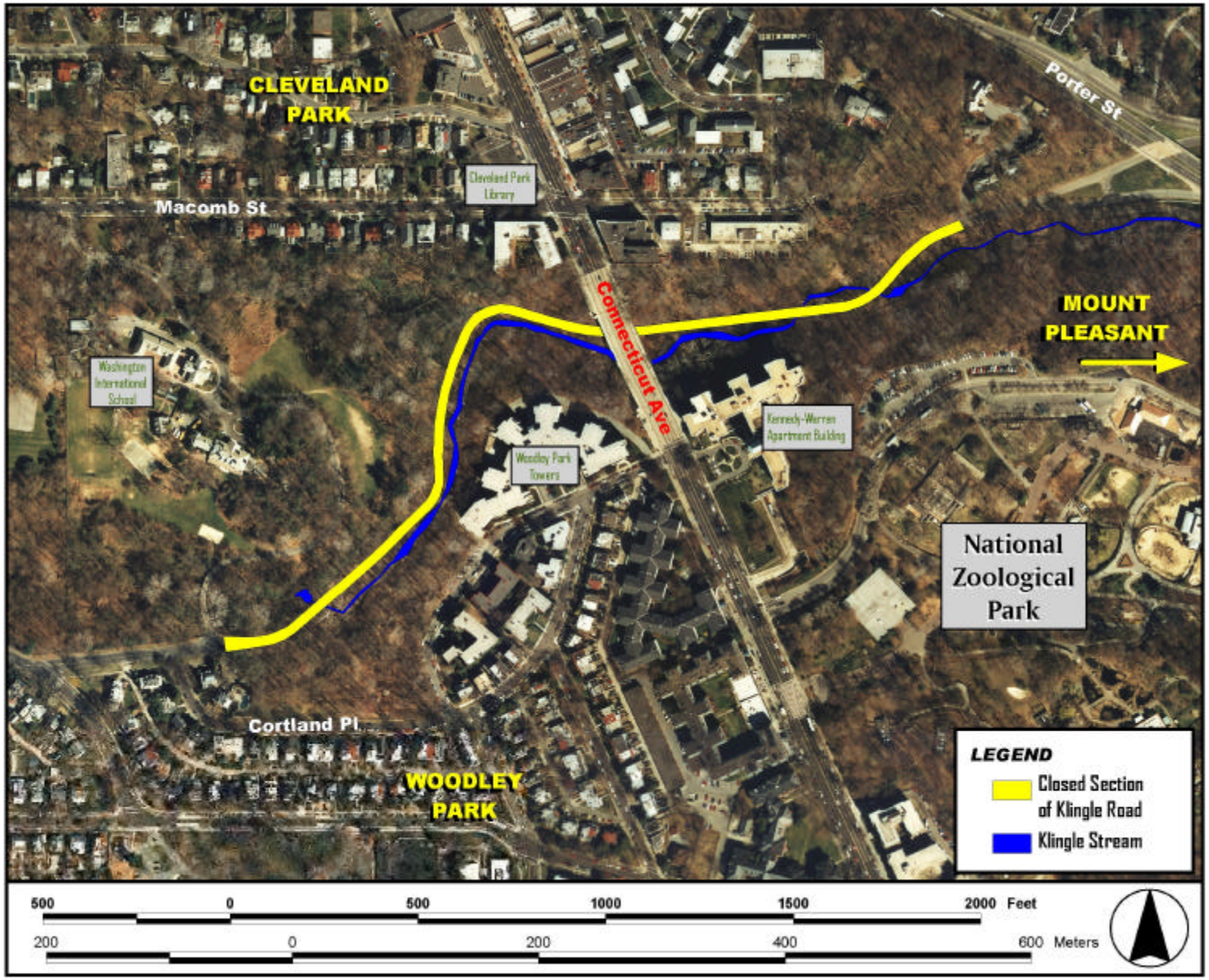
Regional Map



Source: ESRI Data & Maps, 1999.

EXHIBIT 1-2

Site Location Map



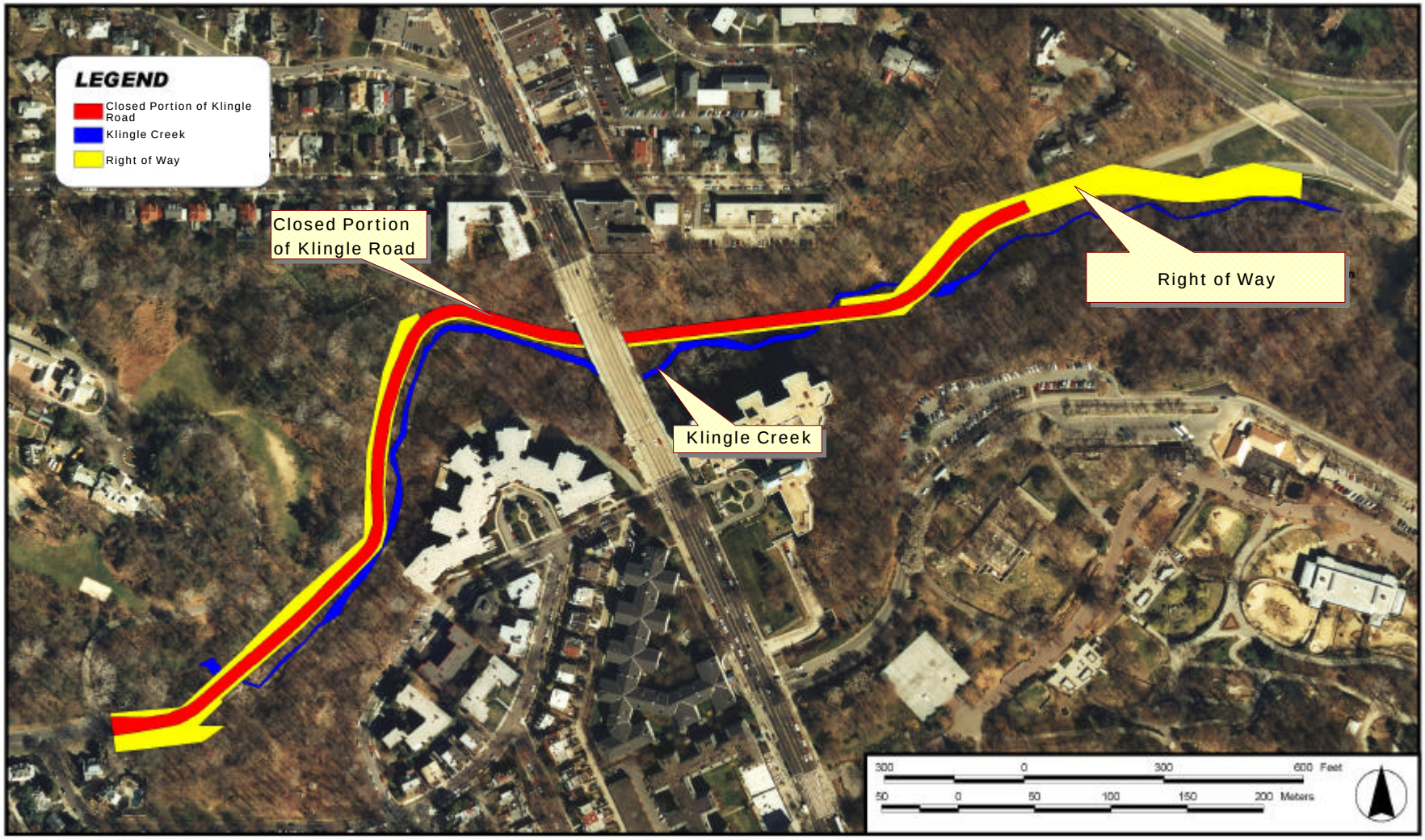
Source: National Capital Planning Commission (NCPC), 1995.

EXHIBIT 1-3 Photographs taken of Klingle Road during rain storm on April 4, 2000

Source: The Louis Berger Group, Inc.

EXHIBIT 1-4

Right of Way Map



Source: DPW, 1991 and NCPC, 1995.

2.0

Options

2.0 OPTIONS

This section provides a description of the options being considered for Klingle Road. The seven options being considered include the following:

- Option A: No Action
- Option B: No Build
- Option C: Green Space
- Option D: Bike, Recreation and Facility Management
- Option E: Rebuild Klingle Road to Its Original Alignment
- Option F: Rebuild Klingle Road to Accommodate Vehicular, Pedestrian and Bicycle Uses
- Option G: Build Klingle Road as One-Lane (One-Way) Road with a Pedestrian/Bicycle Lane

It should be noted that:

1. No option has been selected as the preferred option by the District Division of Transportation (DDOT).
2. Options requiring the permanent closure of Klingle Road to vehicular traffic would require approval from the Council of the District of Columbia and official administrative action would be necessary.

2.1 OPTION A: NO ACTION

The No Action Option for transportation projects proposes to include short-term minor restoration types of activities, such as safety and maintenance improvements, which serve to maintain continuing operation of the existing roadway. Under the No Action Option, Klingle Road would remain permanently closed, however, it would be necessary to repair existing retaining walls to avoid further collapse of the pavement into Klingle Creek.

The approximate cost for the completion of tasks associated with Option A is estimated to be $272,000. This estimated cost takes into consideration the repair/replacement of 300 feet of retaining wall where deterioration of the existing structures is most severe. Costs include a concrete retaining wall, with riprap protection along its base, guardrails along this portion of the road, and a drainage inlet where structural failure is currently occurring.

2.2 OPTION B: NO BUILD

The No Build Option proposed to include the repair of existing retaining walls as proposed under the No Action Option. In addition, the existing drainage system would be repaired or would be replaced. Replacement could be accomplished by two alternative methods: 1) the existing drains, which follow the creek bed, would be removed and would be replaced; or 2) the existing drains would be abandoned in place and a new system would be constructed under the existing roadbed. Both options for the drainage system would require detailed engineering analysis to determine the preferred method. The replacement of the existing drainage system would alleviate existing drainage-related deficiencies in the Klingle Creek watershed.

The approximate cost for the completion of tasks associated with Option B is estimated to be $858,000. This estimated cost makes several assumptions, which include:

1. All construction would take place between wall barriers located at the east and west ends of closed portion of the Klingle Road, approximately 2,500 feet of roadway.
2. To maintain drainage and safety, approximately, 2000 feet of roadway will be resurfaced over existing pavement, while approximately 500 feet of roadway will require complete removal of existing pavement, rebuild of base course, and a new pavement.
3. Approximately 460 feet of retaining wall will be rebuilt and restored.
4. Roughly 230 feet of bank stabilization will be added to the Klingle Valley Creek banks.
5. A storm drain will be rebuilt for approximately 150 feet.

6. Three culverts that bring the Klingle Valley Creek under the roadway will be restored.

2.3 OPTION C: GREEN SPACE

The Green Space Option proposes to include the repair of the existing retaining walls and the repair or replacement of the existing drainage system as proposed in the No Build Option. In addition, Klingle Road would be permanently closed and the existing roadbed would be removed, allowing the area of permanent closure to return to a natural state. Engineering design under this option would include removal of the existing roadway and its appurtenant structures; backfill of the right of way (ROW) with a borrowed-soils base (approximately 18-inches in depth); sodding with 4 inches of topsoil; and grading to direct drainage.

The approximate cost for the completion of tasks associated with Option C is estimated to be $1,107,000. Construction activities needed to accomplish Option C, which were taken into consideration when calculating the estimated cost, included the following:

1. All construction would take place between wall barriers located at the east and west ends of closed portion of the Klingle Road, approximately 2,500 feet of roadway;
2. Demolition and removal of the portion of Klingle Road that lies between engineer stations 6 + 25 and 31 + 70 (current location of east and west wall barriers);
3. Backfill of approximately 6,900 cubic yards of earth;
4. Stabilization of surface by applying roughly 7,700 square yards of sod and topsoil;
5. Construction of all stream bank stabilization features and drainage structures associated with the No Build Option; and
6. The implementation of all necessary sediment control devices.

2.4 OPTION D: BIKE, RECREATION AND FACILITY MANAGEMENT

The Bike, Recreation and Facility Management Option proposes to include the repair of the existing retaining walls and the repair or replacement of the existing drainage system as proposed in Options B and C. In addition, Klingle Road would be permanently closed to vehicular traffic and would be converted to a bike path. The existing roadbed would be replaced by an approximately 8- to 10-foot-wide, hard-surface bike path, which would be constructed within the existing ROW and in compliance with DDOT standards. In addition, the bike path would be constructed to support utility service trucks that require access to the utilities underlying the Connecticut Avenue Bridge. The area adjacent to the bike path would be reestablished as a recreational area. Engineering design would include removal of the existing roadway and its appurtenant structures; backfill of the ROW with a construction-grade soils base to a depth in compliance with DDOT standards; contouring and paving the bike path; and grading to direct drainage.

The approximate cost for the completion of tasks associated with Option D is estimated to be $1,131,000. Construction activities needed to accomplish Option C that were taken into consideration when calculating the estimated cost, included the following:

1. All elements considered necessary for the No Build Option were also included under Option D;
2. Additional lighting and park amenities, including benches, were provided; and
3. Bicycle striping of a 12-foot wide roadway was incorporated.

2.5 OPTION E: REBUILD KLINGLE ROAD TO ITS ORIGINAL ALIGNMENT

The Rebuild Klingle Road to its Original Alignment Option proposes to include the repair of the existing retaining walls and the repair or replacement of the existing drainage system as proposed in Options B-D. In addition, Klingle Road would be reopened to two-way vehicular traffic,

following the rebuilding of the road to its original dimensions. The existing roadbed would be removed and a hard-surface roadway would be reconstructed within the existing ROW. Engineering design would include removal of the existing roadway and its appurtenant structures; backfill of the ROW with a construction-grade soils base to a depth in compliance with DDOT standards; contouring and paving of the road according to DDOT standards; and grading to direct drainage. Appropriate traffic signalization and drainage work also would be included under this option. Total reconstruction of Klingle Road would necessitate a reevaluation of the August 1991 Final Programmatic Section 4(f) Evaluation and Approval.

The approximate cost for the completion of tasks associated with Option E is estimated to be $3,810,000. The cost does take into consideration a contingency factor; however it does not include engineering fees, which are typically 10 percent of total project cost. To calculate the approximate cost associated with Option E, the Design and Engineer drawings for the reconstruction of Klingle Road to its original alignment were utilized. These drawings restore Klingle Road and address all drainage failing drainage features. Using the materials and quantities charts, an appropriate unit of cost was applied to each material using professional experience and expertise. The unit cost takes into consideration both installation and material fees.

The outcome of this costing analysis estimated that the cost per foot of roadway was $22.00 and the cost of per foot of drainage was $10.00 for the Klingle Road Valley. These estimated costs per foot were used in calculating the cost for Options D, F, and G.

2.6 OPTION F: BUILD KLINGLE ROAD TO ACCOMMODATE VEHICULAR, PEDESTRIAN AND BIKE USES

The Build Klingle Road to Accommodate Vehicular, Pedestrian, and Bike Uses Option, proposes to rebuild and widen Klingle Road from its original dimensions to accommodate two-way vehicular traffic, as well as pedestrian and bicycle uses. All existing drainage-related damages and deficiencies would be addressed. The width of the roadway would vary from 25- to 30-feet-wide with one 8- to 10-foot-wide bike lane. Engineering assumptions made for the roadway are without the bike lane and are based on the plans for reconstruction of the roadway developed by the DDOT in 1991. As part of this option, necessary stormwater improvements would be made and drainage improvements would be implemented. The feasibility of this option is constrained due to the limited ROW of the existing roadway.

The approximate cost for the completion of tasks associated with Option F is estimated to be $5,170,000. The cost for this option assumes that Klingle Road will be rebuilt to its original alignment with the addition of a bike lane. Therefore, the cost for this option is the cost of Option E plus the cost for a bike lane and an escalated drainage cost due to the increase of impervious surface. Bike lane installation used the per foot cost for roadway established in determining costs for Option E ($22.00). The drainage cost for Option E was escalated by 15 percent due to the increase in impervious surface. Furthermore, this option also takes into consideration a contingency cost; however engineering fees were not a factor.

2.7 OPTION G: BUILD KLINGLE ROAD AS A ONE-LANE (ONE-WAY) ROAD AND PEDESTRIAN/BIKE LANE

The Build Klingle Road as a One-Lane (One-Way) Road and Pedestrian/Bike Lane Option proposes to include the repair of the existing retaining walls and the repair or replacement of the existing drainage system as proposed in Options B-E. In addition, one lane of Klingle Road would be reopened to one-way vehicular traffic with an associated 8- to 10-foot-wide bike path. The existing roadbed would be removed and a hard surface roadway approximately 12-feet-wide would be constructed within the existing ROW. Engineering design would include removal of the existing roadway and its appurtenant structures; backfill of the ROW with a construction-grade soils base to a depth in compliance with DDOT standards; contouring and paving of the road in recognition and compliance with DDOT standards, and grading to direct drainage. Appropriate traffic signalization would be included under this option. The direction of traffic on the road during peak periods would be determined through an analysis of traffic operations.

The approximate cost for the completion of tasks associated with Option G is estimated to be $3,515,000. The cost for this option assumes that Klingle Road will be rebuilt as a one-way road to its original alignment with the addition of a bike lane. The cost for this option is similar to Option E. It includes Option E's drainage costs; however the narrowing of the roadway and the addition of a bike lane will reduce the amount of pavement in comparison to Option E. Therefore, Option G is slightly lower in cost then Option E. Per foot cost for roadway established in determining costs for Option E ($22.00) was again used to calculate total roadway and bike lane costs. Furthermore, this option also takes into consideration a contingency cost; however engineering fees were not a factor.

The cost estimates for each of the options were established using base cost data derived from *R.S. Means Building Construction Cost Data*, *59th Annual Edition, 2001*. These costs have been adjusted based on actual field engineering experience in the Washington D.C. metropolitan area.

2.8 SUMMARY

Because of the nature of the project area and the surrounding environment, several of the proposed options necessitate many of the same actions. Table 2-1 summarizes the necessary requirements for each option.

In summary, the following preliminary conclusions can be made:

- The retaining wall repair would be required under all options; and
- Drainage system repair or replacement would be necessary under all options except Option A: No Action.

The potential impacts associated with the implementation of each of the proposed options is discussed in Section 3.0.

Table 2-1. Summary of Options—Requirements

Option	Retaining Structure	Drainage System Repair	Bike Path	Roadway		Green Space
				1 lane	2 lanes	
A	Yes	No	No	No	No	No
B	Yes	Yes	No	No	No	No
C	Yes	Yes	No	No	No	Yes
D	Yes	Yes	Yes	No	No	Yes
E	Yes	Yes	No	No	Yes	No
F	Yes	Yes	Yes	No	Yes	No
G	Yes	Yes	Yes	Yes	No	No

No: not implemented

Yes: implemented

3.0

Affected Environment and Environmental Consequences

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section provides a concise description of the existing environmental, social, and economic settings and the potential environmental consequences of the proposed options presented in Section 2.0. The existing environmental conditions and status of Klingle Road and the Klingle Road Valley will be used to establish and determine baseline conditions. These baseline conditions will be used to evaluate the environmental benefits and consequences associated with the proposed options. Environmentally, socially, and/or economically sensitive locations or features in the project's impact area also are identified and are described in this section.

All of the proposed options, excluding the No Action Option, include the repair and/or replacement of the existing stormwater and drainage system. Regardless of the option selected, it is imperative that the stormwater and drainage system in Klingle Road be repaired. On-site evaluations were critical in characterizing the poor environmental conditions currently present in Klingle Valley. The repair or replacement of the existing stormwater and drainage system would result in short-term adverse impacts, but would provide long-term benefits to the local geology, soils, biological resources and water resources in and downstream of Klingle Valley. In addition, a new or restored drainage system will also improve the socioeconomic conditions of the area.

The following sub-sections provide specific analyses of the potential consequences associated with each proposed option.

3.1 GEOLOGY, TOPOGRAPHY, AND SOILS

The geology, topography, and soils in the project area were assessed for their suitability for implementation of the proposed options. These characteristics were considered because they can inhibit or restrict use of an area under an option considered for the project.

3.1.1 Affected Environment

Geology

The project area is located in the Piedmont Physiographic Province, an area characterized by metamorphosed rocks of sedimentary, volcanic, and plutonic origins. Regionally, outcrops of these rocks are typically confined to stream valleys. Such is the case in Klingle Valley, which transcends five generally north to south trending bands of metamorphic rock formations. Rock formations occurring in the project area include: Kensington tonalite, Sykesville formation, garnetiferous biotite-horblend tonalite, Laurel formation, and quartz gabbro, quartz diorite (USGS, 1994).

In the western end of the project area, the tops of the ridges to the north and south of Klingle Valley are capped by colluvium, unsorted gravel, sand, silt, and clay. The capping generally consists of sparse pebbles scattered in a reddish-brown clay matrix (USGS, 1994).

The metamorphic formations occurring across the project area are expressed at the surface as small outcrops and float (large, detached boulders that may appear to be outcrops). These metamorphic formations and associated float are largely responsible for the steep slopes that occur across the project area.

Topography

Topography on and adjacent to the project area ranges from moderately to steeply sloped terrain bisected by Klingle Creek. Elevations within the Klingle Creek watershed range from approximately 395 feet above mean sea level (msl) near its western boundary to approximately 40 feet msl where the drainage enters Rock Creek on its eastern boundary. Elevations in the project area range from approximately 245 feet above msl at the western boundary of the site to approximately 70 feet above msl at Porter Street. Side slopes adjacent to the existing road and Klingle Creek range from moderately steep to steep and, in some places, exceed 30 percent

(Exhibits 3-1 and 3-2). The slope of the valley floor ranges from approximately 2 percent to greater than 12 percent (USGS, 1983). Furthermore, historical contour maps circa 1892 were obtained (Coast and Geodetic Survey, 1892) for comparison to investigate topographical change of Klingle Valley over time (Exhibit 3-3). This comparison concluded that the topography of Klingle Valley for the past 100 years has remained very similar and has experienced only moderate changes as a result of urban development.

Soils

According to the *Soil Survey of the District of Columbia* (USDA, 1976), soils mapped in the project area include Brandywine gravelly loam, Manor loam, Joppa gravelly sandy loam, and Udorthents (Exhibit 3-4). The Brandywine gravelly loam and Joppa gravelly sandy loam dominate the western half of the project area, upstream of the Connecticut Avenue Bridge, while Manor loam dominates the downstream section of the project area. Soil properties and characteristics, as defined by the Natural Resources Conservation Service, include the following (USDA, 1976).

Brandywine gravelly loam. The Brandywine gravelly loam, 8 to 15 percent slopes, is a moderately sloping, somewhat excessively to excessively drained soil that occurs on ridge tops and side slopes in strongly dissected areas of the Piedmont Plateau. Runoff on this phase of the Brandywine series is medium and the hazard for erosion is moderate. Slopes and stoniness moderately limit the soil for most building purposes. In addition, slope grade, low available water capacity, and stoniness limit the potential for landscaping vegetation, and for most recreational uses.

Brandywine gravelly loam. The Brandywine gravelly loam, 15 to 40 percent slopes, is a strongly sloping to steep, somewhat excessively drained soil occurring on side slopes and bluffs above streams and ravines in highly dissected areas of the Piedmont Plateau. Runoff on this phase of the Brandywine series is rapid, and the hazard for erosion is severe. Slopes and stoniness severely limit the soil for most building purposes. These topographic conditions, together with low available water capacity, and stoniness also limit the potential for landscaping vegetation, and for most recreational uses.

Joppa gravelly sandy loam. The Joppa gravelly sandy loam, 15 to 40 percent slopes, is a strongly sloping to steep, well-drained to excessively drained soil on side slopes. Permeability and runoff are rapid and the hazard of erosion is severe. Areas where this soil occurs generally have poor potential for use as building sites because of slope.

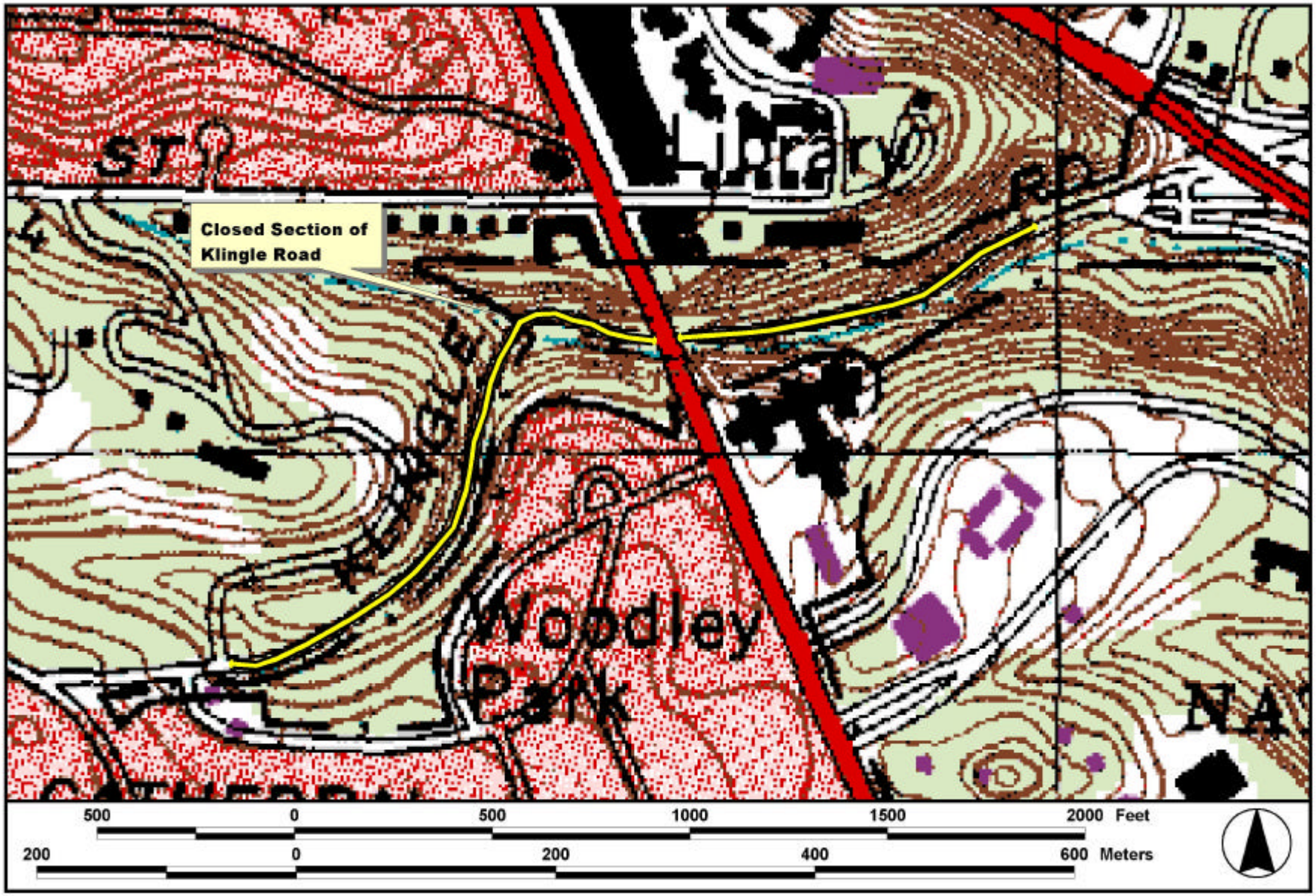
Manor loam. The Manor loam, 15 to 40 percent slopes, is a strongly sloping to steep, well-drained to somewhat excessively drained soil occurring on ridgetops and sideslopes in strongly dissected areas of the Piedmont Plateau. Permeability in the soil is moderate; runoff is rapid; and the hazard of erosion is severe. Building on the soil is severely limited due to the steep slopes. Slopes, some stoniness, and moderate available water capacity also limit the potential for establishing most types of vegetation.

Udorthents. Udorthents, loamy smoothed, are mapped in a small area on the eastern edge of the project area adjacent to Porter Street. This mapping unit consists of disturbed areas previously cut or filled for development. Permeability in the unit is variable, runoff is medium to rapid, and internal drainage is variable. Areas of the soil that have not been built on vary widely with respect to uses and limitations for different land uses. The disturbed nature of the unit makes onsite characterization necessary to determine uses and limitations.

None of the soils identified in the project area are defined as hydric, prime, or unique farmland soils.

EXHIBIT 3-1

Topography Map A:
Klingle Road

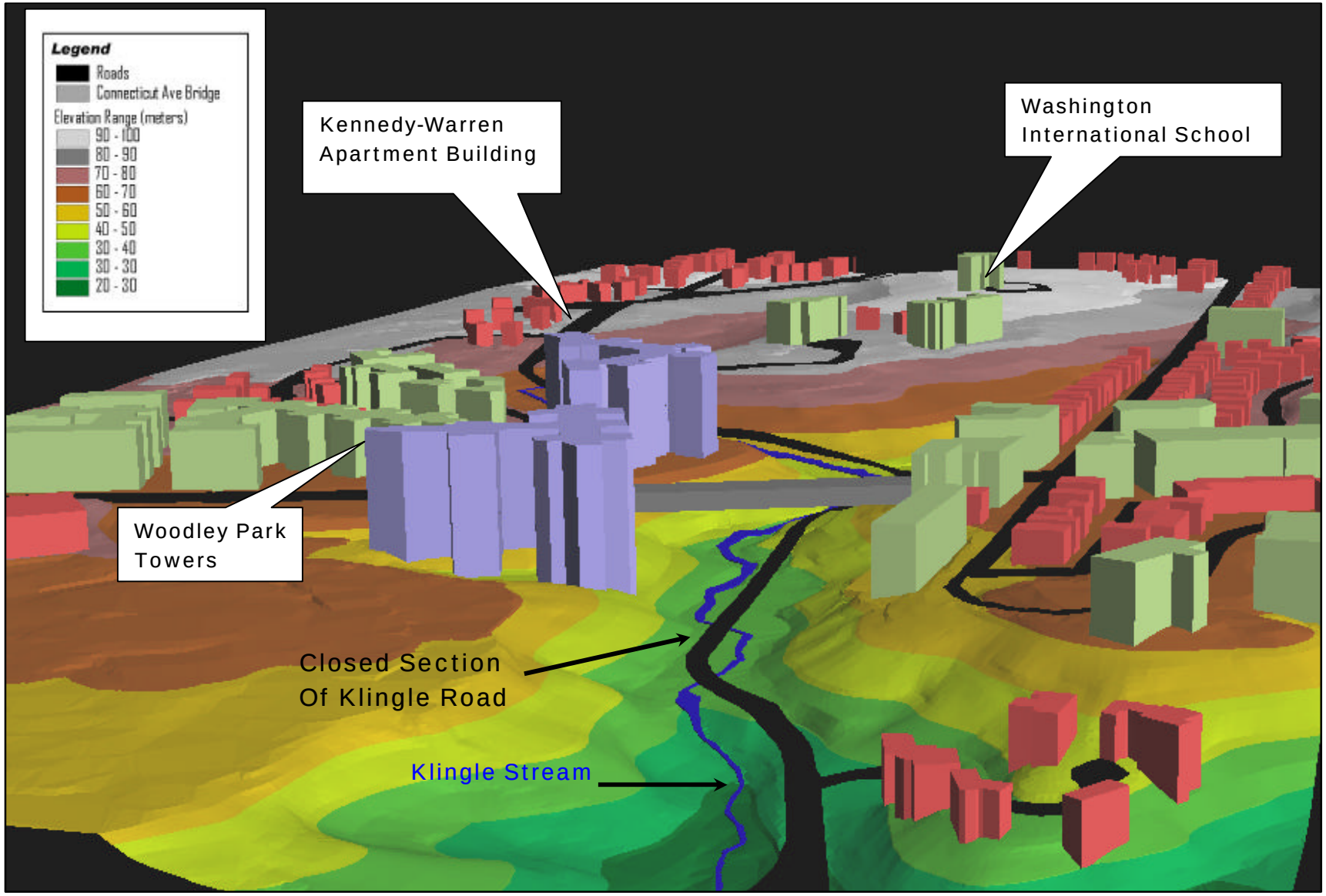


Source: USGS Quad: Washington West, DC, MD, VA; Photorevised 1983.

EXHIBIT 3-2

Topography Map B:
3-D Modeling

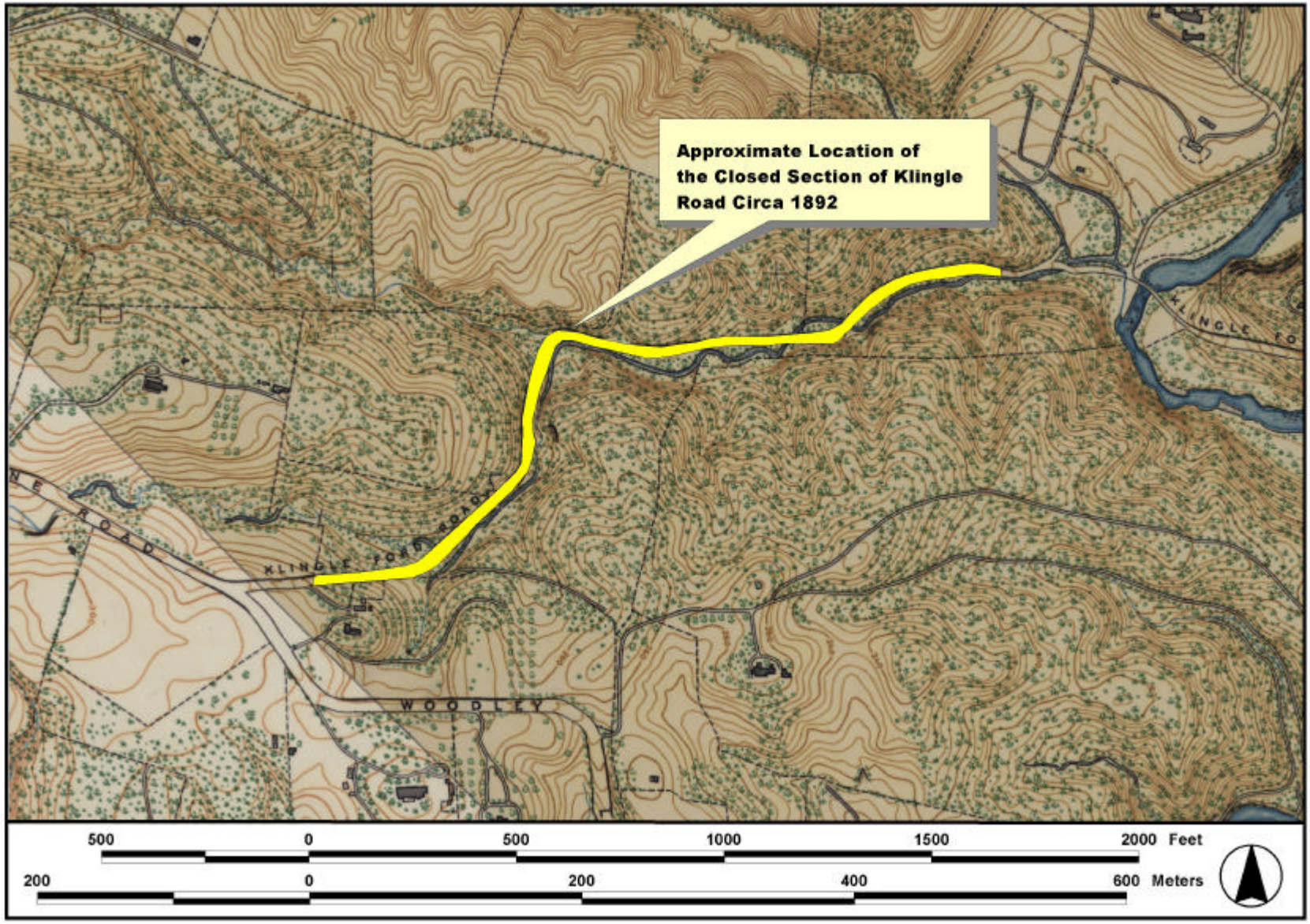
View of Klingle Valley looking Southwest



Source: Topography Data from NCPC, 1996.

EXHIBIT 3-3

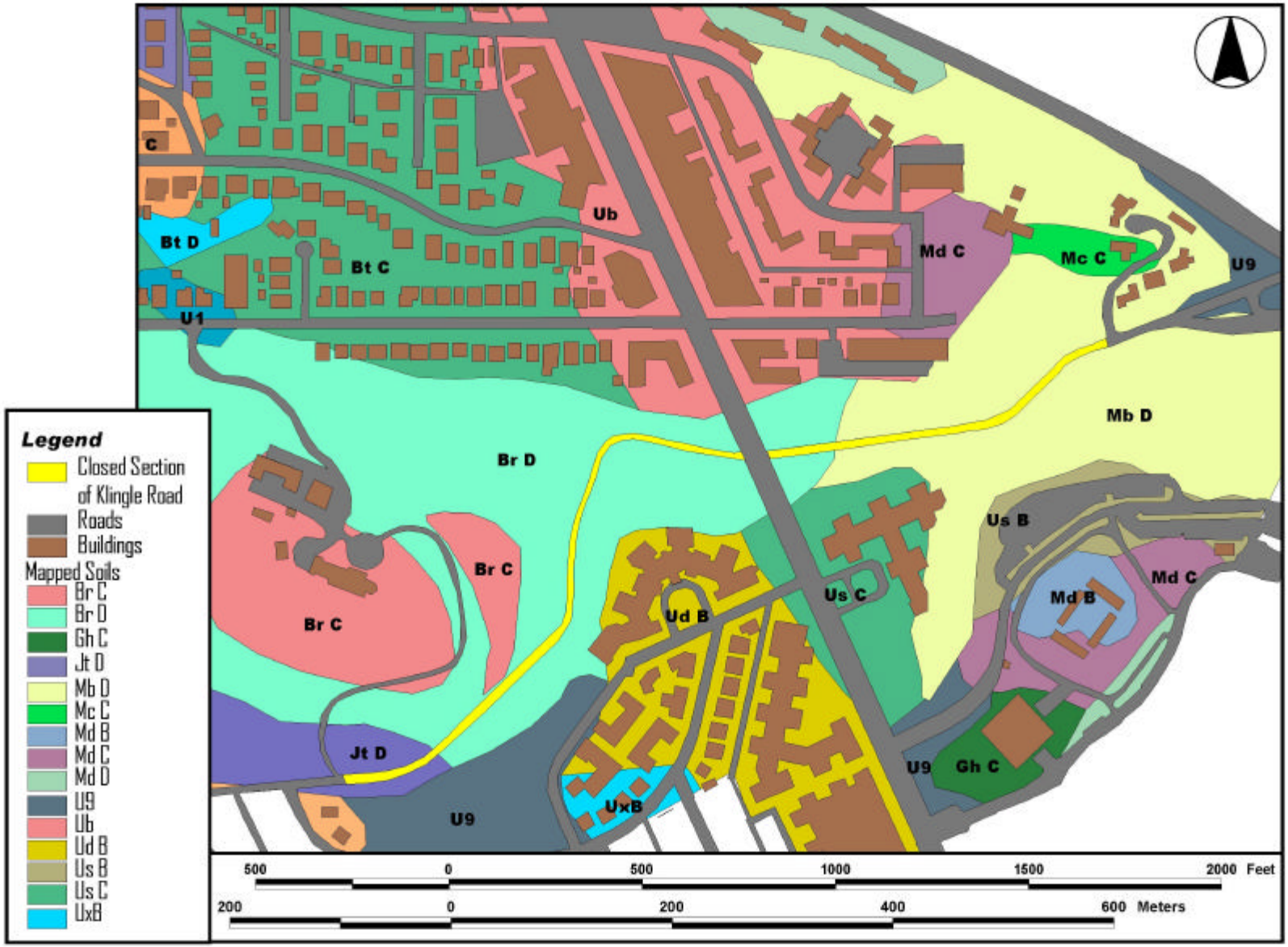
Topography Map C: Circa 1892



Source: Coast and Geodetic Survey, District of Columbia, Sheet #33, 1892; Engraved by Evans & Bartle, Washington DC 1893.

EXHIBIT 3-4

Soil Map



Source: Soil Survey of District of Columbia, 1976.

3.1.2 Environmental Consequences

The analysis of the environmental consequences of the proposed options to local geology, topography, and soils, defined several areas as "critical". These critical areas include any location where the slopes are greater than 15 percent; the soils are defined as highly susceptible to erosion, or both (Exhibit 3-5). Any construction/development activity should be approached with caution in the defined critical areas.

Under all options, properly designed erosion and sediment control measures would be implemented during the repair of the existing retaining walls and, under options B-G, during the repair or replacement of the stormwater and drainage system in order to minimize adverse environmental impacts.

Option A: No Action

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Maintenance activities.

Both short-term and long-term adverse impacts to soils would be expected under the No Action Option. Short-term adverse impacts to soils resulting from erosion during the repair of the retaining walls would be expected. Adverse effects to water quality and aquatic habitat associated with the transport and deposition of eroded soil would also be expected because of the proximity of the retaining walls to Klingle Creek. Implementation of properly designed best management practices (BMPs) would be necessary to minimize erosion during construction activities.

Although the No Action Option includes repair of the retaining walls, continued degradation of the existing road and stormwater conveyance structures would be expected as a result of the aging of the system and erosion associated with uncontrolled flows during high-runoff events. Loss of soil resources as a result of erosion and impacts to water quality and aquatic habitats associated with the deposition of eroded soils would also be expected.

Option B: No Build

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.

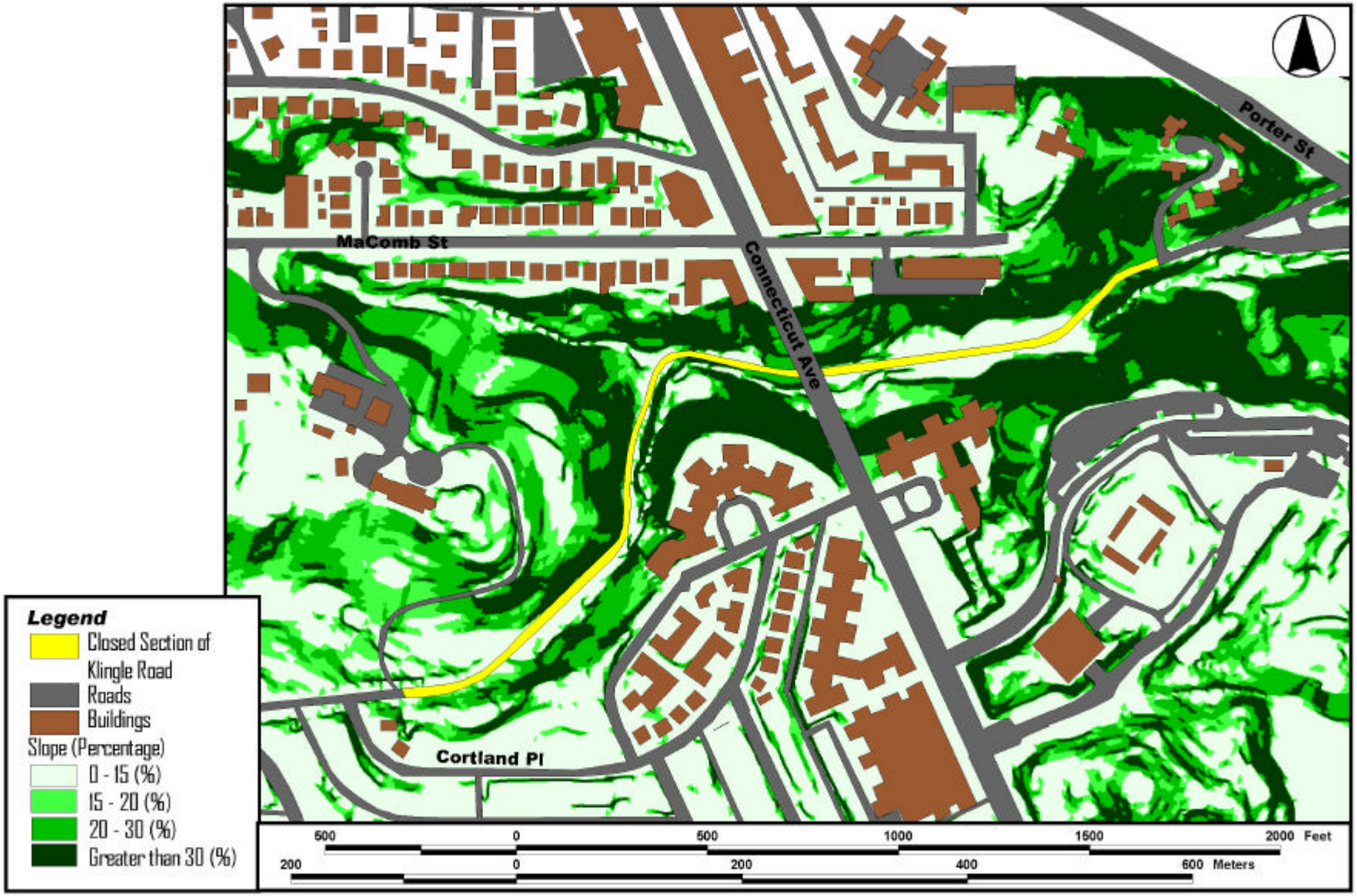
Repair of the retaining walls and replacement of the existing stormwater and drainage system would result in short-term adverse impacts, but would provide long-term benefits to soils in Klingle Valley. Short-term adverse impacts to soils resulting from erosion during the repair of the retaining walls would be expected. Adverse effects to water quality and aquatic habitat associated with the transport and deposition of eroded soil into Klingle Creek would also be expected because of the proximity of the retaining walls to the creek. Implementation of properly designed BMPs would be necessary to minimize erosion during construction activities.

Removal of vegetation or hardened surfaces, such as the existing road surface, along with excavation to access and replace the existing stormwater and drainage system, would temporarily expose soils to increased erosion. Removal and replacement of the existing stormwater and drainage structures that follow the creek bed could result in substantial adverse impacts to soils as a result of excessive erosion because of the proximity of the existing structures to Klingle Creek and steep slopes. Long-term adverse impacts to water quality and aquatic habitats would also be expected as eroded soils would be transported and deposited downcreek. Abandonment of existing stormwater and drainage structures and construction of a new system under the location of the existing roadbed would have short-term impacts with the potential expose soils to excessive erosion because of the occurrence of steep slopes at several locations along the roadbed.

Following the repair or replacement of the existing drainage system, long-term beneficial impacts would be expected as a result of a reduction in erosion associated with uncontrolled runoff during high-flow events.

EXHIBIT 3-5

Slope Map



Source: Topography Data from NCPC, 1996.

Long-term adverse effects related to erosion would result from the continuing degradation of the road.

Option C: Green Space

Action Items

- Road permanently closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove road; backfill ROW; sod with topsoil; grade to direct drainage.

Short-term adverse and long-term beneficial impacts to soils would be expected under the Green Space Option. Impacts to soils associated with repair of the retaining walls and with the replacement of the existing stormwater and drainage system are discussed under Option B.

Permanent closure and removal of the asphalt road would result in short-term adverse impacts to soils in Klingle Valley. Because of the magnitude of the structural damages and the need for heavy equipment, the work would not be confined to the existing roadway, thereby increasing impacts to the geology, topography, and soils. Removal of the existing road surface could result in increased erosion of soils exposed by the removal of the asphalt. Flows from Klingle Creek presently follow sections of the existing road during high-flow events. Stormwater flows over unstable soils, combined with steep slopes and the high erodibility of soils in Klingle Valley, could result in excessive erosion and associated sedimentation. If selected, this option would require the implementation of BMPs for erosion and sediment control. Continued implementation of BMPs for erosion and sediment control would be necessary during revegetation within the ROW area.

Long–term beneficial impacts, following the stabilization of soils and the recolonization of vegetation within the green space, would include: a) a decrease in impervious surface associated with removal of the asphalt roadway; b) improved wildlife habitats; and c) improved water quality.

Option D: Bike, Recreation, and Facility Management

Action Items

- Road remains closed to vehicular traffic.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; and grade to direct drainage.
- Contour and pave hard-surface bike path capable of supporting utility and maintenance trucks.
- Reestablish area adjacent to bike path as a recreation area.

Short-term adverse and long-term beneficial impacts would be expected under Option D. Impacts to soils associated with repair of the retaining walls and replacement of the existing stormwater and drainage system are discussed under Option B.

Removal of the existing asphalt road would result in short-term adverse impacts to soils in Klingle Valley. Because of the magnitude of the structural damages and the need for heavy equipment, the work would not be confined to the existing roadway, thereby increasing impacts to the geology, topography, and soils. Removal of the existing road surface could result in excessive erosion of soils exposed by the removal of the hard top. Flows from Klingle Creek presently follow sections of the existing road during high-flow events. Stormwater flows over unstable soils, combined with steep slopes and the high erodibility of soils in Klingle Valley, could result in excessive erosion and associated sedimentation. If selected, this option would require the implementation of BMPs for erosion and sediment control.

Long-term beneficial impacts to soils, following the repair and upgrading of the existing drainage structures, would be expected as a result of a reduction in erosion associated with uncontrolled runoff during high-flow events.

Because of the high erodibility of the soils in the project area and the steepness of the natural topography, the bike path would require long-term maintenance to ensure soil and slope stability.

Option E: Rebuild Klingle Road to its Original Alignment

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove road; backfill ROW; and grade to direct drainage.
- Rebuild road to its original dimensions; reopen road to two-way vehicular traffic.

Short-term adverse and long-term beneficial impacts to geology, topography, and soils would be expected under Option E. Impacts to soils associated with repair of the retaining walls and replacement of the existing stormwater and drainage system are discussed under Option B.

Removal of the existing asphalt road would result in short-term adverse impacts to soils in Klingle Valley. Heavy machinery and reduced working space would result in temporary adverse effects to soils. Removal of the existing road surface would result in excessive erosion of soils exposed by the removal of the hard top. Most soils occurring in the Klingle Road ROW have severe erosion potentials because of their physical characteristics and steep slopes. Disturbance of areas on or immediately adjacent to steep slopes could result in adverse effects associated with erosion and subsequent deposition into water bodies. Flows from Klingle Creek presently follow sections of the existing road during high-flow events. Stormwater flows over unstable soils, combined with steep slopes and the high erodibility of soils in Klingle Valley, could result in excessive erosion and associated sedimentation. If selected, this option would require the implementation of BMPs for erosion and sediment control.

Reconstruction of Klingle Road to its original alignment would involve major topographic modifications and subsequent short-term adverse effects on local soils and downstream water quality. Adverse impacts to geology, topography, and soils resulting from construction activities, like excavation, grading and the placement of fill, could occur in areas not disturbed by construction of the existing road.

Following the repair or replacement of the existing drainage structures, long-term beneficial impacts would be expected from a reduction in erosion associated with uncontrolled runoff during high-flow events.

Because of the high erodibility of the soils in the project area and the steepness of the natural topography, the road would require long-term maintenance to ensure soil and slope stability.

Option F: Build Klingle Road To Accommodate Vehicular, Pedestrian and Bike Uses

Actions Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; grade to direct drainage.
- Contour and pave hard-surface bike path.
- Rebuild and widen two-lane road to 25-30 feet of width, open to vehicular traffic in both directions.

Short-term and long-term adverse and long-term beneficial affects to geology, topography, and soils would be expected under Option F. Impacts to soils associated with repair of the retaining walls and replacement of the existing stormwater and drainage system are discussed under Option B.

Removal of the existing asphalt road would result in short-term adverse impacts to soils in Klingle Valley. Because of the magnitude of structural damage and need for the use of heavy equipment, the work would not be confined to the footprint of the existing roadway and areas not affected by previous roadwork would be disturbed. Removal of the existing road surface could result in excessive erosion of soils exposed by the removal of the hard

top. Flows from Klingle Creek presently follow sections of the existing road during high-flow events. Stormwater flows over unstable soils, combined with steep slopes and the high erodibility of soils in Klingle Valley, could result in excessive erosion and associated sedimentation. If selected, this option would require the implementation of BMPs for erosion and sediment control.

Widening of the existing ROW would be necessary to accommodate a two-lane road and hard-surface bike path. The construction of a wider roadway would present a long-term adverse impact to the geology, topography, and soils by permanently altering the existing topography and soils. Existing conditions do not provide the necessary space required to expand the roadway to accommodate pedestrian and bicycle traffic. Soils and topography would be affected as a result of bank cutting and the placement of fill that would be required to widen the right-of-way. In addition, a significant amount of bank stabilization would be required along both sides of the road in a number of areas due to the occurrence of steep slopes and high erosion potentials. Additional studies would be required to determine the best design and placement of the road with regard to safety and design requirements and the minimization of environmental impacts. The degree of impacts to topography and soils would depend on placement and configuration of the road and bikeway. In all cases, excavation of steep banks and the placement of fill in areas adjacent to Klingle Creek would likely be required. Adverse impacts to geology, topography, and soils resulting from construction activities, like excavation, grading and the placement of fill, would occur in areas not previously disturbed by construction of the existing road.

The repair of existing drainage damage and upgrading of deficient drainage structures may impact geology, topography, and soils temporarily during construction activities. However, the long-term impact of these repairs would ultimately benefit the geology, topography and soils by reducing erosion during high flow events and allowing the resources to stabilize.

Because of the high erodibility of the soils in the project area and the steepness of the natural topography, the road would require long-term maintenance to ensure soil and slope stability, and safety.

Option G: Build Klingle Road as a One-Lane (One-Way) Road with a Pedestrian/Bicycle Lane

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; grade to direct drainage.
- Contour and pave hard-surface bike path.
- Rebuild one-lane (one-way) road, open to vehicular traffic.

Short-term adverse and long-term beneficial impacts to geology, topography and soils would be expected under Option G. Impacts to soils associated with repair of the retaining walls and replacement of the existing stormwater and drainage system are discussed under Option B.

Removal of the existing asphalt road would result in short-term adverse impacts to soils in Klingle Valley. Heavy machinery and reduced working space would result in temporary adverse effects to soils. Removal of the existing road surface would result in excessive erosion of soils exposed by the removal of the hard top. Most soils occurring in the Klingle Road ROW have severe erosion potentials because of their physical characteristics and steep slopes. Disturbance of areas on or immediately adjacent to steep slopes could result in adverse effects associated with erosion and subsequent deposition into water bodies. Flows from Klingle Creek presently follow sections of the existing road during high-flow events. Stormwater flows over unstable soils, combined with steep slopes and the high erodibility of soils in Klingle Valley, could result in excessive erosion and associated sedimentation. If selected, this option would require the implementation of BMPs for erosion and sediment control.

Adverse impacts to geology, topography and soils resulting from construction activities, like excavation, grading and the placement of fill, would occur in areas not disturbed by construction of the existing road where the new road and pedestrian/bicycle lane is realigned within the existing ROW.

Long-term beneficial impacts following the repair or replacement of the existing drainage structures would be expected resulting from a reduction in erosion associated with uncontrolled runoff during high-flow events.

Because of the high erodibility of the soils in the project area and the steepness of the natural topography, the road and pedestrian/bicycle lane would require long-term maintenance to ensure soil and slope stability.

3.2 BIOLOGICAL RESOURCES

3.2.1 Affected Environment

The biological resources of this site have been determined through resource agency contacts and direct field observations. Field surveys were conducted to determine the extent of invasive species coverage on-site, to characterize the forest habitat, and to determine whether jurisdictional wetlands occur in the project area. Dominant vegetative species were recorded, while vegetative communities, including wetlands, were examined for habitat type and size. Habitats were analyzed and compared to habitat requirements of species known to occur in the vicinity, including species of special status, in order to assess their potential use of the area. Direct observations of wildlife and/or signs of wildlife were also recorded.

Vegetation

Vegetation occurring in the Klingle Road project area was characterized by direct field observations made during site visits conducted on April 12, 2000 and June 19 through June 21, 2000. Specifically, the affected area was surveyed for the presence of trees with a diameter at breast height (dbh) greater than 24-inches (Table 3-1), which is the criterion used by Montgomery County, Maryland; the District of Columbia does not have any established benchmark. The affected area was also surveyed for the overall ground cover. The percent of the understory comprised of invasive species was also estimated. Appendix B details the methodology used and the results of the survey.

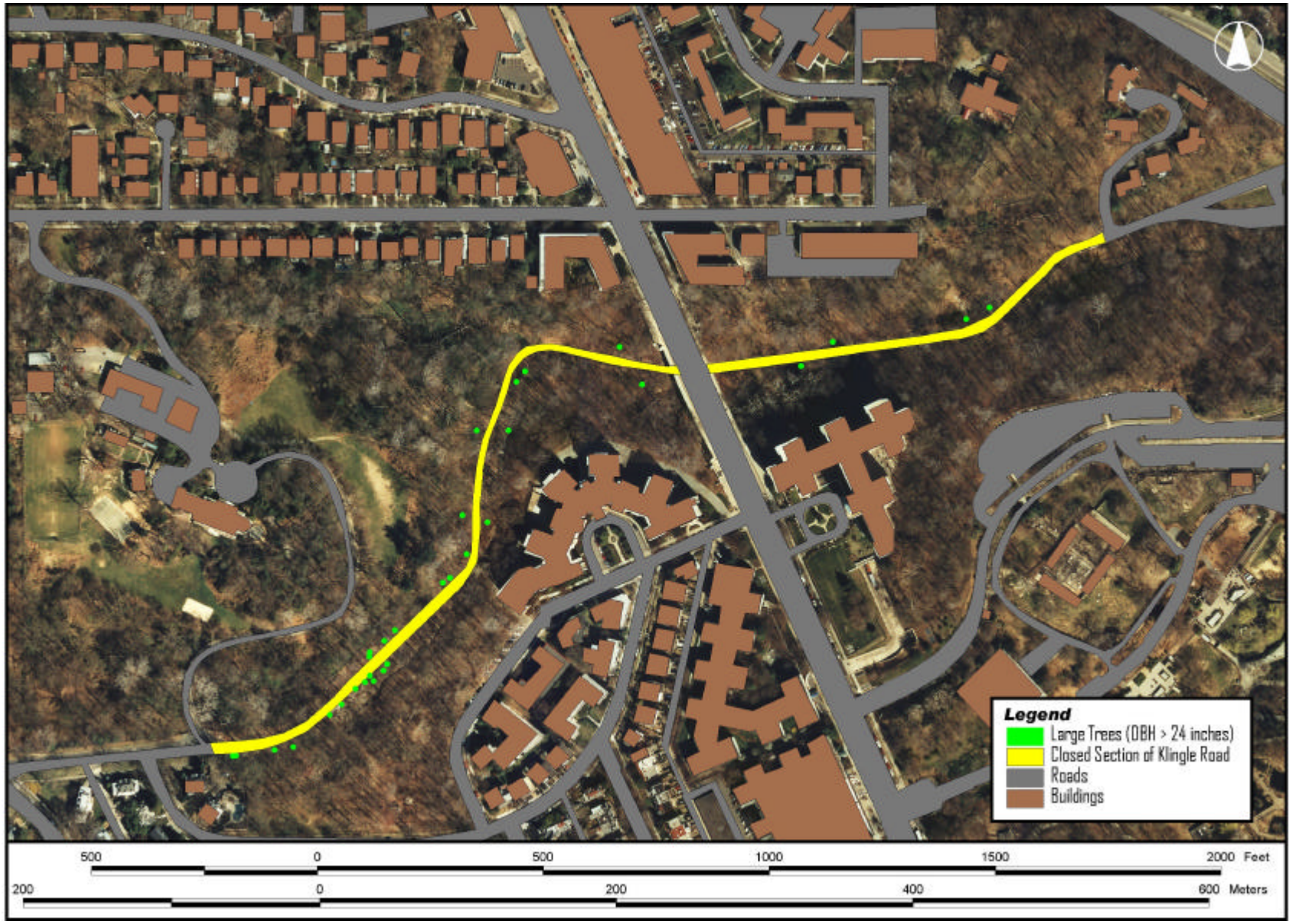
Exhibit 3-6 shows the approximate locations of the large diameter trees in the Klingle Road ROW. General forest stand composition was also noted. A total of 31 24-inch dbh trees occur in the project study area (the area 25 feet to either side of the road centerline). Of these 31 trees, tulip poplar (*Liriodendron tulipifera*) is the dominant species, making up 55 percent of the population. The overall species composition comprises a poplar-oak-hickory mix.

The affected area was surveyed for the presence and dominance of invasive species. This was achieved through a random plot method where 160 random meter-square plots were surveyed for vegetative cover. The percent coverage of each species was determined within the meter-square plots. A large percentage of area included bare ground with no vegetative cover. Of the 39 species identified using the random plot method, 12 were defined as invasive species. These 12 species are, on average, 17 percent of the coverage within the project area, whereas native species are 10 percent, and bare ground averages 79 percent of the ground cover. The most common invasive plant species occurring in the proposed project area is English ivy (*Hedera helix*). English ivy, hich probably originated in adjacent upslope properties, dominates the ground cover over large areas on the site. Pachysandra (*Pachysandra-terminalis*), which is commonly used as landscaping groundcover in surrounding neighborhoods, also occurs as a monotypic groundcover at locations scattered throughout the affected area.

Table 3-2 lists vegetative species documented within the project study area and indicates whether they are native plants, originated from nearby cultivation, or are invasive species. The list is not inclusive of all plant species that occur in the project area, but it includes a list of common tree species occurring on the site, along with all herbaceous, vine, sapling, and shrub species that were identified in the 160 individual meter-square plots characterized in the invasive species survey.

EXHIBIT 3-6

Tree Survey Map



Source: Aerial Photography provided by NCPC, 1995.

TABLE 3-1: TREES IN THE PROJECT AREA WITH GREATER THAN 24-INCH DBH

SCIENTIFIC NAME	COMMON NAME	DBH
Liriodendron tulipifera	Tulip poplar	24.2
Quercus rubra	Red oak	24.3
Liriodendron tulipifera	Tulip poplar	24.8
Carya sp.	Hickory species	25.5
Liriodendron tulipifera	Tulip poplar	25.6
Carya sp.	Hickory species	25.8
Quercus alba	White oak	25.8
Fagus grandifolia	American beech	25.9
Liriodendron tulipifera	Tulip poplar	26.2
Liriodendron tulipifera	Tulip poplar	26.6
Quercus rubra	Red oak	27.8
Liriodendron tulipifera	Tulip poplar	27.9
Liriodendron tulipifera	Tulip poplar	28.0
Quercus rubra	Red oak	28.1
Platanus occidentalis	Sycamore	28.2
Liriodendron tulipifera	Tulip poplar	28.6
Liriodendron tulipifera	Tulip poplar	29.2
Carya sp.	Hickory species	30.8
Liriodendron tulipifera	Tulip poplar	31.4
Liriodendron tulipifera	Tulip poplar	32.0
Carya sp.	Hickory species	32.6
Carya sp.	Hickory species	34.0
Quercus rubra	Red oak	35.6
Quercus alba	White oak	35.6
Liriodendron tulipifera	Tulip poplar	36.2
Liriodendron tulipifera	Tulip poplar	38.7
Liriodendron tulipifera	Tulip poplar	41.3
Liriodendron tulipifera	Tulip poplar	41.5
Liriodendron tulipifera	Tulip poplar	42.1
Liriodendron tulipifera	Tulip poplar	42.8
Platanus occidentalis	Sycamore	47.1

Source: The Louis Berger Group, Inc., 2000

TABLE 3-2: VEGETATIVE COMPOSITION

SCIENTIFIC NAME	COMMON NAME	INVASIVE	ESCAPE	NATIVE
HERBACEOUS/VINE SPECIES				
Alliaria petiolata	Garlic mustard	X	--	--
Arisaema triphyllum	Jack-in-the-pulpit	--	--	X
Asclepias syriaca	Common milkweed	--	--	X
Bidens vulgata	Beggar-ticks	--	--	X
Boehmeria cylindrica	False nettle	--	--	X
Celastrus scandens	Bittersweet	--	--	X
Circaea quadrisulcata	Enchanter's nightshade	--	--	X
Commelina communis	Asiatic dayflower	X	--	--
Cryptotaenia canadensis	Honewort	--	--	X
Duchesnea indica	Indian strawberry	X	--	--
Fragaria sp.	Strawberry	--	--	X
Hedera Helix	English ivy	X	--	--
Impatiens capensis	Spotted jewelweed	--	--	X
Ipomoea hederacea	Ivy-leaved morning glory	X	--	--
Lonicera japonica	Honeysuckle	X	--	--
Mitchella repens	Partridgeberry	--	--	X
Pachysandra-terminalis	Pachysandra	X	X	--
Parthenocissus quinquefolia	Virginia creeper	--	--	X
Polygonum amphibium	Water smartweed	--	--	X
Polygonum persicaria	Lady's thumb	X	--	--
Rubus phoenicolasius	Wineberry	X	--	--
Rubus sp.	Blackberry	--	--	X

SCIENTIFIC NAME	COMMON NAME	INVASIVE	ESCAPE	NATIVE
HERBACEOUS/VINE SPECIES, continued				
Sanicula gregaria	Clustered snakeroot	--	--	X
Toxicodendron radicans	Poison ivy	--	--	X
Urtica dioica	Stinging nettle	X	--	--
Vinca sp.	Perriwinkle	--	X	--
Viola papilionacea	Common blue violet	--	--	X
Vitis sp.	Grape vine	--	--	X
Vitis aestivalis	Pigeon grape	--	--	X
SAPLING/SHRUB SPECIES				
Acer negundo	Box elder sapling	--	--	X
Acer platanoides	Norway maple sapling	X	X	--
Ailanthus altissima	Tree-of-Heaven	X	--	--
Asimina triloba	Paw paw	--	--	X
Carya sp.	Hickory sapling	--	--	X
Cercis canadensis	Redbud	--	--	X
Fagus grandifolia	Beech sapling	--	--	X
Lindera Benzoin	Spicebush	--	--	X
Morus sp.	Mulberry	--	--	X
Ulmus sp.	Elm sapling	--	--	X
Ulmus americana	American elm sapling	--	--	X
TREE SPECIES				
Acer negundo	Box elder	--	--	X
Acer platanoides	Norway maple	X	X	--
Acer saccharinum	Silver maple	--	--	X
Acer sp.	Japanese maple	--	X	--

SCIENTIFIC NAME	COMMON NAME	INVASIVE	ESCAPE	NATIVE
TREE SPECIES, continued				
Asimina triloba	Paw paw	--	--	X
Ailanthus altissima	Tree-of-Heaven	X	--	--
Carya cordiformis	Bitternut hickory	--	--	X
Carya glabra	Pignut hickory	--	--	X
Carya sp.	Hickory	--	--	X
Fagus grandifolia	American beech	--	--	X
Liriodendron tulipifera	Tulip poplar	--	--	X
Morus alba	White mulberry	X	--	--
Paulownia tomentosa	Paulownia	X	--	--
Platanus occidentalis	American sycamore	--	--	X
Quercus alba	White oak	--	--	X
Quercus palustris	Northern pin oak	--	--	X
Quercus rubra	Northern red oak	--	--	X
Ulmus sp.	Elm	--	--	X

Source: The Louis Berger Group, Inc., 2000

Executive Order 11990, Protection of Wetlands

Executive Order 11990, Protection of Wetlands, requires federal agencies to take action to minimize the loss of wetlands. Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR, Part 328.3). The U.S. Army Corps of Engineers regulates development in wetland areas pursuant to Section 404 of the Clean Water Act (33 CFR, Parts 320-330). Three elements are

used to identify wetlands: hydrology, hydrophytic vegetation, and hydric soils.

The characterization of wetlands in the project area was based on the review of the United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) map of the area, *the Soil Survey of the District of Columbia*, and site investigations conducted on June 21, 2000.

Analysis of the 1:24,000 scale NWI map for the Washington West Quadrangle indicated that no wetland habitats occur within the potential area of impact. Additionally, the District of Columbia Wetland Conservation Plan (CWP, 1997) was reviewed to determine if wetlands were documented to occur in the vicinity of the project area. The plan does not document the occurrence of any wetlands within the project area or in any areas in Klingle Valley. The *Soil Survey of the District of Columbia* also indicated that no hydric soils are mapped within the potential area of impact (USDA, 1976). Hydric soils are soils that are saturated, flooded, or ponded for long enough during the growing season to develop anaerobic (oxygen-deficient) conditions in their upper part. Anaerobic soil conditions are conducive to the establishment of vegetation that is adapted for growth under oxygen-deficient conditions and is typically found in wetlands (hydrophytic vegetation).

The assessment of the project area for the presence of jurisdictional wetlands was based on procedures established in the *Corps of Engineers Wetlands Delineation Manual* (1987) and related technical and policy guidance. No areas within the potential project area exhibited the three parameters indicative of the presence of jurisdictional wetlands; therefore, no jurisdictional wetlands were determined to exist within the potential areas of impact. However, Klingle Creek is considered "waters of the United States" under Section 404 of the Clean Water Act, and construction permitting associated with potential impacts to the creek would be required. A small potential wetland occurs in the northwestern section of the project area in association with a ponded section of Klingle Creek on private property immediately adjacent to the Klingle Road ROW. A determination of whether jurisdictional wetlands occur in association with the ponded area, or their extent, was not determined because the site is located entirely on private property and not within the Klingle Road ROW.

Wildlife

As an urban green space, Klingle Valley provides habitat for a variety of wildlife adapted to urban conditions and human populations. Mammalian species that can be expected to utilize the area for habitat include grey squirrel (*Sciurus caroliniensis*), whitetail deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), and opossum (*Didelphis virginiana*). Avian species seen on site during field visits conducted in April and June 2000 include the American crow (*Corvus brachyrhynchos*), mallard (*Anas platyrhynchos*), pileated woodpecker (*Dryocopus pileatus*), blue jay (*Cyanocitta cristata*), mourning dove (*Zenaida macroura*), and green back heron (*Butorides virescens*). A variety of songbirds may be expected to utilize the site as well. Amphibian and reptilian species are reported to occur in the area but were not seen during the site visits.

Bioassessment studies to characterize the ecology and water quality of streams in the District of Columbia were conducted in 1988, 1993, and 1998. Results of the 1988 study conducted by the District of Columbia Department of Consumer and Regulatory Affairs (DCRA) Housing and Regulatory Administration Environmental Control Division (Johnson, 1988) indicate that water quality in the Klingle Creek was fair to poor. Fish, crayfish, and salamanders were reported to be present in the creek. Samples of benthic macroinvertebrates taken in the creek were dominated by chironomid, indicating the creek was organically enriched.

Stream characterizations conducted by W.C. Banta (1993) indicate the creek was moderately impaired and showed evidence of loss of instream cover, increased imbeddedness, channel alteration, and bottom scouring. A benthic macroinvertebrate sample from the creek collected 28 individuals from 14 taxa. The sample included six species of chironomid, a crayfish (*Cambarus robustus*), tipulids, oligochaets and several other species not identified in the study. The dominance of chironomid and the ratio of scrapers to filter-collectors in the sample indicated eutrophication and organic enrichment of the creek. Toxic pollution, organic pollution,

eutrophication, and environmental degradation all appeared to be impacting Klingle Creek at the time of the study.

Biological data provided by the District of Columbia Department of Health (DOH) Watershed Protection Division (1998) indicated aquatic life in Klingle Creek is impacted by poor water quality and habitat degradation. Based on evaluations by the DOH of benthic macroinvertebrates and fish collections, the creek has a low diversity of aquatic species, consisting primarily of species tolerant of adverse conditions.

Additionally, DOH Division of Fisheries and Wildlife and Water Quality conducted a fisheries assessment of Klingle Creek on August 29 and September 15, 2000. Three fish species were identified during the electrofishing survey. Fish were identified in most pools from the confluence of Klingle Creek with Rock Creek upstream for about 885 feet (269 meters), where the elevation of the creek rises approximately 18 feet (six meters) through a series of small falls. No fish species were identified above the falls. Forty-six pools were identified below the fall area and all but three contained fish. The blacknose dace (*Rhinichthys atratulus*) occurred in all pools that had fish and was the most common fish in the creek. In total, 254 blacknose dace were identified in the survey. Six American eels (*Anguilla rostrata*) were identified in five pools and four creek chubs (*Semotilus atromaculatus*) were found in two pools. Only one pool contained all three fish species and six pools contained at least two species (Ryan, 2000). The DOH study concluded that Klingle Creek acts as a refuge for species found in Rock Creek, and consequently, is an important system to the overall health of Rock Creek.

Threatened and Endangered Species

In accordance with Section 7 of the Endangered Species Act (ESA) of 1973, the project area was evaluated for the potential occurrences of federally threatened and endangered species. The ESA requires any federal agency that funds, authorizes, or carries out an action to ensure their action is not likely to jeopardize the continued existence of any endangered or threatened species (including plant species) or to result in the destruction or adverse modification of designated critical habitats.

USFWS, National Park Service (NPS), D.C. Natural Heritage Program and the Superintendent of Rock Creek Park were consulted to determine potential for the presence of any rare, threatened, or endangered species within the project area (Appendix A). USFWS listed no federally threatened, endangered, or proposed plant or animal species occurring in the project vicinity (R.J. Pennington, USFWS, written comm. to K. Laden, DDOT, July 19, 2000). The D.C. Natural Heritage Program also had no record of rare, threatened, or endangered species in the project vicinity (Dr. James L. Sherald, NPS, written comm. to S. Cauley, The Louis Berger Group, November 6, 2000). A letter describing the project along with a map showing the site location was sent from The Louis Berger Group, Inc. to Adrienne Coleman, Superintendent of Rock Creek Park, on November 16, 2000 to formally request the current list of special status species that are known to occur, or that could potentially occur on or in the vicinity of the Klingle Road site. The letter also requested information on any other known sensitive natural resources or ecosystems in the proposed project area that should be considered in the environmental feasibility study (Appendix A). At this time no comments have been received.

3.2.2 Environmental Consequences

In assessing the environmental consequences of the proposed options to vegetation, wetlands, and wildlife, several areas were defined within the project area as “critical.” These critical areas include any location where trees greater or equal to 24-inches dbh occur, wetlands exist, or threatened and endangered species have been documented. No wetlands or threatened and endangered species occur within the project area. Locations where trees with a dbh of greater or equal to 24-inches occur are shown in Exhibit 3-6. Any construction development activity in areas where large dbh trees are documented to occur should avoid the trees where possible and should incorporate BMPs into construction plans to minimize potential impacts.

All of the proposed options, excluding the No Action Option, include repairs and necessary upgrade of the existing stormwater and drainage system. Repair of the existing system would result in short-term adverse impacts, but

would provide long-term benefits to biological resources in Klingle Valley. Removal of vegetation or hardened surfaces such as the existing road surface would expose soils to increased erosion. Repairing the existing system would create short-term adverse impacts but would provide long-term benefits to the flora and fauna communities in the project area. Short-term adverse impacts would include displacing vegetation and disturbing wildlife during construction. Repair of the existing stormwater and drainage system would result in long-term benefits to the biological resources by reducing the adverse impacts associated with high-flow events that have been magnified by the highly urbanized character of the surrounding area. Repair of the existing system would help to reduce erosion and subsequent sedimentation associated with high-flow storm events. On-going habitat degradation or loss associated with erosion, sedimentation, and degraded water quality would be reduced, thereby resulting in an overall improvement in habitat quality in the project area. These short-term, adverse impacts and long-term benefits would result under all of the following options, excluding the No Action Option.

Option A: No Action

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Maintenance activities.

Long-term adverse effects to biological resources that are associated with the No Action Option would be expected. Under the No Action Option, uncontrolled stormwater associated with storm events would continue to affect aquatic habitats; specifically, the continued erosion of the streambanks and steep slopes and the resultant deposition of eroded sediments in downstream habitats. Although repairs to the retaining wall are proposed, the continuing degradation of the existing road surface would be expected to adversely impact in-stream habitats, especially in areas where the road is located immediately adjacent to or within the current flow path of the creek. Unstable streambanks and side slopes associated with uncontrolled stormwater runoff would preclude the establishment of vegetation, which, if established over time, would act to stabilize conditions and to reduce erosion.

Option B: No Build

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.

Repair of the existing stormwater and drainage system would result in short-term adverse impacts, but would provide long-term benefits to biological resources in Klingle Valley, regardless of the method chosen. Repairing the existing drainage system and retaining walls would create short-term adverse impacts, but would provide long-term benefits to the flora and fauna communities in the project area. Short-term adverse impacts would include the displacement of vegetation and the disturbance of wildlife during construction. Impacts related to the repair of the stormwater and drainage system would be dependent on the method of replacement chosen. Replacing the existing system would have short-term adverse impacts on the in-stream habitat; however, the removal of untreated, uncontrolled stormwater flows would have long-term benefits.

Repair of the existing stormwater and drainage system would reduce the current adverse impacts associated with high-flow events, which have been magnified by the highly urbanized character of the surrounding area. Repair of the existing system would help to reduce erosion and subsequent sedimentation associated with high-flow storm events. On-going habitat degradation or loss associated with erosion, sedimentation, and degraded water quality would be reduced resulting in an overall improvement to the quality of habitat. The long-term adverse impacts of this option would include the continued degradation of the existing road and subsequent increase in erosion and sedimentation problems.

Option C: Green Space

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Road permanently closed.
- Remove road; backfill ROW; sod with topsoil; grade to direct drainage.

As with Option B, repair of the existing drainage system would result in short-term adverse impacts, but would provide long-term benefits to biological resources in Klingle Valley, regardless of the chosen method of replacement. Repairing the existing stormwater and drainage system and retaining walls would create short-term adverse impacts, but would provide long-term benefits to the flora and fauna communities in the project area as described under Option B. On-going habitat degradation or loss associated with erosion, sedimentation, and degraded water quality would be reduced resulting in an overall improvement to the quality of habitat.

The permanent closure and removal of the asphalt road would result in short-term adverse impacts to the biological resources in Klingle Valley. Adverse impacts to trees located immediately adjacent to the existing road could occur as a result of damage to root systems during the demolition process. Removal of the existing road surface could also result in excessive erosion of soils exposed by its removal. Erosion of exposed soils and subsequent deposition could adversely affect terrestrial and aquatic habitats in and downstream of Klingle Creek. Due to the magnitude of the structural damages (road collapse) and the need for heavy equipment use, the work would not be confined to the existing roadway, increasing potential short-term impacts to the biological resources.

To prevent excessive erosion and the associated sedimentation, the implementation of temporary BMPs for erosion and sediment control would be implemented during road removal. Continued implementation of erosion control measures would be necessary after completion of construction activities and during re-vegetation within the green space area.

Long–term beneficial impacts to biological resources, following the stabilization of soils and recolonization of vegetation within the green space, would include: a) decrease in impervious surface associated with removal of the asphalt roadway; b) restored wildlife habitats; c) improved water quality; d) increased connectedness between habitats in the valley, and e) benefits associated with the absence of vehicle use, traffic, and noise.

As mentioned, reestablishment of vegetation in the area, following the removal of the existing road surface, would benefit biological habitat conditions in Klingle Valley. Proper preparation of soils in the areas previously covered by road surface would be necessary to promote establishment of native vegetation. Benefits to natural vegetative communities and the establishment of high-quality wildlife habitat would be limited, unless long-term efforts are made to control the establishment and spread of exotic invasive plant species occurring in the project area. Under a non-control approach, exotic invasive landscape vegetation would potentially dominate the vegetative communities in the reestablished green space.

Option D: Bike, Recreation, and Facility Management

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Road remains closed to vehicular traffic.
- Remove existing road; backfill ROW; and grade to direct drainage.
- Contour and pave hard-surface bike path capable of supporting utility and maintenance trucks.
- Reestablish area adjacent to bike path as a recreation area.

Rebuilding Klingle Road as a bike trail, which would provide recreational and facility management opportunities, with the necessary stormwater improvements would have both adverse impacts and benefits to the biological resources in the project area. Because of the magnitude of the structural damages (road collapse) and the need for the use of heavy

equipment, the work would not be confined to the existing roadway, increasing impacts to biological resources. Short-term adverse and long-term beneficial impacts would be expected under Option D. Short-term adverse impacts associated with the repair and upgrade of stormwater and drainage structures discussed under Option B would also be expected under Option D.

Repairing the existing stormwater and drainage system and retaining walls would create short-term adverse impacts, but would provide long-term benefits to the flora and fauna communities in the project area. Short-term adverse impacts would include the displacement of vegetation and the disturbance of wildlife during construction. On-going habitat degradation or loss associated with erosion, sedimentation, and degraded water quality would be reduced resulting in an overall improvement to the quality of habitat.

The existing road surface is currently used for recreational activities, like hiking and jogging. Consequently, an increase in use of the area following its establishment as a bike path would not have additional adverse effects resulting from an increase in human activities.

Option E: Rebuild Klingle Road

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove road; backfill ROW; and grade to direct drainage.
- Rebuild road to its original dimensions; reopen road to two-way vehicular traffic.

Short-term and long-term adverse and long-term beneficial effects to biological resources in Klingle Valley would be expected under Option E. Short-term adverse, as well as long-term beneficial effects to biological resources associated with the repair of retaining walls and repair and replacement of the existing stormwater and drainage system are discussed under Option B.

Reconstruction of Klingle Road would impose long-term adverse impacts to the vegetative community within the project area. Recruitment of some tree and shrub species has occurred immediately adjacent to and within the project area. This vegetation would be permanently removed to accommodate construction and the roadway. Reconstructing Klingle Road to its original alignment would require the removal of some large trees (greater or equal to 24-inch dbh) to accommodate the footprint of the road. Adjustment of the road alignment would be made where necessary and where possible to avoid direct impacts to large diameter trees, in particular where they occur outside of the road's original alignment. In addition, long-term adverse impacts to large trees located immediately adjacent to the footprint of the roadway would occur during construction and following the reopening. Damage to root systems during construction would weaken affected trees and, over time, potentially kill them. To minimize potential adverse impacts and to protect and to reduce potential damage to large diameter trees occurring adjacent to the project area, BMPs would be incorporated into construction plans.

Road reconstruction would have long-term adverse impacts on the wildlife resources that utilize Klingle Valley in a seasonal or permanent fashion. Reconstruction of the road would reintroduce vehicular traffic into the valley, reducing habitat suitability. Lighting associated with the road, along with an overall increase in human activities following road completion, would also limit use of the area by some species. Increased fragmentation of Klingle Valley associated with reconstruction of the road would further limit wildlife use.

Option F: Build Klingle Road To Accommodate Vehicular, Pedestrian and Bike Uses

Actions Items

- Repair existing retaining wall to avoid further pavement collapse into creek.

- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; grade to direct drainage.
- Contour and pave hard-surface bike path.
- Rebuild and widen two-lane road to 25-30 feet, open to vehicular traffic in both directions.

Short-term and long-term adverse and long-term beneficial affects to biological resources in Klingle Valley would be expected under Option F. Short-term adverse as well as long- term beneficial affects to biological resources associated with the repair of retaining walls and repair and replacement of the existing stormwater and drainage system are discussed under option B.

Reconfiguration of Klingle Road would impose major long-term impacts on the vegetative community within the project area. Recruitment of some tree and shrub species has occurred immediately adjacent to, and within, the road right-of-way. This vegetation would be removed to accommodate reconstruction of a two-lane road and hard-surface bike path. In addition, widening of the existing footprint of the road to accommodate pedestrian and bikeway facilities would result in the removal of most of the trees identified in the proposed project area to have diameter breast heights if greater than 24-inches. Large trees not directly affected as a result of removal would probably be adversely affected due to their proximity to the construction activities and, following completion of construction, due to their close proximity to the completed road and bike path. Damage to root systems during construction could weaken effected trees and over time potentially kill the trees.

Widening of the existing footprint of the road under Option F would require encroachment or redirection of the existing stream channel particularly in the central and western sections of the proposed project area. Channelization or redirection of the creek to accommodate the road and bike path would directly affect aquatic species utilizing the creek as a result of habitat removal or relocation. Adverse effects to aquatic species would not be expected to be extensive due to the currently degraded condition of the creek.

Road reconfiguration associated with implementation of Option F would also have long term impacts on terrestrial wildlife and birds that utilize Klingle Valley for habitat. Reconstruction of the road with a hard-surface bike path would reintroduce vehicular traffic along with additional pedestrian and bicycle traffic into the valley reducing its potential for use by wildlife. Lighting associated with the road along with an overall increase in human activities following road completion would also limit use of the area by wildlife. Increased fragmentation of Klingle Valley and permanent removal of vegetation associated with reconstruction of the road with the associated bike path would further decrease the viability for use of the valley by wildlife species.

Option G: Build Klingle Road as a One Lane (One-Way) Road with a Pedestrian/Bicycle Lane

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; grade to direct drainage.
- Rebuild one-lane (one-way) road, open to vehicular traffic.
- Contour and pave hard-surface bike path.

Repair of the existing stormwater and drainage system would result in short-term adverse impacts, but would provide long-term benefits to biological resources in Klingle Valley as described under Option B.

Short-term and long-term adverse impacts to the floral and faunal species would be expected to occur if the roadway were reconfigured within the existing right-of-way to accommodate one-way vehicular traffic and a pedestrian/bicycle lane. The reconfiguration of Klingle Road would require the removal of some large trees (greater or equal to 24-inch dbh) to accommodate the footprint of the road. Adjustment of the road alignment would be made where necessary and where possible to avoid direct impacts to large diameter trees, particularly where they occur outside of the road's

original alignment. In addition, long-term adverse impacts to nearby large trees located immediately adjacent to the footprint of the roadway would occur during construction and following the reopening. Damage to root systems during construction could weaken affected trees over time and could potentially kill the trees. To minimize potential adverse impacts to the trees and to protect and reduce potential damage to large diameter trees occurring adjacent to the proposed project area, BMPs would be incorporated into construction plans.

Road reconstruction would have long-term adverse impacts on the wildlife resources that utilize Klingle Valley on a permanent and/or temporary basis. Reconstruction of the road would reintroduce vehicular traffic into the valley, reducing habitat suitability. Lighting associated with the road, along with an overall increase in human activities following road reconfiguration, would also limit use of the area for some species. Increased fragmentation of Klingle Valley associated with reconstruction of the road would further limit use of the valley by wildlife species.

3.3 WATER RESOURCES

Klingle Creek, a tributary of Rock Creek, is designated as "Special Waters of the District of Columbia" according to the Water Quality Standards, 21 D.C. Municipal Regulations (DCMR) Section 1102.5 (DOH, 2000). Section 1102.4 requires maintenance of the water quality at or above the existing conditions and no long-term water quality effects. This sub-section evaluates the potential impacts associated with the proposed options in the context of these regulations.

3.3.1 Affected Environment

Surface water resources in and adjacent to the Klingle Road project area are characterized by Klingle Creek and a few, small, temporarily ponded areas associated with stormwater outfalls and restricted conveyances. Klingle Creek flows east from its headwaters near Macomb Street for approximately 0.8 miles to its confluence with Rock Creek just south of the Porter Street bridge over Rock Creek. Klingle Creek crosses Klingle Road then flows adjacent to the road's eastern section for approximately half of the existing road's length. The Klingle Creek watershed drains an area approximately 0.5 square miles (320 acres) between Woodley Park and Cleveland Park (Exhibit 3-7).

Klingle Creek is a small stream with a flow rate of less than one cubic foot per second (cfs) (Banta, 1993). Existing stream channel and water quality conditions in Klingle Creek are not representative of a small, healthy urban creek. The level of urban development in Klingle Creek and the surrounding area has limited the ability of the creek to effectively drain the additional runoff from the watershed. As a result of this increased volume of stormwater runoff, the stream channel has had to adjust to accommodate the high volumes of urban stormwater runoff. Increases in the volume and in the flow rate of stormwater runoff entering Klingle Creek has lead to erosion of the streambanks and the streambed. This erosion and associated sediment transport and deposition decreases water quality and the quality of aquatic habitat within the stream system.

Stream Morphology

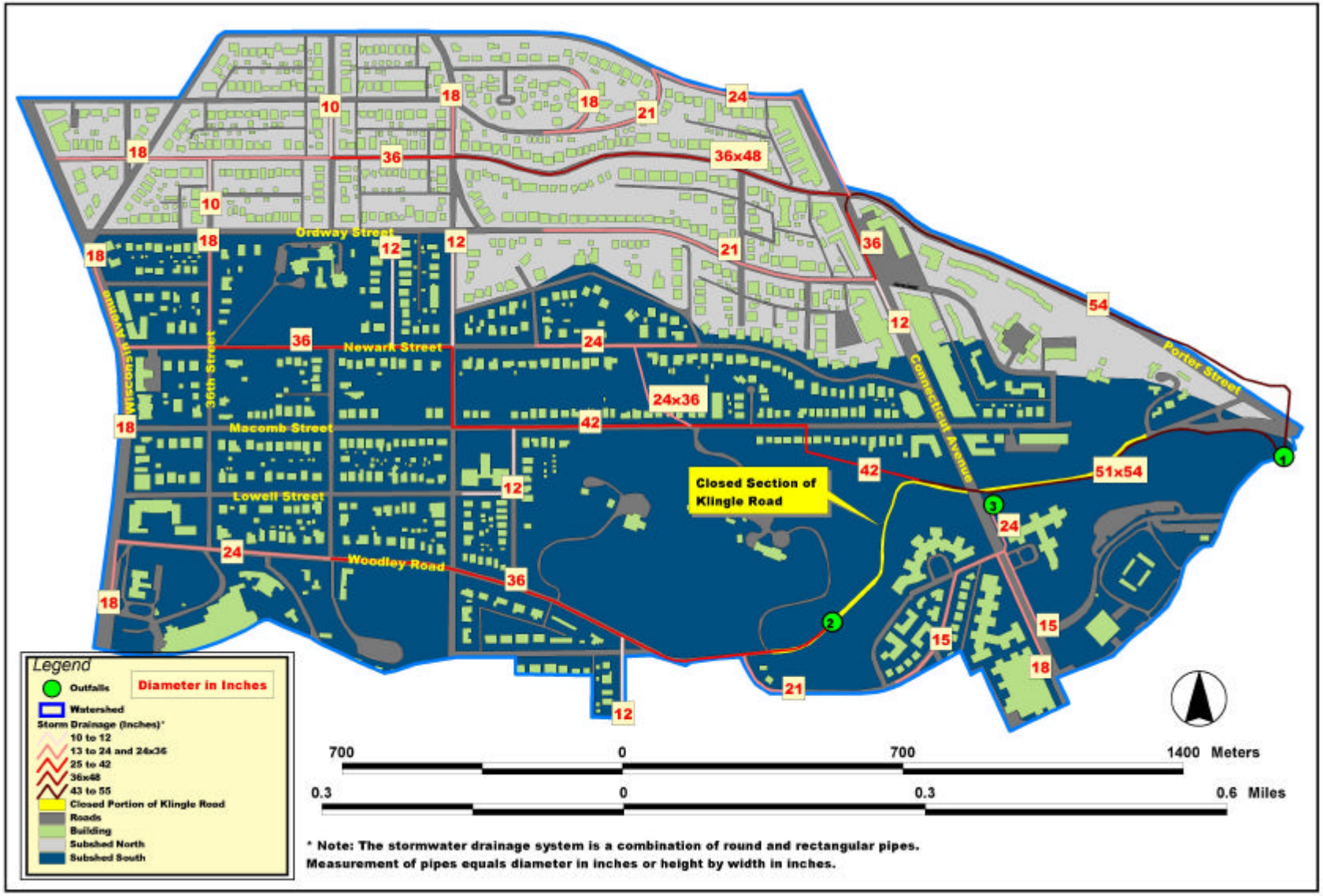
Field assessment of the channel conditions of Klingle Creek indicates the stream channel and creek banks are impacted by streambank and bed erosion. The applicable regional curves for bankful (the water level reached during a 2-year storm) dimensions were used to determine the average stream channel morphology. For a 0.5-square-mile watershed, the average stream channel dimensions are approximately 1.3-feet-deep by 12-feet-wide, with a cross-sectional area of approximately 15-square-feet. Stream channel measurements in four random locations show these dimensions were exceeded in Klingle Creek, indicating that the stream channel is degrading because of increased stormwater flow.

Stormwater and Sewer Conveyance Systems

Nine stormwater outfalls are located in the Klingle Creek watershed. An existing storm sewer system also traverses Klingle Valley (Exhibit 3-7). The sewer line alignment indicates the watershed was subdivided into a

EXHIBIT 3-7

Watershed/Drainage Map



Source: NCPC, Air Survey Corporation Commission, March 1991 and DC Department of Public Works, Sewerage System, November 1986.

north and south subwatersheds. In the north subwatershed, surface runoff is collected in a stormwater drain line adjacent to Porter Street, running from Wisconsin Avenue to the outfall into Rock Creek. Four branches feed into the Porter Street trunk line. The south subwatershed, Klingle Creek, has three distinct outfall systems, as follows:

- Outfall #1 drains to the Newark-Macomb-Klingle Road storm drain collector, discharging to Rock Creek through an outfall structure sharing a headwall with the Porter Street storm sewer line.
- Outfall #2 drains to the Woodley-Klingle Road storm drain collector, discharging to Klingle Creek approximately 200-feet west of Cortland Place.
- Outfall #3 drains an 18-inch collector along Cortland Place from Devonshire Place to Connecticut Avenue and two storm drains two blocks to the east and west sides of Connecticut Avenue, discharging to Klingle Creek from near the south abutment of the Connecticut Avenue Bridge.

The Klingle Creek watershed occurs within the Rock Creek Sewer System Drainage Basin service area. The Klingle Road sanitary sewer collector services a population of approximately 4,000 people and conveys approximately 0.47-million gallons per day of sewage (NPS, 1979). The deteriorated condition of the existing road and odors persistent during multiple site visits indicate the sanitary collector system may be compromised in several locations within Klingle Valley (See Section 3.12.1 for additional discussion of the sewer system potentially affecting the proposed project area.)

Water Quality

Water quality within Klingle Creek has been compromised because of surrounding development; pollutants associated with urban runoff; the degraded condition of the stormwater conveyance systems; the collapse of Klingle Road; and the potentially degraded condition of the sanitary collector system located within the Klingle Creek watershed. Typical pollutants include suspended solids, heavy metals, oils and greases, and organics. These pollutants pose a threat to human and environmental health.
Bioassessments to characterize the ecological character and water quality characteristics of streams in the District of Columbia were conducted in 1988, 1993, and 1998. Conditions in Klingle Creek were characterized in the three studies. Results of the 1988 study conducted by the District of Columbia DCRA Housing and Regulatory Administration Environmental Control Division (Johnson, 1988) indicate that water quality in Klingle Creek was fair to poor. Samples of benthic macroinvertebrates taken in the creek were dominated by chironomid, indicating that the creek was organically enriched.

Stream characterizations conducted in 1993 indicate the stream was moderately impaired and showed evidence of loss of in-stream cover, increased imbeddedness, channel alteration, and bottom scouring (Banta, 1993). A benthic macroinvertebrate sample from the creek collected 28 individuals from 14 taxa. The sample included six species of chironomid. The dominance of chironomid and the ratio of scrapers to filter-collectors in the sample indicated eutrophication and organic enrichment of the creek. Toxic pollution, organic pollution, eutrophication, and environmental degradation all appeared to be impacting the stream at the time of the study.

Biological data provided by the DOH Watershed Protection Division from the 1998 study indicate Klingle Creek is impacted by water quality and habitat degradation. Based on benthic macroinvertebrates and fish collections evaluations conducted by the DOH, it is concluded that the creek has a low diversity of aquatic species, consisting primarily of species tolerant of adverse conditions. Klingle Creek water quality conditions were ranked as fair/poor according to the 1998 rapid bioassessment of stream in the District of Columbia. The poor rating of the water quality conditions was attributed to urban runoff and the presence of the storm water outfalls in the watershed. Dry weather sampling showed an elevated Carbon Oxygen Demand (COD) level resulting from nutrients present in the creek and low concentrations of trace metals in the sediment.

3.3.2 Environmental Consequences

Option A: No Action

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Maintenance activities.

Short-term and long-term adverse impacts on the hydrology and the water quality conditions would be expected to continue with the implementation of the No Action Option. Erosion of the streambed, destabilization of the stream banks, and undercutting would continue as a result of increased flow from the uncontrolled stormwater runoff from the surrounding urban area. These adverse impacts would be expected to further degrade stream habitat. In addition, the increased flow conditions would undercut the retaining wall supporting the roadway, requiring continual improvements and maintenance to the wall. Continued undercutting could lead to the collapse of both the retaining wall and the road into the stream channel in places, further modifying stream flows and impacting instream habitats. Consequently, Klingle Creek will continue to transport sediment and poor water quality to Rock Creek.

Option B: No Build

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.

Short-term adverse impacts on water quality would be expected to occur during the repair of the retaining walls and the repair or replacement of the stormwater and drainage system. These impacts would be mitigated using proper design and implementation of sediment controls during the construction phase. However, the long-term impacts of this option would benefit the environmental conditions of the creek, only if the hydrologic regime conditions in the stream were reduced to natural or pre-urban development conditions. Control and diversion of stormwater runoff would reduce the streambed and bank erosion by reducing the volume of stormwater flow. Long-term impacts would be expected from continuous degradation of the existing roadway. As a result, Klingle Creek would continue to impact Rock Creek water quality conditions.

Option C: Green Space

Action Items

- Road permanently closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove road; backfill ROW; sod with topsoil; grade to direct drainage.

Short-term adverse impacts on the hydrology and water quality would be expected to occur during the repair of the retaining walls and the repair or replacement of the stormwater and drainage system. In addition, removal of the asphalt road would temporarily expose the soil on steep slopes and substantially increase the potential for erosion. The eroded material would have an adverse impact on the aquatic habitat of Klingle Creek and Rock Creek, therefore proper design and implementation of short- and long-term sediment control and management practices would be essential. Post-construction erosion control measures would be implemented until successful revegetation of the affected area is accomplished. The long-term impacts of Option C on the hydrology and water quality would be beneficial by reducing the volume of storm runoff, as well as of erosion material, into Klingle Creek and consequently into Rock Creek.

Option D: Bike, Recreation, and Facility Management

Action Items

- Road remains closed to vehicular traffic.
- Repair existing retaining wall to avoid further pavement collapse into creek.

- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; and grade to direct drainage.
- Contour and pave hard-surface bike path capable of supporting utility and maintenance trucks.
- Reestablish area adjacent to bike path as a recreation area.

If this option were implemented, short-term adverse impacts on the hydrology and water quality would be expected to occur during the construction and the repair of the retaining walls and the stormwater and drainage system. Proper design and implementation of BMPs would be essential to minimize the impacts on Klingle Creek and Rock Creek. By reducing the volume of stormwater runoff in Klingle Creek, the long-term impacts of the option on the hydrology and water quality would be beneficial.

The long-term impacts of vehicular traffic on the water quality would be negative because of an increase in the concentrations of metals, oil, and grease associated with traffic.

Option E: Rebuild Klingle Road to its Original Alignment

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove road; backfill ROW; and grade to direct drainage.
- Rebuild road to its original dimensions; reopen road to two-way vehicular traffic.

The construction process could temporarily impact water quality and aquatic habitats in Klingle Creek and Rock Creek. Short-term, adverse impacts that would occur as a result of construction activities would be mitigated with the proper placement and maintenance of stormwater and erosion and sediment controls during construction.

Long-term impacts of this option would be expected to be beneficial as a result of a reduction in the volume of uncontrolled runoff entering Klingle Creek. The long-term impacts of the vehicular traffic on the water quality would be negative because of an increase in the concentrations of metals, oil and grease associated with traffic.

Option F: Build Klingle Road To Accommodate Vehicular, Pedestrian and Bike Uses

Actions Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; grade to direct drainage.
- Contour and pave hard-surface bike path.
- Rebuild and widen two-lane road to 25-30 feet, open to vehicular traffic in both directions.

Under Option F Klingle Road would be reopened to accommodate vehicular, bike and pedestrian traffic. This option involves replacing the existing road with a new and a wider road that can support two-lanes of vehicular traffic and complies with DDOT standards and the D.C. design specifications. In addition, a bike lane and sidewalks would be built to accommodate bike and pedestrian traffic. These three uses cannot be accommodated within the existing Klingle Road ROW. Widening of the Klingle Road ROW requires additional studies to determine the new road alignment and the extent of stream channel modification or realignment necessary to accommodate the two-lane road and bike path.

Rebuilding Klingle Road to accommodate the vehicular, bike and pedestrian traffic also requires the replacement or repair of the retaining wall and the drainage system.

The construction process would temporarily impact water quality and aquatic habitats in Klingle Creek and Rock Creek. Short-term, adverse impacts that would occur due to construction activities would be minimized through the

use of proper placement and maintenance of stormwater and erosion and sediment controls during construction. Long-term impacts of this alternative would be expected. Beneficial impacts would result from a reduction in the volume of uncontrolled runoff entering the Klingle Creek channel. The long term impacts of the vehicular traffic on the water quality would be adverse due to the increase in the concentrations of metals, oil and grease associated with vehicular traffic.

Furthermore, modification of the stream channel to accommodate the road and the bike path could also result in adverse effects on the water quality and habitat within Klingle Creek and downstream (Rock Creek) if proper management practices to address modified flows were not incorporated into the design of this option.

Option G: Build Klingle Road as a One-Lane (One-Way) Road with a Pedestrian/Bicycle Lane

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; and grade to direct drainage.
- Rebuild one-lane (one-way) road, open to vehicular traffic.
- Contour and pave hard-surface bike path.

Under Option G Klingle Road would be reopened to accommodate vehicular, bike and pedestrian traffic. This option involves replacing the existing road with a new road that can support one-lane of vehicular traffic and complies with DDOT standards and the D.C. design specifications. In addition, a bike lane and sidewalks would be built to accommodate bike and pedestrian traffic. Additional studies will be required to determine the new road alignment and the extent of stream channel modification or realignment necessary to accommodate the one-lane road and bike path.

Rebuilding Klingle Road to accommodate the vehicular, bike and pedestrian traffic also requires the replacement or repair of the retaining wall and the drainage system.

The construction process would temporarily impact water quality and aquatic habitats in Klingle Creek and Rock Creek. Short-term, adverse impacts that would occur due to construction activities would be minimized through the use of proper placement and maintenance of stormwater and erosion and sediment controls during construction. Long-term impacts of this alternative would be expected. Beneficial impacts would result from a reduction in the volume of uncontrolled runoff entering the Klingle Creek channel. The long term impacts of the vehicular traffic on the water quality would be adverse due to the increase in the concentrations of metals, oil and grease associated with vehicular traffic.

Furthermore, modification of the stream channel to accommodate the road and the bike path could also result in adverse effects on the water quality and habitat within Klingle Creek and downstream (Rock Creek) if proper management practices to address modified flows were not incorporated into the design of this option.

3.4 FLOODPLAIN ENCROACHMENT

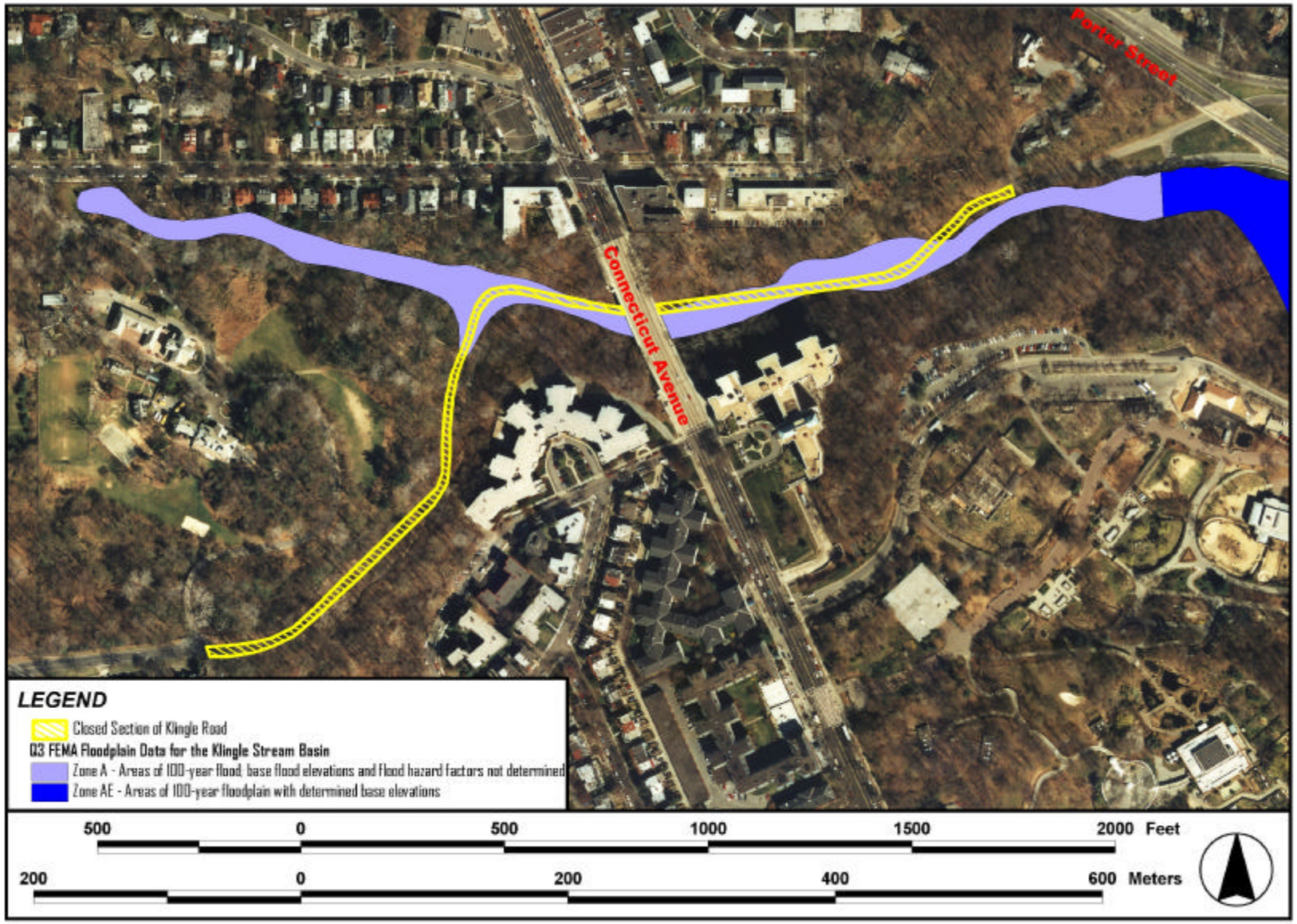
Executive Order (EO) 11988 requires federal agencies to take action to minimize occupancy and modification of the floodplain. Specifically, EO 11988 prohibits federal agencies from funding construction in the 100-year floodplain unless there are no practicable options.

3.4.1 Affected Environment

As shown in Exhibit 3-8, approximately half of the currently closed portion of Klingle Road is within the 100-year floodplain as indicated by the Flood Insurance Rate Maps, Community-Panel Numbers 110001-0010 and 110001-0020 and Federal Emergency Management Agency (FEMA) Q3 Flood Data for Washington, D.C.

EXHIBIT 3-8

Floodplain Map



Source: FEMA Q3 Flood Data, September 1998.

3.4.2 Environmental Consequences

The location of Klingle Road within the 100-year floodplain makes it mandatory for the DDOT and the FHWA to follow EO 11988 for all the proposed options. In accordance with this EO, the DDOT must prepare and circulate a notice containing an explanation of why the selected option is proposed to be located in the floodplain. The DDOT and FHWA must "consider options to avoid adverse effects and incompatible development in the floodplains" including design considerations "to minimize potential harm to or within the floodplain."

Option A: No Action

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Maintenance activities.

All construction activities would follow the FHWA Design Standards for Highways in National Flood Insurance Program Mapped Floodplains (Memorandum dated April 2, 1986, Appendix C). In addition, because of the potential for modification to the floodplain resulting from construction activities, coordination with FEMA would be conducted by the DDOT (Memorandum dated June 25, 1982, Appendix C). Design standards and construction activities would be prepared and would be conducted to minimize potential short-term and long-term adverse impacts to or within the floodplain. Long-term impacts to the floodplain would be expected because of the modification of the stream channel resulting from the retaining wall.

Option B: No Build

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.

All construction activities would follow the FHWA Design Standards for Highways in National Flood Insurance Program Mapped Floodplains (Memorandum dated April 2, 1986, Appendix C). In addition, because of the potential for modification to the floodplain resulting from construction activities, coordination with FEMA would be conducted by the DDOT (Memorandum dated June 25, 1982, Appendix C). Design standards and construction activities would be prepared and would be conducted to minimize potential short-term and long-term adverse impacts to or within the floodplain. Long-term impacts to the floodplain would be expected because of the modification of the stream channel resulting from the repair of the retaining wall. On the other hand, the repair of the stormwater and drainage system would stabilize flows, thereby allowing the stream to reach equilibrium and providing long-term benefits.

Option C: Green Space

Action Items

- Road permanently closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove road; backfill ROW; sod with topsoil; and grade to direct drainage.

Although this option is being considered to minimize potential harm to or within the existing floodplain, removal of the asphalt and repair of the drainage would potentially modify the floodplain. All construction activities would follow the FHWA Design Standards for Highways in National Flood Insurance Program Mapped Floodplains (Memorandum dated April 2, 1986, Appendix C). In addition, because of the potential for modification of the floodplain resulting from construction activities, coordination with FEMA would be conducted by the DDOT (Memorandum dated June 25, 1982, Appendix C). Design standards and construction activities would be prepared and would be conducted to minimize potential short-term and long-term adverse impacts to or within the floodplain. Long-term impacts to the floodplain would be expected due to the modification of the stream channel

resulting from the repair of the retaining wall. On the other hand, the repair of the stormwater and drainage system would stabilize flows, thereby allowing the stream to reach equilibrium and providing long-term benefits.

Option D: Bike, Recreation, and Facility Management

Action Items

- Road remains closed to vehicular traffic.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; and grade to direct drainage.
- Contour and pave hard-surface bike path capable of supporting utility and maintenance trucks.
- Reestablish area adjacent to bike path as a recreation area.

All construction activities would follow the FHWA Design Standards for Highways in National Flood Insurance Program Mapped Floodplains (Memorandum dated April 2, 1986, Appendix C). In addition, because of the potential for modification of the floodplain resulting from construction activities, coordination with FEMA would be conducted by the DDOT (Memorandum dated June 25, 1982, Appendix C). Long-term impacts to the floodplain would be expected due to the modification of the stream channel resulting from the repair of the retaining wall. On the other hand, the repair of the stormwater and drainage system would stabilize flows, thereby allowing the stream to reach equilibrium and providing long-term benefits.

Option E: Rebuild Klingle Road to its Original Alignment

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove road; backfill ROW; and grade to direct drainage.
- Rebuild road to its original dimensions; reopen road to two-way vehicular traffic.

All construction activities would follow the FHWA Design Standards for Highways in National Flood Insurance Program Mapped Floodplains (Memorandum dated April 2, 1986, Appendix C). In addition, because of the potential for modification of the floodplain resulting from construction activities, coordination with FEMA would be conducted by the DDOT (Memorandum dated June 25, 1982, Appendix C). Long-term impacts to the floodplain would be expected due to the modification of the stream channel resulting from the repair of the retaining wall. On the other hand, the repair of the stormwater and drainage system would stabilize flows, thereby allowing the stream to reach equilibrium and providing long-term benefits.

Option F: Build Klingle Road To Accommodate Vehicular, Pedestrian and Bike Uses

Actions Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; grade to direct drainage.
- Contour and pave hard-surface bike path.
- Rebuild and widen two-lane road to 25-30 feet of width, open to vehicular traffic in both directions.

All construction activities would follow the FHWA Design Standards for Highways in National Flood Insurance Program Mapped Floodplains (Memorandum dated April 2, 1986, Appendix C). Because of the potential for modification of the floodplain resulting from construction activities, coordination with FEMA would be conducted by the DDOT (Memorandum dated June 25, 1982, Appendix C). Widening of the existing ROW would be necessary to accommodate a two-lane road and hard-surface bike path. New encroachment into the floodplain of Klingle Creek would be necessary due to site restrictions and limited space. Additional studies would be necessary to determine the best placement of the road and bike path and the degree of new floodplain encroachment or modification that would be necessary to implement the option. Long-term impacts would be expected as a result of further modification of floodplain characteristics and associated

effects on flows during flood events both in Klingle Valley and in downstream habitats. Design standards and construction activities would be prepared and conducted to minimize potential short-term and long-term adverse impacts to, or within, the floodplain or to downstream habitats. Long-term impacts to the floodplain would also be expected due to the modification of the stream channel resulting from the repair of the retaining wall. Repair of the stormwater and drainage system would result in long-term beneficial effects by reducing the amount of uncontrolled stormwater runoff flows in Klingle Valley during storm events.

Option G: Build Klingle Road as a One-Lane (One-Way) Road with a Pedestrian/Bicycle Lane

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; and grade to direct drainage.
- Rebuild one-lane (one-way) road, open to vehicular traffic.
- Contour and pave hard-surface bike path.

All construction and design activities for this option would be undertaken by the DDOT as described for options A-E. Design standards and construction activities would be prepared and conducted to minimize potential short-term and long-term adverse impacts to or within the floodplain. Long-term impacts to the floodplain would be expected due to the modification of the stream channel resulting from the repair of the retaining wall. On the other hand, the repair of the stormwater and drainage system would stabilize flows, thereby allowing the stream to reach equilibrium and providing long-term benefits.

3.5 HAZARDOUS MATERIALS

Federal guidelines recommend a review of potential hazardous materials in the vicinity of the project area because of potential impacts from construction activities.

3.5.1 Affected Environment

A Phase I study was not conducted for the closed portion of Klingle Road, however, Environmental Data Resources, Inc. (EDR) was utilized to conduct a search of available databases as identified by American Society for Testing and Materials (ASTM) Standard E-1527-00. The complete report by EDR is included in Appendix C (EDR, October 20, 2000). For the closed portion of Klingle Road and using the center point (for radius search) of the intersection of Klingle Road and Connecticut Avenue, Washington D.C., EDR found the following.

The U.S. Environmental Protection Agency (EPA) investigated concern regarding exposure to lead from paint chips from the Glover Bridge in September 1999. The results of this investigation were analyzed by the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR concluded that the levels of lead detected in surface soil and from bridge paint samples are a public health hazard. This rating is used for sites that pose a public health hazard because of the existence of long-term exposures (greater than one year) to hazardous substances or conditions that could result in adverse health effects. Planned remediation for this issue is currently in progress by the D.C. government.

It is important to note, while information may be included in the federal or state databases, it does not necessarily indicate the presence of an environmental problem or public health threat. The full EDR report contains information on each site including information on violation status, classification, facility status, and other data. A full Phase I study under ASTM Standard E-1527-00 is recommended for any option selected.

Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) List

The CERCLIS list is a nationwide database created by the EPA to maintain and regulate those facilities or sites that the EPA has investigated or will investigate for suspected or uncontrolled releases of hazardous substances, contaminants, or pollutants as reported by states, municipalities, private companies, and private citizens under CERCLA (or the Superfund Program). Once a site is placed on the CERCLIS list, it may be subjected to several

additional levels of evaluation to determine the severity of the contamination, from discovery and preliminary assessment to site inspection, and possibly the application of the EPA's Hazard Ranking System (HRS). Such a determination could ultimately place the site under consideration for inclusion on the National Priorities List (NPL). Inclusion on the CERCLIS list does not confirm the presence of an environmental problem or a public health threat. EDR's review of the CERCLIS list dated 4/16/2000 revealed three CERCLIS sites exist in the study area. These sites include:

- UDC Oil Spill 1977; 4200 Connecticut Ave., N.W.
- Soapstone Creek Oil Spill Resp.; 4411 Connecticut Ave., N.W.
- Archibald Glover Park Outfall, 42nd & Edmund Sts., N.W.

More details on these sites are included in Appendix C.

National Priorities List (NPL)

The EPA's NPL (or Superfund List) is a federal listing of uncontrolled or abandoned hazardous or toxic waste sites that can potentially pose risk to human health or to the environment. The list is created from the CERCLIS database and is primarily based upon a score that each site or facility receives from the HRS. After a site or facility has been identified as a CERCLIS site, the EPA conducts an assessment of the property. The HRS score associated with the degree of environmental risk found is one of the determinations made as to whether the site is placed on the NPL. These sites are then prioritized for possible long-term remedial action and referred to the state for further action under state programs. There were no mapped sites found in EDR's search of available, or "reasonably ascertainable," government records either on the target property or within the ASTM Standard E-1527-00 search radius around the target property for the NPL database.

Resource Conservation and Recovery Information System (RCRIS) List

The RCRIS list is a compilation of records from a nationwide database created to maintain and to regulate sites or facilities that handle, treat, store, or dispose of hazardous wastes under the Resource Conservation and Recovery Act (RCRA). Inclusion on the list is not necessarily indicative of contamination; rather, it indicates the presence of potential sources of contamination.

- **Small Quantity Generator (SQG):** Generates in one or more months between 220 pounds and 2,200 pounds of hazardous waste. EDR's review of the RCRIS-SQG list dated 6/21/2000 revealed four sites within approximately 0.5-miles of the target property. Details of these sites are included in Appendix C.
- **Large Quantity Generator (LQG):** Generates in one or more months 2,200 pounds of hazardous waste. There were no mapped sites found in EDR's search of available government records, whether on the target property or within the ASTM Standard E-1527-00 search radius around the target property for the RCRIS-LQG database.
- **Treatment, Storage, and Disposal Facility (TSD):** Site where a hazardous waste substance is treated, stored, or disposed. There were no mapped sites found in EDR's search of available government records, whether on the target property or within the ASTM Standard E-1527-00 search radius around the target property for the RCRIS-TSD database.

Emergency Response Notification System (ERNS) List

The ERNS list is a compilation of records from a national computer database and retrieval system created to store information on accidental releases of oil and hazardous substances. The information stored in this database is acquired through the National Response Center. Each incident report is required to contain and provide the discharge name, date of release, amount released, and type of substance released. EDR's review of the ERNS list dated 8/8/2000 revealed two ERNS sites within approximately 0.5-miles of the target property. Details of these sites are included in Appendix C.

Leaking Underground Storage Tank (LUST) List

LUST incident reports contain an inventory of reported leaking underground storage tank incidents. The data come from the DCRA's District of Columbia LUST Cases List. EDR's review of the LUST list dated 9/5/2000

revealed 40 LUST sites within approximately 1.5-miles of the target property. Details of these sites are included in Appendix C.

Underground Storage Tank (UST) List

The Underground Storage Tank database contains registered USTs. The data come from the DCRA's District of Columbia UST Database List. EDR's review of the UST list dated 7/19/1999 revealed that there are 78 UST sites within approximately 0.5 miles of the target property. Details of these sites are included in Appendix C.

3.5.2 Environmental Consequences

Under all of the options considered, some construction would be necessary, if only to repair the retaining walls along Klingle Road. Under all of the options, with the exception of the No Action Option, repair to or replacement of the underground stormwater and drainage system would be necessary. Under any option selected, the DDOT should perform a Phase I Environmental Site Assessment in accordance with the ASTM Standard E-1527-00. All potential above-ground and underground sources of hazardous waste in the project area should be investigated.

3.6 AIR QUALITY

3.6.1 Affected Environment

FHWA guidelines on air quality specify which pollutants should be analyzed given the varied differences from one region to another. The level of detail in an air quality study will also vary according to the size of the project. According to *Regional Approaches to Improving Air Quality*, a publication distributed by EPA, states and communities cannot independently solve their air pollution problems because air pollution is not contained within political boundaries. This is especially relevant to an area such as Washington, D.C. that only covers a land area of approximately 68 square miles. Since air pollution is regional in nature and would have effects beyond Washington, D.C. boundaries, air quality was considered on a regional level for this report. It is also unlikely that any of the build options would produce induced effects (new traffic) and would instead shift existing traffic from other roads back onto Klingle Road. In this feasibility study, five of the most common pollutants measured in the Washington, D.C. metropolitan region are reviewed: ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, and particulate matter.

Ozone

The Washington, D.C. metropolitan region exceeds the federal air quality standard for one air pollutant: ground-level ozone or smog. Ground-level ozone is formed when volatile organic compounds (VOC) and nitrogen oxides (NOx) react in sunlight. Common sources of VOCs and NOxs include emissions from utilities, industrial sources, trucks, cars, buses, lawnmowers, boats, and commercial products such as solvents, cleaning solutions, paints, and insecticides. VOC and NOx may travel many miles before forming into ozone. Frequently, ozone occurs in suburban and rural areas of the Washington, D.C. metropolitan region, far away from the sources that cause it. It is estimated that one-third of the pollution-causing ozone formation in the region comes from outside of the region (Metropolitan Washington Council of Governments, 2000).

Carbon Monoxide

Carbon monoxide (CO) is a colorless, odorless gas that forms when carbon in fuels is not completely burned. CO concentrations in ambient air typically come from the incomplete combustion of fuels from motor vehicles (Metropolitan Washington Air Quality Committee, 1997). The acceptable CO standard is 35 parts per million over a 1-hour period or 9 parts per million over an 8-hour period. Since 1990, 8-hour average CO levels have steadily declined in the Washington region and are in attainment of national health standards (Metropolitan Washington Air Quality Committee, 1997).

Sulfur Dioxide

Sulfur dioxide is a gas that forms when sulfur-bearing fuels (typically coal and oil) are burned. It can damage trees, crops, and other plants in the natural environment. In combination with nitrogen dioxide, sulfur dioxide can

also lead to the formation of acid rain. Sulfur dioxide in this region is measured in 3-hour concentrations. Overall, monitoring levels indicate sulfur dioxide levels are low and declining in the Washington region (Metropolitan Washington Air Quality Committee, 1997).

Nitrogen Dioxide

Nitrogen dioxide is a gaseous pollutant that can irritate the lungs and can lower resistance to respiratory infections. This gas is formed by the combustion of fuels at high temperatures, both from vehicles and industrial uses. Average annual rates as measured in the region show no discernible trend of either an increase or decrease since 1985 (Metropolitan Washington Air Quality Committee, 1997).

Particulate Matter

Particulate matter is the name given to solid or liquid particles found in the air, typically particles less than 10 microns in diameter (referred to as PM_{10}). PM_{10} may cause health problems, such as respiratory infections, cancer and premature death. It also is a major cause of reduced visibility in many regions of the country (Metropolitan Washington Air Quality Committee, 1997). In this region, PM_{10} has been measured since 1989 according to new EPA guidelines. Since that time, PM_{10} rates have experienced a general decline and concentration levels at all monitoring stations have been well below the national standards (Metropolitan Washington Air Quality Committee, 1997).

3.6.2 Environmental Consequences

According to FHWA guidelines, the Clean Air Act, the primary pollutant that needs to be analyzed during this stage of feasibility study is CO. By 1989, levels of CO reached the accepted health standard at all regional monitoring locations and have continued a downward trend since that time. The metropolitan region is meeting the federal standard for all previously mentioned pollutants except ozone, though ozone concentration levels have generally improved over the last decade. According to research and analysis by the Metropolitan Washington Air Quality Committee, the highest one-hour ozone levels have declined by almost ten percent and the average number of high-ozone days each summer has also steadily dropped (Metropolitan Washington Air Quality Committee, 1997). FHWA does not require the analysis of ozone at the project level because ozone is an area-wide pollutant and should be analyzed at a greater scale than at the project level. Under options A-E, it is assumed that regional air quality will neither improve or decline given the small geographic size of the road and the assumption that most of the proposed vehicular trips would not be induced. Further study of air quality may be necessary to determine microscale effects of traffic on air quality.

3.7 NOISE

The FHWA encourages state and local governments to consider noise and land use compatibility for all federally funded road projects. Noise is one of the most-noticed environmental pollutants, therefore potential noise impacts should be carefully evaluated with special consideration given to sensitive noise receptors, like residences, businesses, schools, and parks in the project area. However, in the consideration of noise for each project option, it is important to note that Klingle Road operated as a collector roadway until 1991.

3.7.1 Affected Environment

Sensitive noise receptors in the project area would include the primary residential areas surrounding Klingle Road, as well as the Washington International School and the National Zoological Park. The two apartment buildings located nearby the closed portion of Klingle Road are the Kennedy-Warren Apartment Building and Woodley Park Towers; they would also be considered as potentially sensitive noise receptors. The area surrounding the closed portion of Klingle Road is a mix of undeveloped property and open space abutments to residential and institutional areas. Connecticut Avenue, a heavily traveled roadway in Washington, D.C. that runs above Klingle Road, bisects the closed portion of the roadway.

3.7.2 Environmental Consequences

Option A: No Action

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.

Under this option there would be no short-term or long-term adverse impacts related to noise in the project area with the exception of temporary noise elevations during the reconstruction of the retaining walls. Since the closed portion of Klingle Road would not be opened to traffic under this option, no long-term adverse impacts associated with noise would be anticipated.

Option B: No Build

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.

Noise impacts would be associated with the repair of the retaining walls and the replacement or repair of the stormwater and drainage system and would be expected to be adverse and short-term in nature. Under this option, the closed portion of Klingle Road would not be opened to traffic and no long-term adverse impacts associated with noise would be anticipated.

Option C: Green Space

Action Items

- Road permanently closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove road; backfill ROW; sod with topsoil; and grade to direct drainage.

Noise impacts would be associated with the repair of the retaining walls and the replacement or repair of the stormwater and drainage system and would be expected to be adverse and short-term in nature. Under this option, the closed portion of Klingle Road would not be opened to traffic and no long-term adverse impacts associated with noise would be anticipated.

Option D: Bike, Recreation, and Facility Management

Action Items

- Road remains closed to vehicular traffic.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; and grade to direct drainage.
- Contour and pave hard-surface bike path capable of supporting utility and maintenance trucks.
- Reestablish area adjacent to bike path as a recreation area.

Impacts associated with Option D would be similar to the adverse short-term construction impacts discussed for options B and C. Since the closed portion of Klingle Road would not be opened to traffic under this option, no long-term adverse impacts associated with noise would be anticipated.

Option E: Rebuild Klingle to Original Alignment

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove road; backfill ROW; and grade to direct drainage.
- Rebuild road to its original dimensions; reopen road to two-way vehicular traffic.

Under Option E, the currently closed portion of Klingle Road would be reopened to traffic. Noise impacts associated with the reopening (change repair and rebuilding of the road) would be expected short-term adverse. Opening the roadway to two-way traffic would necessitate an additional noise analysis in accordance with FHWA regulations. At a minimum, an analysis would include a more detailed description of noise-sensitive areas, like residences, businesses, schools, and parks, and would include information on the number and types of activities that could be affected. The analysis would also include the extent of the impact in decibels at each sensitive area. If mitigation for noise is warranted for noise impacts, activities should be undertaken in accordance with the FHWA regulations.

Option F: Build Klingle Road To Accommodate Vehicular, Pedestrian and Bike Uses

Actions Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; grade to direct drainage.
- Contour and pave hard-surface bike path.
- Rebuild and widen two-lane road to 25-30 feet, open to vehicular traffic in both directions.

Under Option F, the currently closed portion of Klingle Road would be rebuilt and widened allowing for the reintroduction of traffic. Noise impacts associated with this reopening would be expected to be short-term adverse. Opening the roadway to a widened two-lane roadway with accompanying recreation path would necessitate an additional noise analysis under FHWA guidelines. At a minimum, an analysis would include a more detailed description of noise-sensitive areas, like residences, businesses, schools, and parks, and would include information on the number and types of activities that could be affected. The analysis would also include the extent of the impact in decibels at each sensitive area. If mitigation for noise is warranted for noise impacts, activities should be undertaken in accordance with the FHWA regulations.

Option G: Build Klingle Road as a One-Lane (One-Way) Road with a Pedestrian/Bicycle Lane

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; and grade to direct drainage.
- Rebuild one-lane (one-way) road, open to vehicular traffic.
- Contour and pave hard-surface bike path.

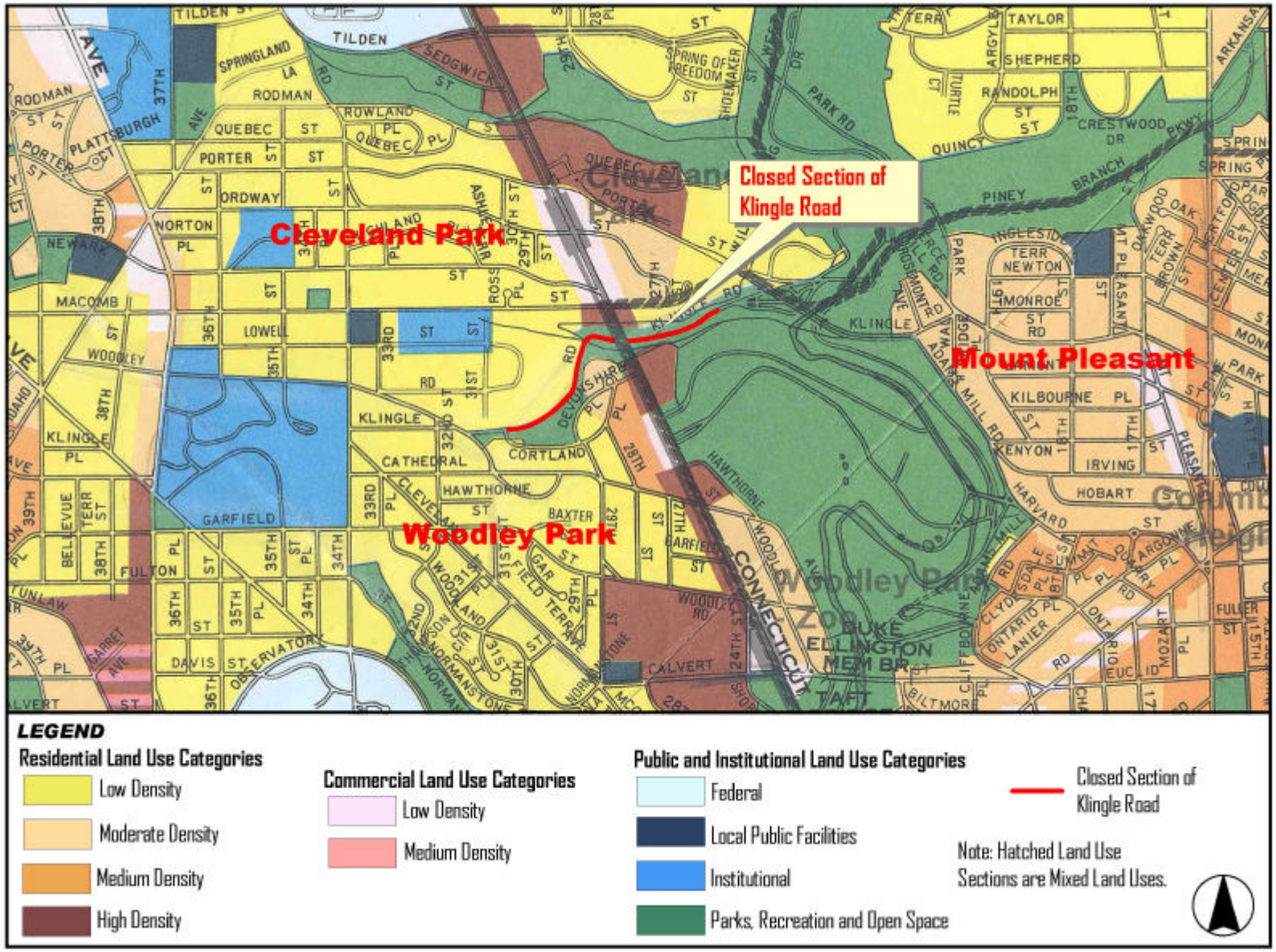
Noise impacts associated with the reopening of the road would be expected to be short-term adverse. Opening the roadway to two-way traffic would necessitate an additional noise analysis in accordance with FHWA regulations. At a minimum, an analysis would include a more detailed description of noise-sensitive areas, like residences, businesses, schools, and parks, and would include information on the number and types of activities that could be affected. The analysis would also include the extent of the impact in decibels at each sensitive area. If mitigation for noise is warranted for noise impacts, activities should be undertaken in accordance with the FHWA regulations.

3.8 LAND USE

The land use designations for the areas surrounding and adjacent to Klingle Road were examined using the District of Columbia Generalized Land Use Map (Exhibit 3-9) and were verified through field reconnaissance. The area studied is bordered by Rodman Street and Piney Branch Road on the north; 16th Street on the east; Cleveland Avenue, Calvert Street, and Harvard Street on the south; and Wisconsin Avenue and 31st Street on the west. Included in this area are the neighborhoods of Mount Pleasant, Woodley Park, and Cleveland Park.

EXHIBIT 3-9

Land Use Map



Source: District of Columbia Generalized Land Use Map, DC 1995.

3.8.1 Affected Environment

Klingle Road

The closed portion of Klingle Road is designated as park, recreation, and open space and connects to Rock Creek Park, which shares the same designation. Immediately adjacent to or near the closed portion of Klingle Road are apartment buildings, residential areas, the National Zoological Park, the Washington International School, and a property owned by the Embassy of India.

Mount Pleasant

The majority of the Mount Pleasant neighborhood is designated as moderate-density residential. Other land uses in the neighborhood include areas along 16th Street designated as medium-density residential and an area of low-density commercial along Mount Pleasant Street.

Woodley Park

The Woodley Park neighborhood is primarily designated as low-density residential. Other land use designations include the following:

- high-density residential (at Devonshire Place east of Connecticut Avenue and the area between Calvert Street and Woodley Road and 29th Street and 24th Street);
- medium-density residential (in the area of Connecticut Avenue, 28th Street, Cortland Place, and Cathedral Avenue);
- moderate-density residential (at Devonshire Place west of Connecticut Avenue, between Hawthorne Street and Connecticut Avenue, and Calvert Street and Cathedral Avenue);
- local public facility (at the corner of Cleveland Avenue and Calvert Street);
- a Metro station (on Connecticut Avenue between Calvert Street and Woodley Road);
- low-density commercial (along Connecticut Avenue between Calvert Street and Woodley Road and Cathedral Avenue and Devonshire Place); and
- parks, recreation and open space (the area of Rock Creek Park east of Hawthorne Street and the area between Klingle Road, Cortland Place, Devonshire Place, and Connecticut Avenue).

Cleveland Park

The land use in the Cleveland Park neighborhood is primarily designated as low-density residential. Other land use designations include the following:

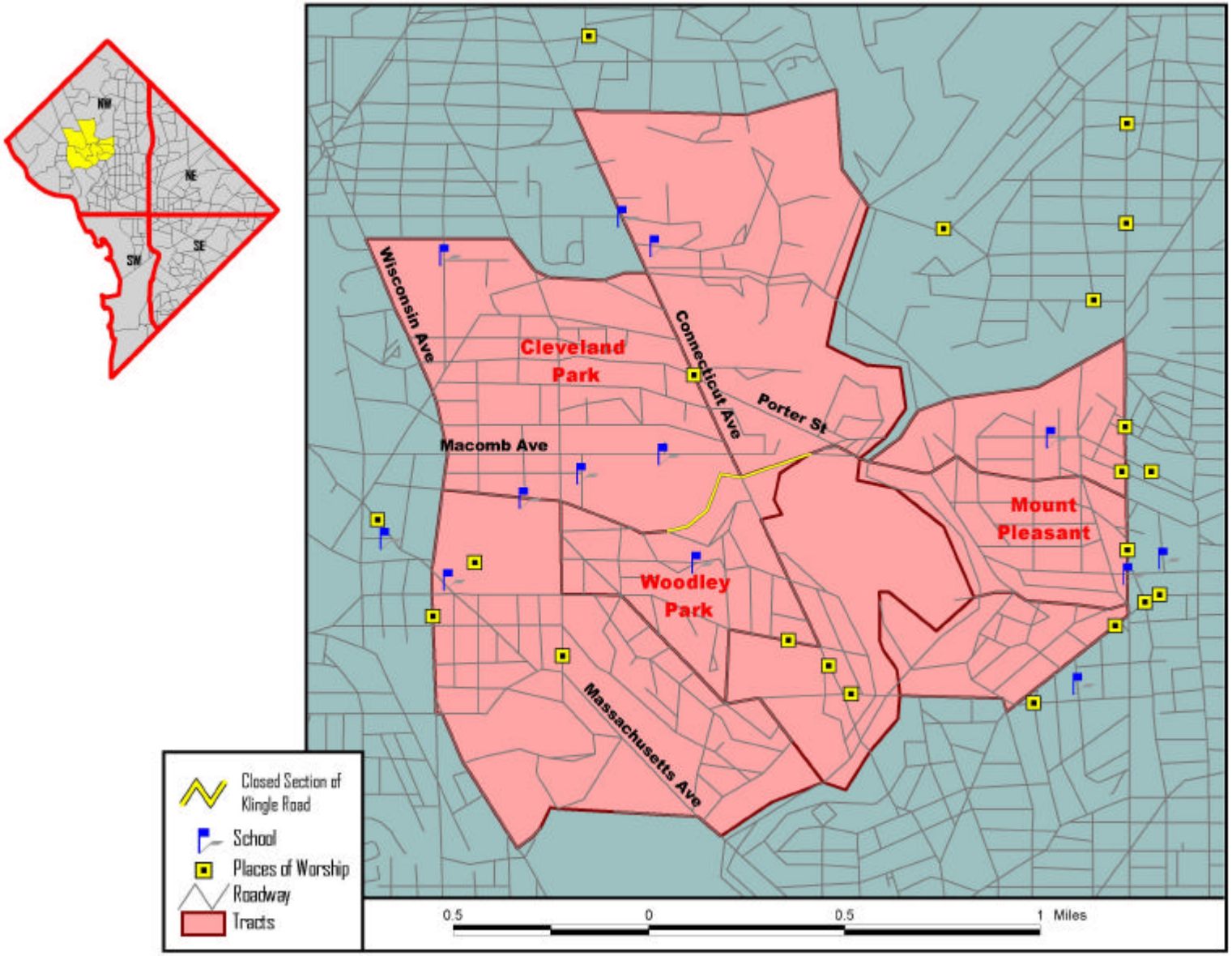
- high-density residential (along Connecticut Avenue between Klingle Road and Macomb Street and the area between Porter Street and Rodman Street that extends east of Connecticut Avenue and covers most of Quebec Street);
- medium-density residential (to the east of Wisconsin Avenue between Macomb Street and Newark Street);
- moderate-density residential (to the east of Connecticut Avenue between Porter Street and Macomb Street and dispersed along Wisconsin Avenue between Woodley Road and Norton Place);
- low-density commercial (along Connecticut Avenue between Porter Street and Macomb Street and along Wisconsin Avenue between Macomb Street and Norton Place);
- parks, recreation and open space (on Macomb Street between 35th Street and 34th Street and the area north of Quebec Street and east of Connecticut Avenue that contains Rock Creek Park);
- institutional (the area between 33rd Street, Macomb Street, Lowell Street, and 31st Street, and between Wisconsin Avenue, 36th Street, Woodley Road and Lowell Street, and between 34th Street, Ordway Street, Newark Street and 36th Street);
- a Metro station (at Connecticut Avenue and Porter Street); and
- a local public facility (between Macomb Street, Lowell Street, 33rd Street, and 34th Street).

Schools

There are 17 schools located in the areas immediately surrounding the closed portion of Klingle Road (Exhibit 3-10). The names and location of the schools are listed in Table 3-3.

EXHIBIT 3-10

Places of Worship and Schools Map



Source: The Louis Berger Group, 2000.

TABLE 3-3: SCHOOLS SURROUNDING THE CLOSED PORTION OF KLINGLE ROAD

School	Address
Maret School	3000 Cathedral Avenue, NW
Annunciation School	3825 Klingle Place, NW
West Elementary School	1338 Farragut Street, NW
Wilson Senior High School	3950 Chesapeake Street, NW
Hearst Elementary School	3950 37th Street, NW
Edmund Burke Middle School	2955 Upton Street, NW
University of the District of Columbia	4200 Connecticut Avenue, NW
Eaton Elementary School	3301 Lowell Street, NW
Oyster Elementary School	300 Bryant Street, NW
Stoddert Elementary School	4001 Calvert Street, NW
H.D. Cooke Elementary School	2525 17th Street, NW
Beauvoir, The National Cathedral Elementary School	3500 Woodley Rd, NW
George Bancroft Elementary School	1755 Newton Street, NW
Bell Multicultural Middle School	3145 Hiatt Place, NW
Washington International School	3100 Macomb St., NW
Lincoln Middle School	3101 16th Street, NW
St. Albans School	Mt. Saint Alban

Source: The Louis Berger Group, Inc. 2000. Table prepared by the Louis Berger Group Inc. using available address information for each school.

Places of Worship

There are 21 places of worship located in the areas immediately surrounding the closed portion of Klingle Road (Exhibit 3-10). The names and location of the places of worship are listed in Table 3-4.

Parks and Recreation Areas

Parks and recreation areas that are located in the areas immediately surrounding the closed portion of Klingle Road include Rock Creek Park and its extensions and the National Zoological Park.

Public Buildings

The Cleveland Park Public Library is a public building located off of Connecticut Avenue, near the closed portion of Klingle Road.

Tregaron Property

Tregaron, also known as The Causeway, consists of 20 acres at 3029 Klingle Road. The property contains a brick neo-classical mansion that was designed in 1912 by Charles Adams Platt. The Washington International School has a campus on Tregaron that includes seven buildings on six acres of land. The outdoor facilities at the Tregaron Campus include a practice field, volleyball area, and basketball court.

3.8.2 Environmental Consequences

The proposed options are not expected to have any short-term or long-term adverse impacts on land use in the project area under Options A through Option G.

3.9 ZONING

3.9.1 Affected Environment

Current zoning was examined using the District of Columbia Zoning Map to determine the existing zoning designations for the area surrounding

TABLE 3-4: PLACES OF WORSHIP SURROUNDING THE CLOSED PORTION OF KLINGLE ROAD

Place of Worship	Address
Canaan Baptist Church	1607 Monroe St NW
Casa del Pueblo United Methodist Church	1459 Columbia Rd NW
Christian Science Churches	1770 Euclid St NW
Conquesthouse Ministries	4300 16th St NW
Meridian Hills Baptist Church	3146 16th St NW
National Baptist Memorial Church	1501 Columbia Rd NW
Orthodox Church of Jesus Christ	2732 34th St NW
St. Germaine Foundation	2307 Calvert St NW
Seventh Day Adventists Organizations	3150 Chesapeake St NW
St Thomas Apostle Church Rectory	2665 Woodly Rd NW
Trinity AME Zion Church	3505 16th St NW
Washington Seventh Day Baptist Church	4700 16th St NW
Zion Baptist Church	4290 Blagden Ave NW
St Stephen & the Incarnation Episcopal Church	1525 Newton St NW
Unification Church of Washington	1610 Columbia Rd NW
Russian Orthodox Church of Saint John	4001 17th St NW
Capital Memorial Seventh Day Adventist Church	3150 Chesapeake St NW
Adas Israel Congregation	Connecticut Ave/ Porter Street
Sukyo Mahikari	2639 Connecticut Ave NW
I Am Accredited Temple	2307 Calvert St NW
Temple Micah	2829 Wisconsin Ave NW
Global Renewal	3855 Massachusetts Ave NW
Washington National Cathedral	Massachusetts/ Wisconsin Avenues NW

Source: The Louis Berger Group, Inc. 2000. Table prepared by the Louis Berger Group Inc. using available address information for each place of worship.

Klingle Road. The area studied is bordered by Rodman Street and Piney Branch Road on the north, 16th Street on the east, Cleveland Avenue, Calvert Street, and Harvard Street on the south and Wisconsin Avenue and 31st Street on the west. Included in this area are the neighborhoods of Mount Pleasant, Woodley Park, and Cleveland Park.

As seen in Table 3-5, 10 of the 30 zoning districts present in the District of Columbia are represented in the neighborhoods surrounding Klingle Road. Five of the 18 overlay districts are also in this area. The majority of land in the area is zoned for residential and community business uses. Areas to the east of Klingle Road are mainly designated for row dwellings and flats (R4), and moderate-density apartment homes (R-5-B). West of Klingle Road, one-family detached dwellings (R-1-A, R-1-B) and one-family semi-detached dwellings (R2) are the dominant zoning districts.

Klingle Road

Immediately adjacent to Klingle Road, there are a variety of zoning districts. East of the road, the National Zoological Park is the dominant land use and does not have a zoning designation. The remaining land east of the road is zoned for apartment homes (R-5-D, R-5-B). The land immediately west of Klingle Road is classified as R-1-A and C-2-A, allowing for one-family detached dwellings and medium-density community business center. Similar zoning variations can be found in the surrounding neighborhoods of Mount Pleasant, Woodley Park and Cleveland Park.

Mount Pleasant

Mount Pleasant was identified as the area between 16th Street and Rock Creek Park/National Zoological Park that is bounded by Piney Branch Road on the north and Harvard Street on the south. Within this area, four of the ten zoning districts were represented, with R-5-D, R-5-B, and R-4 being the dominant districts. Areas classified as R-5-D and R-5-B were mainly found in the areas between Piney Branch Road and Lamont Street and around Harvard Street. The remainder of Mount Pleasant is zoned for row dwellings (R4) with a small area and for medium-density community business center (C-2-A) at Mount Pleasant Street between Lamont Street and Irving Street.

TABLE 3-5: SUMMARY OF ZONING DESIGNATIONS IN THE VICINITY OF THE KLINGLE ROAD STUDY AREA

R-1-A	One-Family Detached Dwellings
R-1-B	One-Family Detached Dwellings
R2	One-Family Semi-Detached Dwellings
R3	Row Dwellings
R4	Row Dwellings and Flats
R-5-A	Low Density Apartment Houses
R-5-B	Moderate Density Apartment Houses
R-5-D	Medium-High Density Apartment Houses
C-2-A	Medium Density Community Business Center-
C-3-A	Medium Bulk Major Business and Employment
Overlay Districts	
NC	Neighborhood Commercial
WP	Woodley Park
CP	Cleveland Park
TSP	Tree and Slope Protection
NO	Naval Observatory

Source: Zoning Map of the District of Columbia

Woodley Park

Woodley Park consists of the area west of Rock Creek Park and the National Zoological Park and east of 31st Street that is bordered by Klingle Road on the north and Cleveland Avenue/Calvert Street on the south. Similar to Mount Pleasant, the majority of Woodley Park is zoned for apartment homes and one-family dwellings. The area of Woodley Park east of Connecticut Avenue consists mainly of the National Zoological Park with the remaining land zoned R-5-B, R-5-D, and R4. The area west of Connecticut Avenue and south of Klingle Road is zoned for apartment homes (R-5-B). Along Connecticut Avenue, medium-density apartment homes are the primary zoning district, along with C-2-A near Calvert Road.

Cleveland Park

Zoning in Cleveland Park was examined for the area between Rodman Street and Woodley Road/Klingle Road/Porter Street with Rock Creek Park on the east and Wisconsin Avenue and Idaho Avenue on the west. Along Connecticut Avenue, the zoning in Cleveland Park is mainly commercial (C-3-A, C-2-A). Although zoning for apartment homes (R-5-D) also exists around Connecticut Avenue, the majority of areas zoned for multi-family dwellings are found just east of Wisconsin Avenue. The remainder of Cleveland Park is zoned for one-family homes (R-1-A, R-1-B, R-2).

3.9.2 Environmental Consequences

The areas surrounding Klingle Road are zoned as a combination of low to high-density residential and medium-density commercial. These zoned parcels of land would not be expected to experience short-term or long-term adverse impacts resulting from the implementation options A through G.

3.10 SOCIOECONOMIC ISSUES AND ENVIRONMENTAL JUSTICE

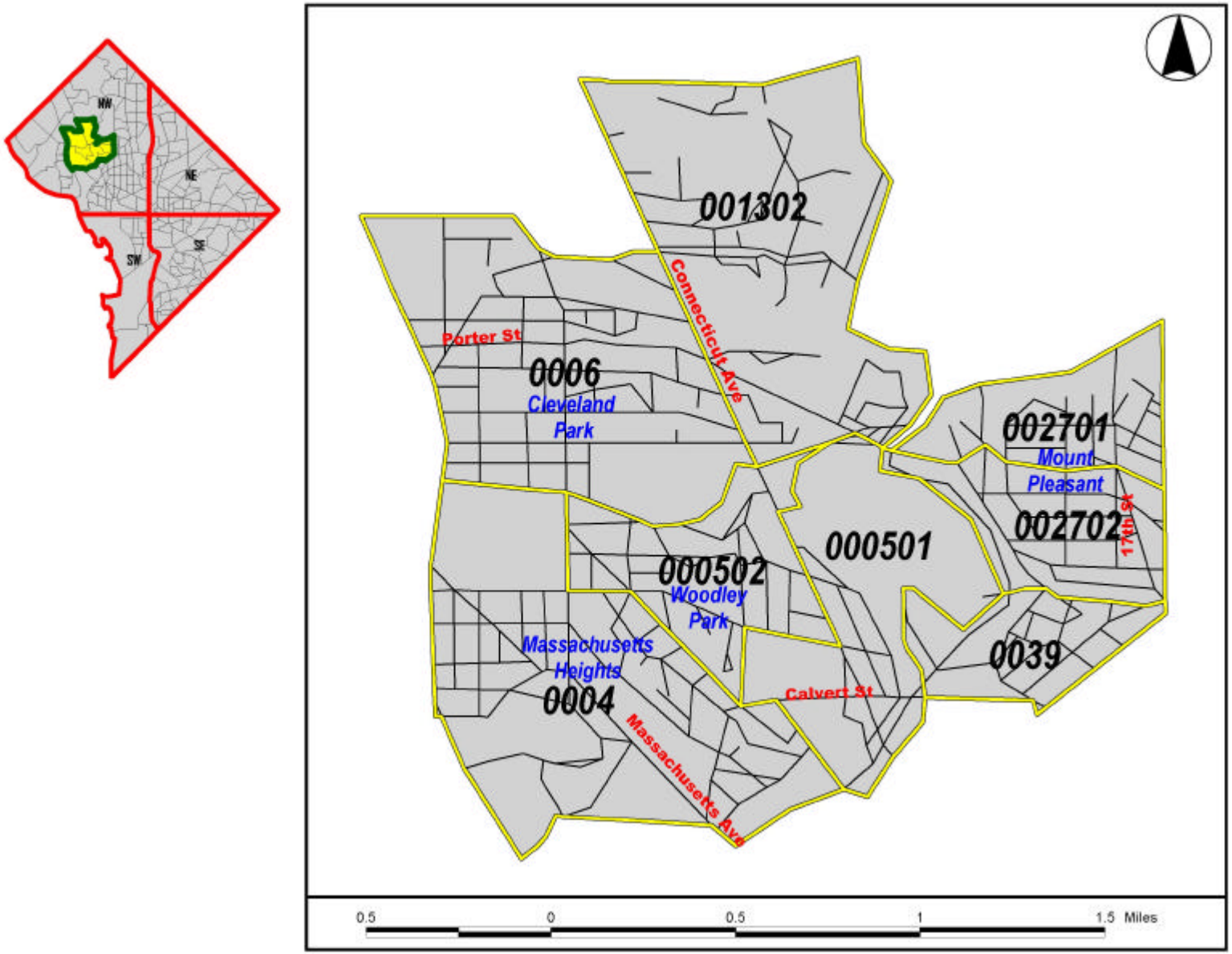
3.10.1 Affected Environment

According to the FHWA, Office of Environment and Planning, a community impact analysis should identify a geographic region, incorporating the communities that may be impacted by the project based on scoping, public involvement, and interagency coordination (FHWA, 1996). The study boundary was identified by geocoding all addresses obtained at the public meeting held on March 15, 2000, and letters, comment cards, and emails received from concerned citizens (Appendix B). Geocoding is a process of identifying coordinates of a location given its address.

After the study boundary was defined (Exhibit 3-11), the community profile was investigated. A community profile provides an overview of the area, which is used as a basis for identifying potential impacts of all the options suggested for Klingle Road. This sub-section describes community characteristics, such as population demographics and

EXHIBIT 3-11

Tracts Within Socioeconomic Study Boundary



Source: ESRI Data & Maps, 1999

economic and social characteristics of the communities. To support the text, a series of maps and tables summarize important data and depict physical characteristics. New models were not generated for this feasibility study; instead, existing information and census data were used (from the D.C. Office of Planning or other local and federal agencies).

Population

According to 1990 U.S. Census data, the study area was home to approximately 34,630 residents. Between 1990 and 1997, population estimates for the total study area population declined 6.5 percent, even though two of the tracts experienced population increases (Claritas Estimates, 1998). Tables 3-6 and 3-7, and Exhibit 3-12 compare the population within the given census tracts of the study area. Between 1990 and 1997, six of the eight tracts experienced declines in population, with the greatest declines occurring in tracts east of Klingle Valley. However, these two tracts retain a population significantly higher than several of the tracts west of Klingle Creek. Of the eight tracts, two experienced small to moderate population increases during the same time period. Tract 0004.00, located west of Klingle Valley, increased in population by 3.6 percent, and tract 0027.01, located east of the Klingle Valley, increased by 3.3 percent over the same time period.

Within the study area, African Americans compose 16.0 percent of the population and whites compose 77.5 percent. Citywide, the white population comprises 34.3 percent of the total population, while the African American population makes up approximately 62.3 percent of the D.C. population. Racial composition varies greatly within the tracts of the study area as indicated in Table 3-8. The majority of the population is white except for tracts 0027.01, 0027.02 and 0039, where the white population does not outnumber the African American and Hispanic population combined (Table 3-9).

Age of Population

The majority of residents in the study area are between the ages of 25 and 54. Only 8.8 percent of the population in the area is between the ages of 5 and 17. The population distribution of the study area resembles the population distribution of the city as whole, in which the greatest concentration of ages is also between 25 and 54.

TABLE 3-6: POPULATION CHANGE IN TRACTS

CENSUS TRACT	PERCENT POPULATION 1990—1997	POPULATION 1998	PERCENT POPULATION 1997—1998
0004.00	8.9%	1,487	3.6%
0005.01	-2.2%	2,654	-2.2%
0005.02	-6.9%	3,409	-4.0%
0006.00	-6.3%	4,248	-8.6%
0013.02	-6.1%	4,975	-11.4%
0027.01	-10.3%	4,584	3.3%
0027.02	-9.0%	5,207	-8.3%
0039.00	0.2%	3,978	-13.6%
Total	-5.6%	30,542	-6.5%

Source: State Data Center , U.S. Census, and Claritas, 1998

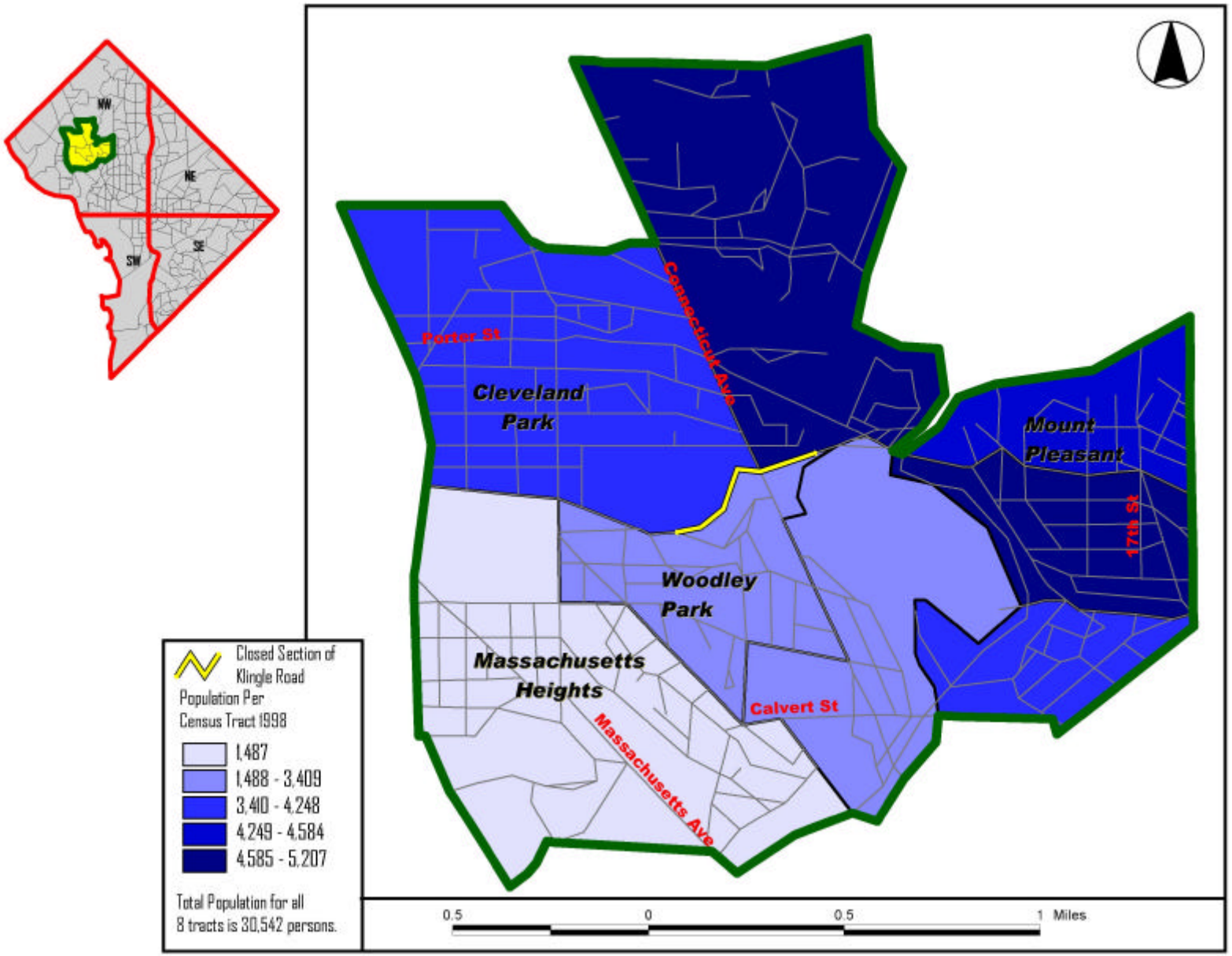
TABLE 3-7: POPULATION OF STUDY AREA TRACTS

CENSUS TRACT	POPULATION 1990	POPULATION 1997
0004.00	1,319	1,436
0005.01	2,774	2,714
0005.02	3,816	3,551
0006.00	4,960	4,646
0013.02	5,976	5,612
0027.01	4,950	4,438
0027.02	6,242	5,681
0039.00	4,593	4,603
Total	34,630	32,681

Source: State Data Center , U.S. Census, and Claritas, 1998

EXHIBIT 3-12

Population Map



Source: DC State Data Center, 2000; ESRI Data & Maps, 1999.

TABLE 3-8: RACIAL COMPOSITION OF STUDY AREA

RACE	ACTUAL POPULATION STUDY AREA	PERCENT POPULATION STUDY AREA	ACTUAL POPULATION D.C.	PERCENT POPULATION D.C.
White	23,684	77.5%	179,577	34.3%
African American	4,891	16.0%	325,840	62.3%
American Indian, Eskimo, Aleut	131	0.5%	1,768	0.4%
Asian or Pacific Islander	1,836	6.0%	15,939	3.0%

Source: State Data Center , U.S. Census, and Claritas, 1998

TABLE 3-9: PERCENT RACE PER TRACT

CENSUS TRACT	TRACT POPULATION	AFRICAN AMERICAN	WHITE	ASIAN	HISPANIC
0004.00	1,339	3.93%	83.92%	4.15%	6.93%
0005.01	2,697	4.97%	83.22%	4.83%	6.76%
0005.02	3,816	2.96%	84.88%	2.91%	9.17%
0006.00	4,960	8.57%	79.88%	2.66%	8.79%
0013.02	5,976	5.82%	80.96%	4.59%	8.42%
0027.01	4,896	41.77%	33.88%	5.45%	18.89%
0027.02	6,242	30.94%	35.57%	1.14%	30.62%
0039.00	4,593	32.68%	44.18%	1.65%	20.01%

Source: State Data Center , U.S. Census, and Claritas, 1998

Income

Census data for the study area indicate significant discrepancies in household and median income between the various tracts (Table 3-10). Citywide, the per capita income is $29,383 and the median household income is $43,011. Within the study area these values are higher, with an average per capita income of $56,889 (Exhibit 3-13) and the median household income of $79,282 (Exhibit 3-14) (U.S. Census, 1990 and Claritas, 1998).

TABLE 3-10: MEDIAN HOUSEHOLD INCOME/PER CAPITA INCOME PER TRACT

LOCATION	HOUSEHOLDS	MEDIAN HOUSEHOLD INCOME	POPULATION	PER CAPITA INCOME
City-Wide	224,500	$43,011	523,124	$29,383
0004.00	567	$206,667	1,487	$98,565
0005.01	1,856	$55,112	2,654	$46,424
0005.02	1,927	$77,727	3,409	$62,533
0006.00	1,891	$90,991	4,248	$89,600
0013.02	3,782	$66,156	4,975	$68,741
0027.01	2,100	$42,629	4,584	$26,861
0027.02	2,127	$49,063	5,207	$25,701
0039.00	2,433	$45,908	3,978	$36,687

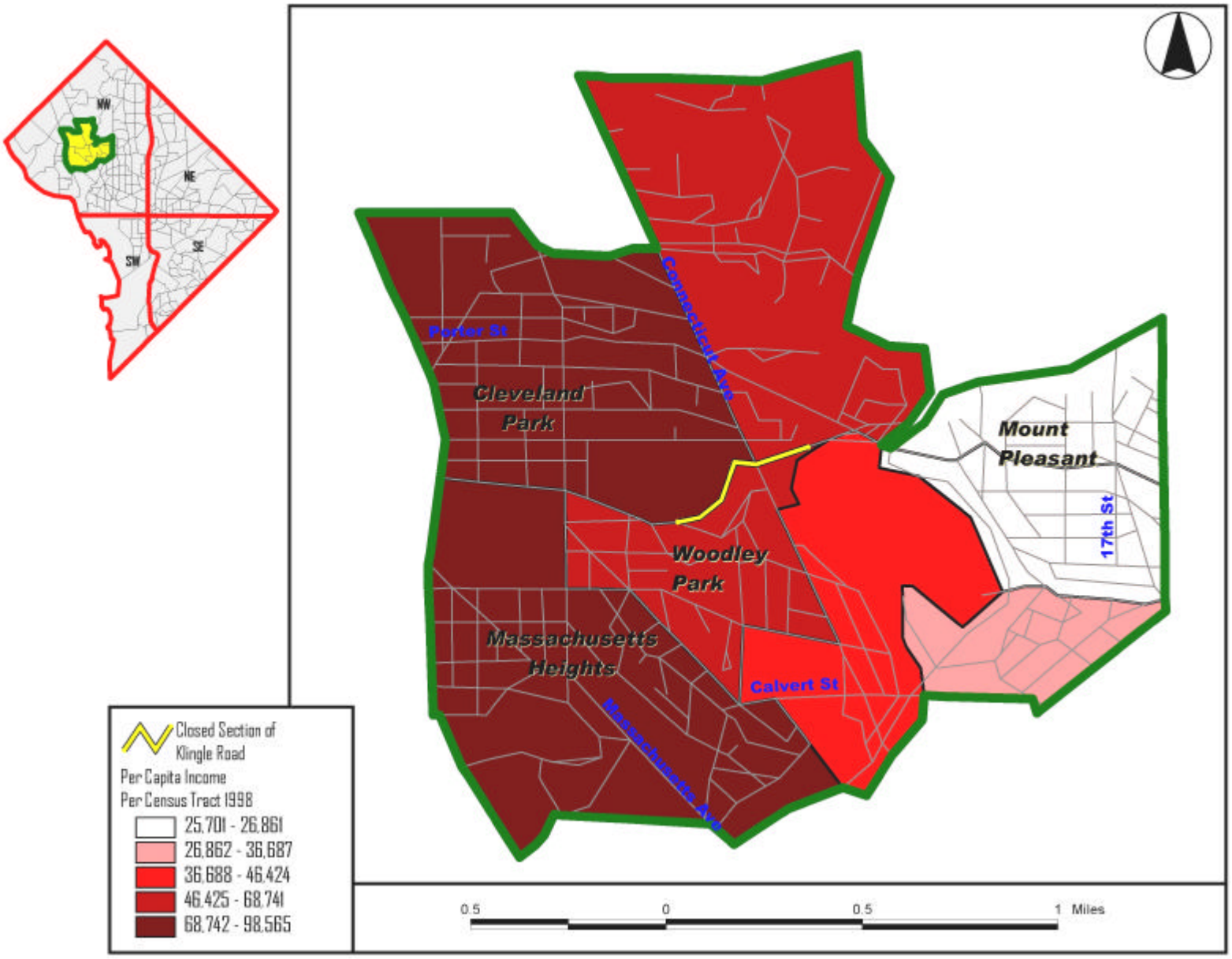
Source: State Data Center, U.S. Census and Claritas 1998

Within the study area, income varies greatly between the tracts. Tract 0004.00 has a median household income of $206,667 and a per capita income of $98,565. The three tracts with the lowest income levels include 0027.01, 0027.02 and 0039.00, located east of Klingle Creek in the Mount Pleasant neighborhood, with median household incomes of $26,861, $25,701 and $36,687 respectively. These three tracts also contain the greatest number of persons living below the poverty level defined by the U.S. Department of Health and Human Services within the study area (Table 3-11 and Exhibit 3-15).

Table 3-12 shows that the greatest number of college graduates resides in tract 0004.00, which also contains the highest per capita and median household incomes.

EXHIBIT 3-13

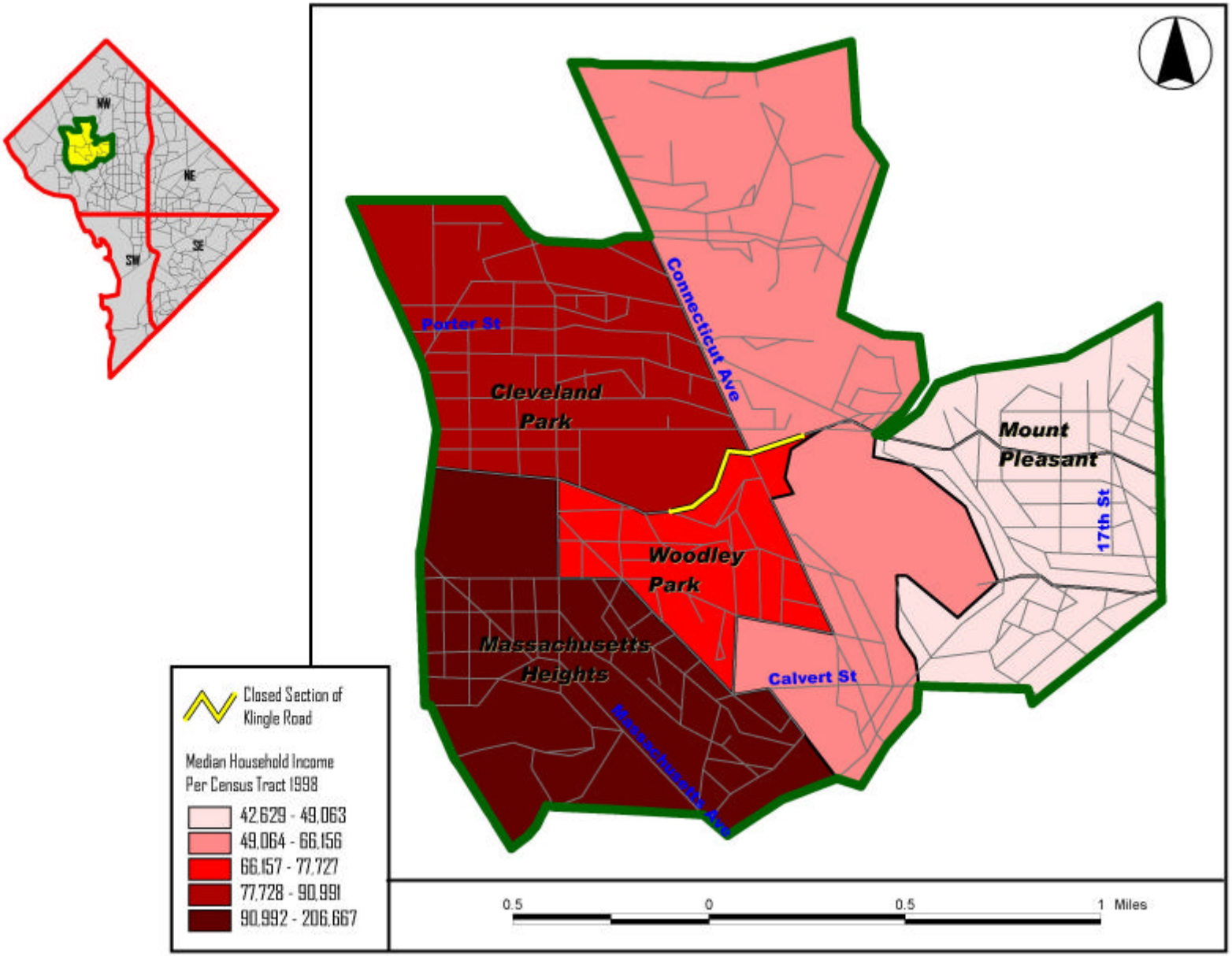
Per Capita Income



Source: DC State Data Center, 2000; ESRI Data & Maps, 1999.

EXHIBIT 3-14

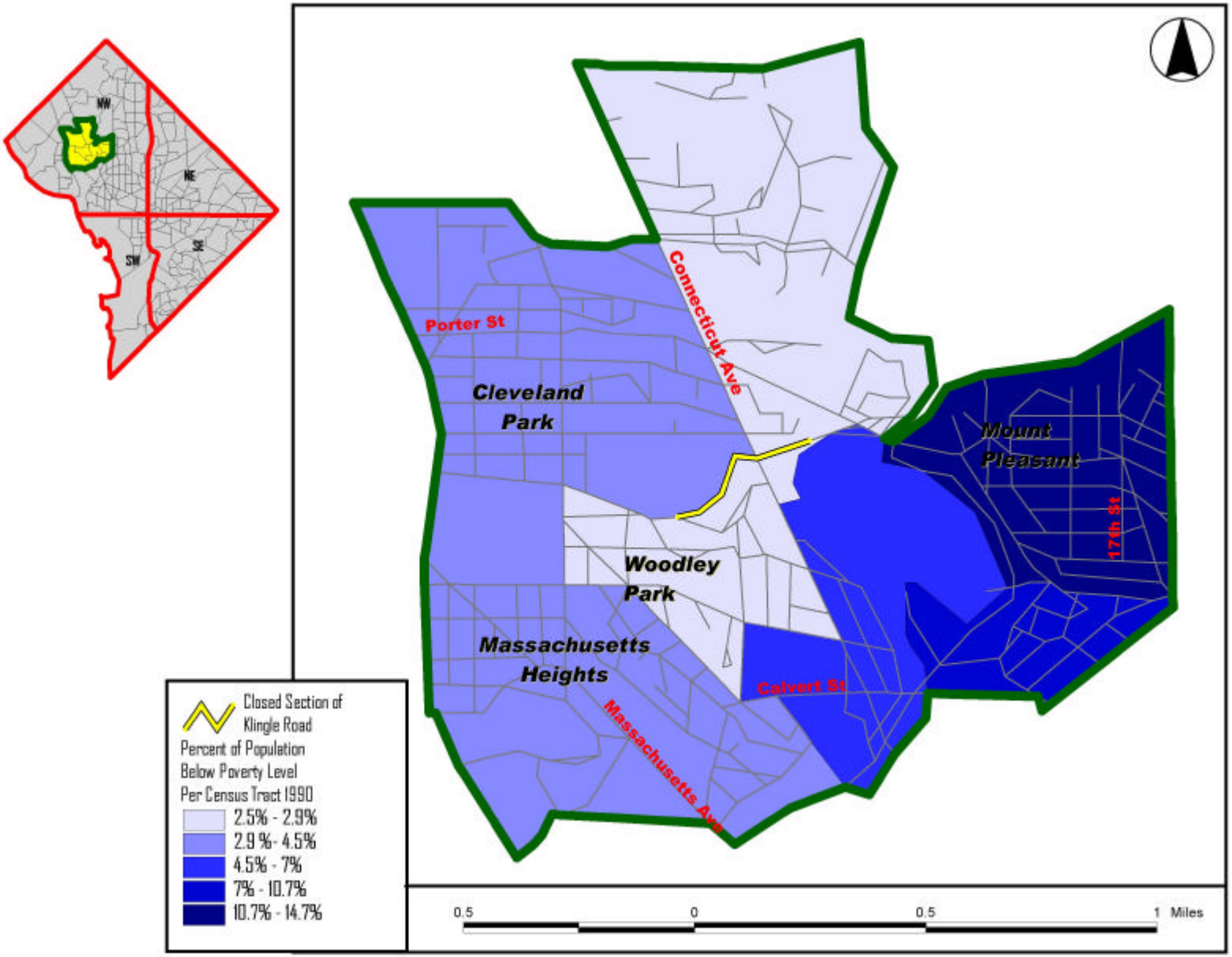
Median Household Income



Source: DC State Data Center, 2000; ESRI Data & Maps, 1999.

EXHIBIT 3-15

Poverty Level Map



Source: DC State Data Center, 2000; ESRI Data & Maps, 1999.

TABLE 3-11: PERCENT BELOW POVERTY PER TRACT

LOCATION	PERSONS FOR WHOM POVERTY IS MEASURED	PERCENT BELOW POVERTY LEVEL
Citywide	570,826	16.9%
Tract 0004.00	1,385	4.1%
Tract 0005.01	2,690	7.0%
Tract 0005.02	3,816	2.5%
Tract 0006.00	4,399	4.5%
Tract 0013.02	5,975	2.9%
Tract 0027.01	4,531	13.7%
Tract 0027.02	6,146	14.7%
Tract 0039.00	4,593	10.7%

Source: State Data Center, U.S. Census, and Claritas, 1998

TABLE 3-12: EDUCATIONAL ATTAINMENT IN STUDY AREA

CENSUS TRACT	PERSONS 25 YEARS AND OVER	PERCENT HIGH SCHOOL GRADUATES	PERCENT COLLEGE GRADUATES
City-Wide	409,131	73.1%	33.3%
0004.00	994	91.2%	72.8%
0005.01	2,432	93.3%	70.1%
0005.02	3,073	95.9%	75.8%
0006.00	3,979	89.8%	69.4%
0013.02	5,334	94.2%	67.0%
0027.01	3,702	76.0%	39.6%
0027.02	4,388	70.9%	41.9%
0039.00	3,504	81.6%	59.7%
Total and Study Area Average	27,406	86.6%	62.0%

Source: State Data Center, U.S. Census, and Claritas, 1998

Environmental Justice

On February 11, 1994, President Clinton signed EO 12898, entitled Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The EO directs federal agencies "to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations in the United States." The purpose of the order is to avoid the disproportionate placement of adverse environmental, economic, social, or health impacts from federal actions and policies on minority and low-income populations. In order to prevent the potential for discrimination and disproportionately high and adverse effects on specific populations, a process must identify minority and low-income populations that might be affected by implementation of a proposed action and options.

3.10.2 Environmental Consequences

Overall, the population is predominantly white and high-income when compared with the entire Washington, D.C. population. There are differences in income and racial composition between the tracts within the study area. However, none of the tracts would experience adverse impacts on minority and/or low-income residents in the study area based on any of the project's proposed options

3.11 PUBLIC SERVICES AND UTILITIES

3.11.1 Affected Environment

Several utilities exist adjacent to and beneath the Klingle Road ROW. This section addresses utilities and community services that may be affected by the proposed options. Specifically, the following utilities and services will be addressed: Verizon (formerly Bell Atlantic), District Cable Vision, D.C. Fire and Emergency Medical Services, Washington Metropolitan Area Transit Authority (WMATA), Potomac Electric Power Company (PEPCO), D.C.

Police Services, D.C. Bureau of Traffic (street lights), Washington Gas, and the Water and Sewer Authority (WASA). The potential of relocating the utilities that are located adjacent to the ROW or underneath the existing road bed is not considered to be feasible at this time. Topography, disruption of service and cost are considered to be prohibitive factors in the complete relocation of these utilities out of the ROW. A more detailed cost and design analysis would be required to determine the full environmental and financial impacts of utility relocation.

Verizon

Verizon, formerly Bell Atlantic, is the primary telephone service provider in the region. Currently, no conduits are located under the roadway or in Klingle Road ROW. A major conduit is located in the alley off of Cortland Place and serves telephone service to this area. It is accessible regardless of the selected option. Therefore, Verizon would not be impacted by the proposed Klingle Road options (Ray Dodd, Verizon, personal communication, May 24, 2000).

District Cable Vision

District Cable Vision is the cable service provider to residents in the District of Columbia. Cable service runs through the Verizon conduits; therefore, the availability of phone service also ensures the availability of cable service. District Cable Vision is currently using the conduit located in the alley off of Cortland Avenue to provide cable service in the area adjacent to the project. Therefore District Cable Vision would not be impacted by the proposed Klingle Road options (Purnell Jackson, District Cable Vision, personal communication, April 24, 2000).

Potomac Electric Power Company (PEPCO)

Two major underground conduits and underground cables are located within the project area. The first conduit is located in the alley east of the Cortland Place and Klingle Road intersection. The second conduit is located near the intersection of Klingle Road and Porter Road to serve the adjacent residential area. PEPCO requires that access to these two conduits be maintained for service purposes. The second conduit is accessible outside of the Jersey barrier prohibiting traffic to the closed portion of Klingle Road; therefore, this conduit would not be affected by any of the Klingle Road options (Jim Slayton, PEPCO, personal communication, May 4, 2000). The underground cables are located along the closed portion of Klingle Road. These lines service street lighting for adjacent roads and sections of Porter Road.

Although, PEPCO was contacted and the project options were made available to PEPCO, the potential impacts of the project on PEPCO's operations are not clear since no official response was received at the time of this writing.

DDOT Bureau of Traffic Services (Street Lights)

Because of the Klingle Road closure in 1991, the high power voltage system at Woodley and Klingle Roads were cut-off at Cortland Place in the early 1990s and the street lights were removed. All lights that are being reinstalled along Porter are fed from a main circuit at Williamsburg Lane and Porter Street; therefore, none of the proposed options would affect street lighting service (Mike Dorsey, DDOT Bureau of Traffic Services, personal communication, April 28, 2000).

Washington Gas

Washington Gas maintains an active 12-inch, wrapped-steel pipeline that runs from the intersection of Klingle Road and Cortland Place, adjacent and underneath the Klingle Road (Douglas Ryan, Washington Gas, personal communication, November 6, 2000). This 12-inch lines runs underneath and alongside Klingle Road until Klingle Road crosses under the Connecticut Avenue Bridge, where the line intersects with a piping tee and continues to run east on Klingle Road as an 8-inch line to the intersection of Porter Street. These lines serve most of the adjacent properties as well as the National Zoological Park. Washington Gas performs a leak survey every three years, which is accomplished by walking the pipeline route. In the event that repairs are necessary, Washington Gas would require a 12-foot-wide surface that would support service equipment (typically a backhoe) to access all portions of the lines. All pipelines not located underneath paved surfaces require a minimum of three to six feet of surface coverage.

Presently, Washington Gas maintains a ROW, but an easement would be necessary in the absence of the existing roadway (Douglas Ryan, Washington Gas, personal communication, November 6, 2000). If the roadway is removed, Washington Gas would request an easement for its existing gas line.

D.C. Police Services

Klingle Road has been closed for approximately 10 years without any known or tangible impacts to emergency response times. In addition Patrol Service Area (PSA) 411 in Mount Pleasant indicated the Klingle Road conditions have not affected the PSA's ability to patrol the area (Sgt. Yolander Jackson, D.C. Police Department, personal communication, April 27, 2000). According to the D.C. Police Department, officers "adjust" to road closings or other obstructions. Lt. Roger Roch of the 2nd District reiterated Sgt. Alexander's statements regarding the ability to provide adequate police services to the Woodley Park area (Lt. Roger Roch, D.C. Police Department, personal communication, April 27, 2000). Anecdotal evidence from local officers suggests that the Klingle Road closure has not adversely affected the police department in providing service to the surrounding areas (Appendix A). Letters describing the project were sent from The Louis Berger Group, Inc. to Lt. Roger Roch of the Second District Police Station and Sgt. Yolander Alexander of the Fourth District Police Station with an attached map for review and comment on October 12, 2000 (Appendix A). At this time, no comments have been received.

Fire and Rescue Services

Fire and Rescue personnel located east and west of Klingle Road affirm that Porter Street currently serves as the access road across Connecticut Avenue. Lt. Herby Sprow of the 5th Battalion stated that if Klingle Road were reopened to vehicular traffic, the Fire and Rescue would continue to use Porter Street, as it is an easier road on which to maneuver a large truck (personal communication, May 1, 2000). Lt. Christopher Jordan of the 4th Battalion stated that, while opening Klingle might be helpful in accessing areas west of the park, it is not necessary for his station to provide adequate service to the area (personal communication, May 1, 2000) (Appendix A). Letters describing the project and an attached map for review and comment were sent from The Louis Berger Group, Inc. to Lt. John Briscoe of the 5th Battalion and Lt. Christopher Jordan of the 4th Battalion on October 12, 2000 (Appendix A). At this time, no comments have been received.

Washington Metropolitan Area Transit Authority (WMATA)

WMATA has a powerstation for Metro located inside the south abutment of the Connecticut Avenue bridge. This powerstation serves the grounding grid, which is located underground and adjacent to Klingle Road. This grounding grid provides the power to Metro in the area. WMATA service vehicles use Klingle Road for access to this particular power station and grounding grid. WMATA requires that access to the area under the Connecticut Avenue Bridge be maintained for a full-size service truck to service this powerstation (Michael Harrison, personal communication, May 9, 2000). A letter describing the project was sent from The Louis Berger Group, Inc. to Michael Harrison of WMATA with an attached map for review and comment on October 17, 2000 (Appendix A). On November 16, 2000 Mr. Harrison responded stating "WMATA has no preference to the options for correcting the problem. We only ask that our maintenance access be continued for the grounding field and that any construction project protect the grounding field" (email communication, November 16, 2000). Mr. Harrison verbally stated on September 22, 2001 that their access needs would not require a paved road.

Water and Sewer Authority (WASA)

A letter describing the project was sent from The Louis Berger Group, Inc. to Jim Shebelski, P.E., of WASA with an attached map for review and comment on October 17, 2000. According to a review of the project study area by WASA representatives, there are no active water mains in the study area. However, there is a four-foot, three-inch round storm drain running alongside Klingle Road. This storm drain primarily carries stormwater from Macomb Street and the surrounding area but not stormwater from Klingle Road. At the east end of Klingle Road, past Connecticut Avenue, a drainpipe that crosses under Klingle Road has collapsed and would need to be repaired in the future (WASA, letter received November, 2000). There is also an active sanitary sewer coming from Woodley Road and running east along Klingle Road to Porter Street. One of the major concerns with road

removal is the loss of surface covering over these lines. Water lines require a minimum of 4.5-feet of coverage, and sewer lines need approximately 5.5-feet. WASA may also request a perpetual ROW in the event the road is removed. The WASA Design Office would need to be included in any design phase for the proposed options (Appendix A).

3.11.2 Environmental Consequences

Option A: No Action

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Maintenance activities.

The continued erosion in the area, if left unchecked, may lead to the exposure of gas and water lines. Water lines in particular require several feet of coverage in order to stabilize the lines in the ground. Option A may potentially have adverse short-term and long-term impacts on water, gas, and sewer lines in the area of the closed road.

Option B: No Build

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.

Short-term impacts may result from repair work. Option B is not anticipated to produce adverse long-term impacts on any of the utilities or public services. Repairing the drainage system would alleviate the erosion problems. Community services such as police and fire and rescue have already adapted their service to the road closure. Phone and cable service would not be impacted by this option.

Option C: Green Space

Action Items

- Road permanently closed.
- Remove road; backfill ROW; sod with topsoil; grade to direct drainage.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.

Option C would have short-term and long-term adverse impacts on Klingle Valley. The removal of the road would require coordination with Washington Gas, WASA, and WMATA.

WMATA also requires an access point to the grounding grid located in the abutment of the Connecticut Avenue Bridge. WASA has stated that removing the asphalt may require additional fill to provide the proper coverage and support for pipelines and that no trees should be planted within 5-feet of the centerline of the sewers (Appendix A). Telephone and cable service would not be impacted by this option. Complete removal of the road would impact the ability of these utilities to fully access their infrastructures in the area of the closed ROW, this would necessitate further study to plan for access of utilities. Relocation or assessment of access routes for maintenance and repair of utilities was not part of the original scope of work for this feasibility study. Further study is necessary to fully determine the adverse impacts on utilities under this option.

Option D: Bike, Recreation, and Facility Management

Action Items

- Road remains closed to vehicular traffic.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; and grade to direct drainage.
- Contour and pave hard-surface bike path capable of supporting utility and maintenance trucks.

✍ Reestablish area adjacent to bike path as a recreation area.

Ground coverage and disturbance of underground water and sewer lines, as well as utility service access, would need to be addressed with the appropriate coordinating agencies. The bikeway has to be engineered to allow access for maintenance vehicles or other heavy equipment to provide emergency and routine maintenance. Phone and cable service would not be impacted by this option.

Option E: Rebuild Klingle to Original Alignment

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove road; backfill ROW; and grade to direct drainage.
- Rebuild road to its original dimensions; reopen road to two-way vehicular traffic.
- Appropriate roadway lightning and traffic signalization.

Coordination with WASA, WMATA, PEPCO and Washington Gas would be essential to mitigate the level of disturbance and disruption in service of these utilities. Phone and cable service would not be impacted by this option.

Option F: Build Klingle Road To Accommodate Vehicular, Pedestrian and Bike Uses

Actions Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; grade to direct drainage.
- Contour and pave hard-surface bike path.
- Rebuild and widen two-lane road to 25-30 feet, open to vehicular traffic in both directions.

Coordination with WASA, WMATA, PEPCO, and Washington Gas would be essential to mitigate the level of disturbance and disruption in service of these utilities. Phone and cable service would not be impacted by this option. Given the limited ROW, topography of Klingle Valley, and excessive costs, it is anticipated that the relocation of certain utilities is not feasible at this time. Further study, including cost and design analysis, would be necessary to determine if relocation of utilities would be feasible.

Option G: Build Klingle Road as a One Lane (One-Way) Road and a Pedestrian/Bicycle Lane

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; and grade to direct drainage.
- Rebuild one-lane (one-way) road, open to vehicular traffic.
- Contour and pave hard-surface bike path.
- Appropriate roadway lightning and traffic signalization.

Coordination with WASA, WMATA, PEPCO, and Washington Gas would be essential to mitigate the level of disturbance and disruption in service of these utilities. Phone and cable service would not be impacted by this option.

3.12 TRAFFIC CIRCULATION AND ACCESS TO RESIDENTIAL AND COMMERCIAL AREAS

3.12.1 Affected Environment

Klingle Road is located in northwest Washington, D.C. and runs west to northeast from the National Cathedral to Beach Drive in Rock Creek Park (Exhibits 1-1 and 1-2). Klingle Road is listed as a collector road for vehicular traffic on the District of Columbia's Functional Classification Map. Collectors provide direct access to major traffic generators such as a Metro station or a

large complex of apartments. They may connect a neighborhood to a major arterial roadway. The segment of Klingle Road between Porter Street and Cortland Place (approximate designations) was closed to traffic in 1991 because of deterioration of the roadway related to drainage failure. The Council of the District of Columbia never officially closed this segment of Klingle Road through an administrative action; however, this portion of the road remains closed to traffic.

Using data collected by the DDOT and the Metropolitan Washington Council of Governments, The Louis Berger Group, Inc. conducted a transportation assessment for Klingle Road, which is included as Appendix D. Although not necessarily related to the closing of Klingle Road, the road network surrounding Klingle Road is currently experiencing excessive delays and poor level of service, especially along roads parallel to Klingle Road. The reopening of Klingle Road is one of the options evaluated to improve the east-west cross-town traffic conditions, which provide access to the National Cathedral, American University, upper Georgetown, and the MacArthur Boulevard area as well as many other schools, places of worship, and recreational areas as discussed in Section 3.2. In order to evaluate the potential traffic impacts of reopening Klingle Road, the following intersections were considered for traffic operational analysis:

- Intersection of Connecticut Avenue and Porter Street
- Intersection of Cleveland Avenue and Garfield/32nd Street
- Intersection of 34th Street and Woodley Road
- Intersection of Woodley Road and Klingle Road
- Intersection of Woodley Road and 32nd Street

The detailed transportation assessment is included in this report as Appendix D.

3.12.2 Environmental Consequences

Under options A-D, Klingle Road would remain closed to traffic and the traffic impacts would be considered to be the same for each option. Long-term adverse impacts to traffic patterns would be expected to include a worsening of traffic congestion on east-west cross-town roadways. However, adverse impacts to existing traffic accident patterns would not be anticipated. The opening of Klingle Road to vehicular traffic would result in only minor improvements to traffic operations because the road size is incapable of relieving traffic or reducing the current level of service at surrounding intersections.

Option E: Rebuild Klingle Road to its Original Alignment

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove road; backfill ROW; and grade to direct drainage.
- Rebuild road to its original dimensions; reopen road to two-way vehicular traffic.

Beneficial impacts associated with this option may include a delay reduction at Porter Street and Connecticut Avenue and the potential for a reduction in the number of accidents on neighboring intersections. In addition, opening the roadway to east-west traffic would provide another thoroughfare for cross-town access to schools, places of worship, commercial areas, and public buildings. Adverse impacts to traffic patterns associated with this option may include an increase in traffic volume at Woodley Road and 34th Street, with the already failed eastbound approach experiencing more delays. In addition, it would be expected that most of the already failed approaches at study intersections would continue to operate with an unacceptable level of service.

Option F: Build Klingle Road To Accommodate Vehicular, Pedestrian and Bike Uses

Actions Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; grade to direct drainage.
- Contour and pave hard-surface 8-10 foot-wide bike path.

- Rebuild and widen two-lane road to 25-30 feet, open to vehicular traffic in both directions.

Under this option, beneficial impacts may include a delay reduction at Porter Street and Connecticut Avenue and the potential for a reduction in the number of accidents on neighboring intersections. Inherently, an improvement in road design enhances the capacity of the facility and thereby attracts more traffic. Similar to options E and G, it would be expected that most of the already failed approaches at study intersections would continue to operate with an unacceptable level of service.

Option G: Build Klingle Road as a One-Lane (One-Way) Road with a Pedestrian/Bicycle Lane

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; and grade to direct drainage.
- Rebuild one-lane (one-way) road, open to vehicular traffic.
- Contour and pave hard-surface bike path.

Under this option, the flow of traffic would be one-way in direction, possibly reversible, during different peak periods of the day. Determination of traffic direction or designated periods of the day in which to change the direction of the flow of traffic would be determined through future more detailed traffic analysis. It would be expected that during afternoon peak periods, Woodley Road at 34th Street would have a moderate increase in traffic volume and the already failed eastbound approach would experience more delays. Based on the traffic engineering study, it is expected that beneficial impacts to traffic patterns would include a moderate delay reduction on Porter Street and Connecticut Avenue (morning westbound only; afternoon eastbound only) and a moderate delay reduction expected on Cleveland Avenue and Garfield Street. In addition, this option would be expected to reduce the impact on the transportation environment, while addressing the transportation need in the area and taking advantage of travel directional differences during peak periods, thereby providing traffic congestion relief on surrounding affected routes during the time and in the general direction when needed most. In addition, this option would provide an east-west bicycle/pedestrian transportation lane.

3.13 CULTURAL RESOURCES

Sources at the D.C. State Historic Preservation Office and at Rock Creek Park were used to identify cultural resources that might be affected by the proposed options associated with Klingle Road. Archaeological and historical properties were identified on the basis of archival research; no field surveys were undertaken for this feasibility study.

3.13.1 Affected Environment

The Klingle Road project is located within Rock Creek Park, a large urban park that is owned and administered by the NPS. Congress created Rock Creek Park in 1890 and the original park property, known as Reservation 339, encompasses some 1,755 acres. It is a historic district listed in the National Register of Historic Places (NRHP). The enabling legislation that created Rock Creek Park established the Klingle Ford Bridge as the park's downstream boundary. Klingle Valley Park, which includes the Klingle Road study area, is administratively included in Rock Creek Park, but it is not part of the historic district. The Rock Creek Park Historic District is characterized as a picturesque, forested valley with scenic, gorge-like views. Although it was created in the tradition of great American urban parks, its historical significance derives primarily from its qualities as a natural landscape. There are a number of historic structures that contribute to the park's significance, of which the most notable are Pierce-Klingle Mansion and Pierce Mill. Both properties include a number of associated outbuildings or structures. As a significant landscape, the circulation system formed by the road network also contributes to the character of the historic district (Bushong 1990a, 1990b; Wheelock 1993).

There are a number of known archaeological properties within Rock Creek Park, although none are within the Klingle Road project area. There has

been no systematic archaeological survey of Rock Creek Park, but the potential for significant archaeological resources is considered high. Previous archaeological work in Rock Creek Park dates to more than 100 years ago, when William Henry Holmes, one of the fathers of North American archaeology, undertook his studies of aboriginal quarries in the Washington, D.C. metropolitan area (Holmes, 1897). One of these quarry areas, the Piney Branch Quarry Site, is listed on the National Register of Historic Places. This site is located roughly one-half mile east of the Klingle Road project area and it encompasses a 30-acre area of opposing slopes overlooking the Piney Branch floodplain (Potter, n.d.). Soapstone Valley Park, another administrative unit within Rock Creek Park, would also be expected to contain archaeological resources. Klingle Valley could contain Native American archaeological sites associated with the quarry areas in Piney Branch and Soapstone Valley.

Potential archaeological resources in Rock Creek Park could date from the earliest well-documented human occupation of North America, the Paleoindian period (circa 11,000 to 8,000 B.C.). Sites from this period are quite rare and it is most likely that archaeological remains in Rock Creek would be associated with the Archaic (circa 8,000 to 1000 B.C.) or Woodland (circa 1000 B.C. to 1600 A.D.) periods. A modern study of the Piney Branch Quarry Site (Munford, 1982) suggests this site was used most intensively during the Late Archaic period (circa 3000 to 1000 B.C.). Despite the urbanization that has occurred over the past century, prehistoric finds have been reported at many locations in Rock Creek Park (Inashima, 1985) and the surrounding upland areas. Two such sites have been reported in the upland areas surrounding Klingle Valley: the Dumbarton Heights Site (51NW20) and the Garfield Street Site (51NW42). Site survey forms at the D.C. Historic Preservation Division give little information about these sites, as they are based on collections held at the Smithsonian Institution.

Historic settlement had occurred at the mouth of Rock Creek by the late 17th century. By the end of the 18th century, a number of mills had been established along Rock Creek. By the Civil War, the mills along Rock Creek had been eclipsed by those situated along the C&O Canal in Georgetown. One of the best-known industrial sites in Rock Creek Park, Pierce Mill, is located a short distance upstream from Klingle Valley. Aside from industrial sites, such as mills, archaeological resources associated with the 17th, 18th, or 19th centuries could include remains of pioneer settlement, plantations, or fords. Prior to the development of the modern road network, east-west travel across Rock Creek depended on fords. One of the most prominent fords across Rock Creek was located at Pierce Mill. There was also a ford at Klingle Road; this ford was located at the mouth of Klingle Creek, which is approximately in the location of the Porter Street bridge (Exhibit 3-16).

Historical maps of the city do not indicate any structures or potential archaeological sites along the Klingle Road project area (Boschke, 1861; Michler, 1867; U.S. Coast and Geodetic Survey, 1892). Historical settlement was mostly concentrated in the upland areas and the stream valleys were largely undeveloped. The steep topography associated with Rock Creek valley impeded the city's expansion until the late 19th century. Development of the neighborhoods surrounding the Klingle Road project area was facilitated by construction of numerous bridges across Rock Creek and by the expansion of the trolley system in the late 19th century. Today, the Klingle Road project area is flanked by two historic districts that reflect the city's urban expansion that followed the Civil War. Immediately north of Klingle Road, the Cleveland Park Historic District is a large urban neighborhood that includes roughly 1,000 contributing structures representing 18th- and 19th-century estates, late 19th-century Victorian houses, and various 20th-century residences and commercial buildings. The NRHP Nomination Form at the State Historic Preservation Office includes a boundary definition that indicates the district is bounded by Woodley Road and Klingle Road on the south. The Cleveland Park Historic District embodies the leading principles of late 19th-century urban planning and is one of Washington's best examples of a "streetcar suburb."

Tregaron (The Causeway) is one of the most notable properties within the Cleveland Park Historic District, located at 3029 Klingle Road/3100 Macomb Street. This landmark estate includes a mansion, outbuildings, and landscaped grounds designed by Charles Adams Platt, one of the foremost country house architects of the early 20th century. Porter Street, immediately north of its intersection with Klingle Road, also contains a number of properties listed in the NRHP, including Linnean Hill (also known

EXHIBIT 3-16

Source: Historic Resource Study – Rock Creek Park; 1990.

as Pierce-Klingle Mansion), Greystone, Gearing Bungalow, and Pine Crest Manor (Historic Preservation Division, 1995).

The Old Woodley Park Historic District abuts Rock Creek Park immediately south of the Klingle Road project area. Although subdivided in the late 19th century, this neighborhood was developed in the early 20th century. It contains numerous residences and commercial structures attributed to some of Washington's most notable architects and builders (Historic Preservation Division, 1995).

3.13.2 Environmental Consequences

In accordance with Section 106 of the National Historic Preservation Act, the DDOT has initiated consultations with the D.C. Historic Preservation Division, D.C. State Historic Preservation Office, regarding the proposed project options for Klingle Road (Appendix A). Cultural resource investigations undertaken for this feasibility study were limited to a review of readily available information at the State Historic Preservation Office (SHPO) and NPS. It is not known whether any archaeological properties eligible for the NRHP are present within the ROW and its immediate surroundings. However, if the DDOT implements any of the options involving new construction or repairs to the stormwater and drainage system, field surveys would be undertaken to determine whether or not archaeological properties eligible for the NRHP are within the Area of Potential Effect (APE) associated with the undertaking. Based on readily available information, the APE should be considered to have potential for archaeological resources.

This review indicates that three historic districts that are listed in the NRHP bound Klingle Road. As the southern boundary of the Cleveland Park Historic District may coincide with Klingle Road, one or more of the project options may have an impact on this historic property. Administratively, Klingle Valley Park is included within Rock Creek Park. Although Klingle Valley is not included with the Rock Creek Park Historic District, some of the options would have an effect on the traffic circulation system within the historic district. If the DDOT moves forward with any of these options, as discussed below, the DDOT would fulfill its responsibility under Section 106 of the National Historic Preservation Act in accordance with the Advisory Council on Historic Preservation's *Procedures for Protection of Historic Properties* (36 CFR 800), as follows. After defining an appropriate APE, the DDOT would, in consultation with the SHPO and other interested parties, apply the criteria of effect with regard to historic districts. If it is determined that the project would have an adverse effect on a historic district, the DDOT would develop a plan to mitigate the adverse effect, again in consultation with the SHPO and interested parties.

Option A: No Action

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Maintenance activities.

Under this option there, would be no short-term or long-term adverse impacts to historic districts and structures. However, implementation of the No Action Option may result in the loss, by erosion, of archaeological resources. This would be mitigated by an archaeological survey to identify archaeological resources. If significant resources are identified, the DDOT would consult with the SHPO to develop an appropriate plan for mitigation.

Option B: No Build

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.

It is assumed that this would involve some excavation and restoration of the floodplain landscape and that there would be no adverse effect to historic structures or districts. However, there may be some adverse impact to undiscovered archaeological resources. If this option were selected, the DDOT would undertake an archaeological survey of the APE associated

with the drainage improvements to determine whether or not significant archaeological resources are present; if present, the DDOT would develop a plan to avoid or to minimize adverse effects to such resources.

Option C: Green Space

Action Items

- Road remains closed.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.

Like Option B, it is assumed that this option would have no adverse impacts to historic structures or districts; however, there may be undiscovered archaeological resources within the APE. If this option were selected, the DDOT would undertake an archaeological survey of the APE associated with the construction zone to determine whether or not significant archaeological resources are present. If present, the DDOT would develop a plan to avoid or to minimize adverse effects to such resources.

Option D: Bike, Recreation, and Facility Management

Action Items

- Road remains closed to vehicular traffic.
- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; and grade to direct drainage.
- Contour and pave hard-surface bike path capable of supporting utility and maintenance trucks.
- Reestablish area adjacent to bike path as a recreation area.

It is uncertain whether this option would have any adverse impact on archaeological resources, historic districts, or individual historic resources. If this option were selected, the DDOT would undertake an archaeological survey of the APE associated with the construction zone to determine whether or not significant archaeological resources are present. If present, the DDOT would develop a plan to avoid or to minimize adverse impacts to such resources. In addition, the DDOT would also undertake a study to determine whether there would be an effect on the Cleveland Park Historic District of any individual historic resources; and, if so, develop a plan to avoid or to minimize adverse impacts to such resources.

Option E: Rebuild Klingle Road to Its Original Alignment

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove road; backfill ROW; and grade to direct drainage.
- Rebuild road to its original dimensions; reopen road to two-way vehicular traffic.

Alternative E would involve rebuilding Klingle Road to its original width and alignment as well as repairs to the stormwater drainage system. If this alternative is selected, DDOT would undertake an archaeological survey of the APE associated with the construction zone, to determine whether or not significant archaeological resources are present. If so, DDOT would develop a plan to avoid or minimize adverse effects to such resources. Also, by altering the existing traffic patterns, this alternative may have an effect on the Rock Creek Park Historic District; if this alternative is selected, DDOT would consult with the SHPO and other interested parties to assess the effect, and if the effect is determined to be adverse, undertake additional consultations to develop plans to mitigate adverse effects. Also, the DDOT would undertake a study to determine whether there would be an effect on the Cleveland Park Historic District, the Woodley Park Historic District, or any individual historic resources, and if so, consult with the SHPO and other interested parties to assess the effect, and if the effect is determined to be adverse, undertake additional consultations to develop plans to mitigate adverse effects.

Option F: Build Klingle Road to Accommodate Vehicular, Pedestrian, and Bicycle Uses

Actions Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; grade to direct drainage.
- Contour and pave hard-surface 8-10 foot-wide bike path.
- Rebuild and widen two-lane road to 25-30 feet of width, open to vehicular traffic in both directions.

Implementation of this alternative might have an impact on potential archaeological resources within the construction area; therefore, if this alternative is selected, DDOT would undertake an archaeological survey of the APE associated with the construction zone, to determine whether or not significant archaeological resources are present. If so, DDOT would develop a plan to avoid or minimize adverse effects to such resources. Also, by altering the existing traffic patterns, this alternative may have an effect on the Rock Creek Park Historic District; if this alternative is selected, DDOT would consult with the SHPO and other interested parties to assess the effect, and if the effect is determined to be adverse, undertake additional consultations to develop plans to mitigate adverse effects. Also, the DDOT would undertake a study to determine whether there would be an effect on the Cleveland Park Historic District, the Woodley Park Historic District, or any individual historic resources, and if so, consult with the SHPO and other interested parties to assess the effect, and if the effect is determined to be adverse, undertake additional consultations to develop plans to mitigate adverse effects.

Option G: Build Klingle Road as a Single Lane (One-Way) Road and a Pedestrian/Bicycle Lane

Action Items

- Repair existing retaining wall to avoid further pavement collapse into creek.
- Replace stormwater and drainage system by one of two methods described in Section 2.0.
- Remove existing road; backfill ROW; and grade to direct drainage.
- Rebuild one-lane (one-way) road, open to vehicular traffic.
- Contour and pave hard-surface bike path.

Implementation of this option might have a short-term adverse impact on potential archaeological resources within the construction area; therefore, if this option were selected, the DDOT would undertake an archaeological survey of the APE associated with the construction zone to determine whether or not significant archaeological resources are present. If present, the DDOT would develop a plan to avoid or to minimize adverse effects to such resources. Also, by altering the existing traffic patterns, this option may have an effect on the Rock Creek Park Historic District. If this option is selected, the DDOT would consult with the SHPO and other interested parties to assess the effect and, if the effect were determined to be adverse, would undertake additional consultations to develop plans to mitigate adverse effects.

3.14 SUMMARY

The current environmental conditions in Klingle Valley call for the selection of an option that offers a solution to the following critical issues:

- The stormwater and drainage system is in desperate need of repair or replacement. Continuous degradation of the system translates into further environmental degradation.

- Klingle Road in its present condition represents an environmental and human health hazard.

- The existence of utility lines within the valley requires the establishment of a maintenance program and access for appropriate utility vehicles.

- Taking into consideration the need for continued maintenance operations of utility lines, an access road for maintenance vehicles

should exist under all of the proposed options (including No-Action, Green Space, No-Build, and Bike Path). Consequently, the need for an access road becomes a pivotal factor in the decision-making process for the selection of a particular option.

Implementation of any of the proposed options would have adverse impacts on the local geology, topography and soils. Consequently, it would also affect the water quality conditions in Klingle Creek and Rock Creek. Steep slopes, high erosion potential of the soils, and the flashy character of stormwater runoff in Klingle Valley make the soils highly susceptible to erosion during runoff events. Construction activities associated with the proposed actions would expose soils to increased erosion by removing vegetation or the existing hard top. Adverse effects to water quality and aquatic habitats associated with the transport and deposition of eroded soil would be expected because of the proximity of the project area to Klingle Creek. Adverse effects to the local geology, topography, and soils associated with the use of heavy equipment and excavation, grading, and the placement of fill during construction activities in previously undisturbed areas would be also be expected. Adverse effects to water quality related to vehicular traffic include high concentrations of metals, oils and grease, and organic pollutants.

Long-term beneficial effects to the local geology, topography and soils would be expected following the repair and upgrade of the existing drainage structures as a result of a reduction in erosion associated with uncontrolled runoff during high-flow events. Water quality conditions would also be improved as a consequence of repair or replacement activities of the stormwater and sewer conveyance systems.

Short-term adverse effects to the biological resources would be expected with any construction activities in the project area. Wildlife that currently use the area would potentially be displaced because of increased human activity, reintroduction of vehicular traffic noise, etc. Rehabilitation of the drainage system, regardless of the selected option, would benefit biological resources; particularly aquatic resources that are currently impacted by uncontrolled flows and stormwater runoff.

Long-term impacts of reopening Klingle Road would produce negligible beneficial improvements to traffic congestions or safety at surrounding intersections. Given the limited size of the ROW, reopening Klingle Road would only lead to minor improvements in relieving congestion at surrounding intersections. A more detailed traffic study, including a new traffic count, would be necessary to fully determine the impacts of reopening Klingle Road.

If it is determined, through further analyses, that any of the proposed options would have an adverse effect on a cultural resource, the DDOT should develop a plan to mitigate this effect, in consultation with the SHPO and interested parties. The DDOT would fulfill this responsibility under Section 106 of the National Historic Preservation Act in accordance with the Advisory Council on Historic Preservation *Procedures for Protection of Historic Properties* (36 CFR 800).

Table 3-13 provides a summary of the effects each option would have on the environmental attributes evaluated in this feasibility study.

The implementation of any of the proposed options would involve a substantial amount of engineering modifications (e.g., road construction, utility renewal) in order to substantially improve the environmental conditions in Klingle Valley.

The extent of the work needed, the variety of resources affected, the topographic characteristics, and the socioeconomic and political factors, are only some of the driving forces playing a central role in the selection of an option. Consequently, the execution of an Environmental Impact Statement (EIS) for this area, that would address all of these issues in depth, is highly recommended.

TABLE 3-13: SUMMARY OF IMPACTS

RESOURCE	Option A	Option B	Option C	Option D	Option E	Option F	Option G
Geology, Topography, Soils	*Short-term adverse* *Long-term adverse*	*Short-term adverse* *Beneficial*	*Short-term adverse* *Beneficial*	*Short-term adverse* *Beneficial*	*Short-term adverse* *Beneficial*	*Short-term adverse* *Long-term adverse* *Long-term beneficial*	*Short-term adverse* *Beneficial*
Biological Resources	*Short-term adverse* *Long-term adverse*	*Short-term adverse* *Beneficial*	*Short-term adverse* *Beneficial*	*Short-term adverse* *Beneficial*	*Short-term adverse* *Long-term adverse* *Beneficial*	*Short-term adverse* *Long-term adverse* *Long-term beneficial*	*Short-term adverse* *Long-term adverse* *Beneficial*
Water Resources	*Short-term adverse* *Long-term adverse*	*Short-term adverse* *Beneficial*	*Short-term adverse* *Beneficial*	*Short-term adverse* *Long-term adverse* *Beneficial*	*Short-term adverse* *Long-term adverse* *Beneficial*	*Short-term adverse* *Long-term adverse* *Beneficial*	*Short-term adverse* *Long-term adverse* *Beneficial*
Floodplains	*Short-term adverse* *Long-term adverse*	*Short-term adverse* *Beneficial*	*Short-term adverse* *Long-term adverse* *Beneficial*	*Short-term adverse* *Long-term adverse* *Beneficial*	*Short-term adverse* *Long-term adverse* *Beneficial*	*Short-term adverse* *Long-term adverse* *Long-term beneficial*	*Short-term adverse* *Long-term adverse* *Beneficial*
Hazardous Materials	*No Effect*	*No Effect*	*No Effect*	*No Effect*	*No Effect*	*No Effect*	*No Effect*
Air Quality	*No Effect*	*No Effect*	*No Effect*	*No Effect*	*Further Study*	*Further Study*	*Further Study*
Noise	*Short-term adverse*	*Short-term adverse*	*Short-term adverse*	*Short-term adverse*	*Short-term adverse* *Further Study*	*Short-term adverse* *Further study*	*Short-term adverse* *Further Study*
Land Use	*No effect*	*No effect*	*No effect*	*No effect*	*No effect*	*No effect*	*No effect*
Zoning	*No effect*	*No effect*	*No effect*	*No effect*	*No effect*	*No effect*	*No effect*
Socioeconomics	*No effect*	*No effect*	*No effect*	*No effect*	*No effect*	*No effect*	*No effect*
Public Services and Utilities	*Short-term adverse* *Long-term adverse*	*Short-term adverse*	*Short-term adverse*	*Short-term adverse*	*Short-term adverse*	*Short-term adverse*	*Short-term adverse*
Traffic	*Long-term adverse* *Beneficial* *Further Study*	*Long-term adverse* *Beneficial* *Further Study*	*Long-term adverse* *Beneficial* *Further Study*	*Long-term adverse* *Beneficial* *Further Study*	*Short-term adverse* *Long-term adverse* *Beneficial* *Further Study*	*Short-term adverse* *Long-term adverse* *Beneficial* *Further Study*	*Short-term adverse* *Long-term adverse* *Beneficial* *Further Study*
Cultural Resources	*Further Study*	*Further Study*	*Further Study*	*Further Study*	*Further Study*	*Further Study*	*Further Study*
Cost Estimates	*$272,000*	*$858,000*	*$1,107,000*	*$1,131,000*	*$3,810,000*	*$5,170,000*	*$3,515,000*