4.0 ENVIRONMENTAL CONSEQUENCES

This chapter examines the methodologies and environmental consequences associated with the No Action/No Build Alternative (Alternative A) and the five build alternatives (Alternative B1, Alternative B2, Alternative C, Alternative D1, and Alternative D2).

Sections 4.1 through 4.13 describe the environmental consequences that would result to resources within the study or project area (identified in Chapter 1, Purpose and Need) from implementing each alternative. The resource topics discussed in Chapter 3, Affected Environment are evaluated in this chapter. Each action alternative is compared to the baseline condition of pre-road rehabilitation, represented by the No Action/No Build Alternative to determine resource impacts.

In addition to CEQ and FHWA Guidance on NEPA implementation, there are many federal executive orders and other federal, state, and local laws and regulations that are considered and implemented in conjunction with NEPA. Regulations, orders, and laws that are pertinent to a resource impact analysis are briefly described below each impact topic heading and are described in detail in Appendix F.

Each section addresses two types of impacts: construction impacts that would arise during construction activities; and, operational impacts that would occur once the project is constructed and operating on a long-term basis. Impacts that result from construction activities typically occur over a shorter time period, usually only lasting during construction and ending upon project completion. However, some construction impacts could be long-term and potentially permanent and are noted as such. Operational impacts are associated with ongoing operation and maintenance or from the continued presence of the road and may be considered long term.

Because the five build alternatives would have similar environmental consequences during the construction and operational phases of the project, the alternative impact discussions are grouped together under each resource topic. Where impacts may differ between alternatives, the specific alternative and related impact is noted.

Mitigating actions that would serve to minimize the intensity or duration of some impacts are also presented in each section following the impact analysis throughout Chapter 4.

4.1 LAND USE AND ZONING

4.1.1 Regulatory Framework

The area surrounding Klingle Road are subject to local land use and zoning requirements as described in the District of Columbia Municipal Regulations. In addition, because the closed section of Klingle Road bisects a portion of Rock Creek Park, the area is also subject to land use requirements set forth by the *National Park Service Organic Act and Rock Creek Enabling Legislation.* The National Park Service Organic Act (16 U.S.C. l 2 3, and 4), consists of the Act of August 25 1916 (39 Stat. 535) and amendments, established the creation of the National Park Service within the Department of the Interior on August 25, 1916. This Act defines the mission of all National Park Service units, including Rock Creek Park, and states:

> "...to promote and regulate the use of the...national parks...which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

The 1890 enabling legislation for Rock Creek states that Rock Creek is to be “perpetually dedicated and set aside as a public park or pleasure ground for the benefit and enjoyment of the people of the United States.” The legislation goes on to say that Rock Creek Park is to “provide for the preservation from injury or spoliation of all timber, animals, or curiosities within said park and their retention in their natural condition as nearly as possible.”

4.1.2 Methodology and Assumptions

Environmental consequences to land use and zoning were based on the potential for land use change to occur as a result of the implementation of any of the proposed alternatives.

4.1.3 No Action/No Build Alternative

The No Action/No Build alternative would not impact the surrounding land use and zoning in the nine census tracts that comprise the study area. The current zoning is a combination of low- to high-density residential and medium density commercial. It would be unlikely that these already zoned parcels or individual neighborhoods would be impacted either adversely or beneficially by the No Action/No Build Alternative. The majority of land surrounding Klingle Road has already achieved full build out and did so before Klingle Road was closed in 1991. When Klingle Road was fully operational prior to 1991, it was not a main artery in the city, such as nearby Connecticut Avenue, therefore not likely to be affecting land use and zoning decisions. The continued closure of this road to vehicular traffic would most likely not affect future land use and zoning issues.

Conclusion

The closure and deteriorating condition of Klingle Road has not adversely or beneficially affected the current zoning of properties in the study area; therefore, it is unlikely that the continued closure would affect future land use and zoning uses.

4.1.4 Build Alternatives (Alternatives B1, B2, C, D1, and D2)

Construction Impacts

Construction impacts on local zoning would be unlikely to occur either short term or long term as a result of the reopening of Klingle Road. This is due to the fact that the majority of land in and around Klingle valley is either zoned as residential or parkland. Construction needed to reopen this road would not require any variances to these zoning designations.

There would likely be some impacts to land use with regards to visitor use of the National Park Service land within Klingle Valley. These impacts however are expected not to be great, since the area is currently closed to public use due to safety concerns. Given the relative isolation of the road within National Park Service lands, impacts to land uses within surrounding residential and commercial areas and neighborhoods are not expected to occur during construction.

During the construction of the road, there would be instances where the park’s natural resources could be harmed as a result of construction activities. However, because these activities would be done in order to minimize harm to the natural resources of Rock Creek Park, the spirit of the park’s enabling legislation would still be upheld. As stated: “…provide for the preservation from injury or spoliation of all timber, animals, or curiosities within said park and their retention in their natural condition as nearly as possible.”

Mitigation

While there would be no mitigations necessary to minimize impacts to land use, all mitigations provided in the rest of this chapter aimed at preserving the resources of Rock Creek Park will apply.

Operational Impacts

Under the Build Alternatives (B1, B2, C, D1, and D2), there would be little, if any, impacts to land use and zoning. Around 70 percent of the area around Klingle Road is National Park Service land, which would remain undeveloped, thereby preventing new residential, commercial or business properties from being developed along the road way within the those sections of the project area. In addition, it would be unlikely that re-opening Klingle Valley to cars would promote development in those privately held properties along Klingle Road. Development could occur without the road being open, and due to the physical constraints of the site, creating new access points to Klingle Road would be unlikely. With regards to other properties in the general vicinity of Klingle Road, land uses near Klingle Road are typically zoned low to medium residential and already fully built out. Introducing traffic into the valley would not cause a need to change the zoning.

Implementation of any of the build alternatives would not likely go against either the NPS Organic Act or the enabling legislation for Rock Creek Park. Reopening the road to traffic could potentially have adverse impacts to the natural resources found within Klingle Valley and within Rock Creek Park, however, with the restoration of Klingle Creek and the installation of a new stormwater management system, the natural resources of the park would actually benefit as erosion from uncontrolled stormwater would be slowed, water quality would be improved, and the creek would be restored.

Mitigation

While there would be no mitigations necessary to minimize impacts to land use, all mitigations provided in the rest of this chapter aimed at preserving the resources of Rock Creek Park during the operation of Klingle Road will apply.

Conclusion

As the areas surrounding Klingle Road is made up mostly of National Park Service Land, and there is little opportunity for additional development within the immediate area, the proposed actions (Alternatives B1, B2, C, D1, and D2) are expected to have little to no adverse impact to land use and zoning.

4.2 FARMLANDS

There are no farmlands in the project area; therefore, this topic has been dismissed.

4.3 AESTHETICS AND VIEWSHEDS

4.3.1 Regulatory Framework

National Highway System (NHS) Designation Act (23 U.S.C. 109) (November 1995)

Section 304 of the National Highway System (NHS) Designation Act (23 U.S.C. 109) (November 1995). Which states a design for new construction, reconstruction, resurfacing (except for maintenance resurfacing), restoration, or rehabilitation of a highway on the National Highway System (other than a highway also on the Interstate System) may take into account, the constructed and natural environment of the area; the environmental, scenic, aesthetic, historic, community, and preservation impacts of the activity; and access for other modes of transportation.

4.3.2 Methodology and Assumptions

This section analyzes the potential impacts to the typical visual character of the project area traversed by each alternative. Impacts to visual character were evaluated using the methodologies promulgated by the

Federal Highway Administration Office of Environmental Policy (DOT-FH-11-9694) and the American Society of Landscape Architects (ASLA). Views were evaluated for their potential to alter near or distant views of the roadway, and views from the roadway.

The analysis considers landform, water, vegetation and human-made components of the near and distant views, how the existing condition of the road and creek have degraded the local visual quality and how an improved alignment of Klingle Road could alter these visual characteristics from and of the road. Man-made engineering features in the proposed build alternatives that were evaluated for their impacts to the existing visual character included pavement surface, cut and fill slopes along the creek, and retaining walls. Impacts were evaluated for short-term (generally defined as a year) conditions created during construction and for long-term conditions after the road and creek are improved and the road is operational.

For this analysis, the viewer groups are two: 1) those individuals that view Klingle Road from buildings in close proximity to the roadway; and, 2) those individuals that view the adjacent landscape while traveling along the reconstructed Klingle Road. Near and distant views would occur as one was traveling along Klingle Road and distant views would occur as one views the road from the Connecticut Avenue Bridge and surrounding buildings. An example of a distant view would be a view of a prominent landscape feature, such as the National Cathedral, from Klingle Road that could be affected by reconstruction of the road.

For over 160 years, the presence of Klingle Road has been part of the visual landscape of Klingle Valley. Over time, the roadway has become an entrenched “thread” in the fabric of the landscape. It is part of the overall visual composition of the area that includes the existing topography, Klingle Creek, vegetation, and manmade elements, such as retaining walls. The presence of Klingle Road as it had existed originally 160 years ago changed the character of the local setting then but did not alter the regional landscape character. Today, Klingle Road in conjunction with Klingle Creek is severely degraded and affects the local visual environment but not the regional landscape. Near views of the creek and road reveal a detailed look at the existing degraded environment up close. Distant views of the road are basically non-existent in the summer and only slightly more visible during the winter. For the purpose of this analysis, we will focus on determining the impacts of near views of and from Klingle Road and Creek.

Parkland, in terms of visual impact assessment, is considered a visually sensitive resource as defined by the Federal Highway Administration Office of Environmental Policy (DOT-FH-11-9694). Seventy percent of the DDOT right of way borders National Park Service land.

4.3.3 No Action/No Build Alternative

The No Action/No Build Alternative would not change the existing poor visual quality experienced in the project area. Klingle Road has been torn apart by the ravages of uncontrolled stormwater forced to flow overland instead of through the conveyances provided, which are silted in and clogged. As a result, large chucks of concrete and asphalt have washed into Klingle Creek, creating debris piles that are obstacles to the passage of stormwater. Jersey barriers placed to protect the edge of pavement and existing stone retaining walls between the road and the creek are also falling into the creek. The road pavement is spalled, cracked and full of holes. Numerous layers of pavement are exposed and continue to slough off. Erosion in the creek has denuded stream banks and numerous trees with exposed roots are poised to fall into the creek. The general visual aspect of the road and creek corridor is negative and will grow worse as stormwater damage increases unchecked.

Conclusion

Visual quality within the project would remain poor, deteriorating further in the future, because of the affects of uncontrolled stormwater on the existing roadway and within Klingle Creek.

4.3.4 Build Alternatives (B1, B2, C, D1, and D2)

Construction Impacts

Construction activities would include removal of pavement, regrading of eroded road and creek areas, excavation for wall foundations and rebuilding of retaining walls, repaving of the road, repair and/or replacement of utilities, removal of trees and subsequent replanting, removal and replacement of curb and gutter, placement of rock in the creek, and other activities. The limits of construction would be restricted to one foot beyond where construction is designated to occur.

Views of the Road: The only views of Klingle Road would be from the Connecticut Avenue Bridge and adjacent condominiums (such as the Kennedy-Warren), or apartment buildings (such as the Macomb House). Trees removed along the reconstructed roadway could have an impact on visual quality of Klingle Road when viewed from these locations. However, the number of trees removed would result in a negligible (not of any measurable or perceptible consequence to the viewer) to minor impact on the scene because these distant views of the road would continue to be obscured by trees in summer. Construction activity likely would not occur in winter when views of the road construction would be more prevalent due to loss of foliage. The greatest number of trees would be lost in Alternatives D1 and D2, and would most likely result in a more adverse impact to visual quality than in the other build alternatives (see biological resource impacts).

Views from the Road: During construction, the site would be closed to cars and pedestrians; thus, there would be no views from the road for drivers or pedestrians.

Operational Impacts

Operational Impacts would occur after improvements have been made to Klingle Road and Creek.

Views of the Road: Views of the road from either west or east of the Connecticut Avenue Bridge, north views of Klingle Road from adjacent residential structures, such as the Kennedy-Warren Apartments and the Woodley Tower Apartments and views of the south side of Klingle Road from the Macomb House would be obscured principally by vegetation in the summer. In each case, these views are from above the road, which is recessed into Klingle Valley, overlooking the road through the tops of existing vegetation that are fully leafed out. From the Washington International School, there would be no views of the road in either summer or winter due to the distance from the school to Klingle Road and due to the sight lines of the road that would be blocked by the existing rolling terrain and thick tree cover. Initially, due to the loss of some trees during construction, there may be small pockets of views that open up of the creek and the road from the bridge or from these adjacent residential units. However, over time, as replacement trees mature, theses small pockets of views would close up and the tree cover would block any viewsheds that may have opened up during construction. Views of the road in winter from the bridge or from the same adjacent residences would be less blocked by vegetative cover but these views would still be obscured by the forest's thick vegetative branches. With the road and creek repaired, viewers from Connecticut Bridge and these residences would see glimpses of new pavement, new stone walls and a naturalized repaired creek with large rocks placed strategically to protect the creek.

The repairs to the road and the creek would effectively clean up the debris deposited on the road and in the creek, direct the flow of water within required channels and emphasize the outstanding natural outcropping in the creek. These improvements to the road and creek would have a major beneficial or noticeable beneficial visual impact on the quality of the surrounding environment. By employing context–sensitive design elements, such as using native stone that matches existing rocks in the creek, coloring the pavement the color that matches the road would largely blend in with the environment and the trees planted, after some vegetation had been removed during construction, would create a tree canopy similar to the original cover.

Views from the Road: Viewers from the road would see the repair of the creek with stream channels that are contained within the creek banks, new plantings of native vegetation along the creek and road beds, repaired retaining walls, faced with native stone and a road bed that blends in with the rustic quality of the area. These changes would have a major beneficial impact on the scenic experience along Klingle Road. Before these improvements would have been implemented, the general appearance of the project area was one of neglect. The project area was littered with storm debris, ruts, holes and deposits of sand and other materials, which degraded the view of the road and surrounding area, trees with uncovered root systems were unearthed along the stream banks and appeared ready to fall in the creek or road, retaining walls had fallen in the creek and had left the stream bank bare, gouged and unstable. Improvements to Klingle Creek would also create a noticeable change to the visual environment due to grading of stream banks and placement of rock. Over time, however, vegetation would soften the impacts of grading as shade-tolerant species cover the banks.

Mitigation

The FHWA has developed a design standard, context sensitive design (CSD) that includes visual considerations for roads. These standards would be implemented during design of the build alternatives.

CSD objectives are:

- To complement the existing natural environment.
- To maintain sensitivity to the existing context of the roadway corridor.
- To provide a sense of consistency along the entire route.
- To establish a design baseline for roadway enhancements.

Included in the conceptual design scheme for Klingle Road are a program for aesthetic enhancements for the existing natural features in the corridor; visual design treatments to build elements that reduce their sense of scale (i.e., brown road pavement that blends with the environment); an overall design theme for enhancements to complement the visual context of the corridor (context sensitive solutions); corridor landscape enhancements for both the road and creek, including riparian and wildlife habitat treatment. The EIS presents examples of appropriate design treatments that incorporate the tenets of CSD and other environmentally-friendly design options for the road and stormwater alternatives in Appendix A.

Conclusion

During construction, negligible to minor adverse impacts to the visual environment associated with Klingle Road could occur due to some loss of tree cover. However, once the road is operational and tree cover and other vegetation is reestablished, views of Klingle Road would be relatively unchanged for residents in adjacent buildings and views from Klingle Road would be beneficial for travelers through the valley. By employing context –sensitive design elements, the road would largely blend in with the environment and reestablished vegetation would create a tree canopy similar to the original cover.

4.4 TOPOGRAPHY, GEOLOGY, AND SOILS

4.4.1 Regulatory Framework

Soil Erosion and Sedimentation Control Act (1977 as amended)

The program reviews and approves all construction and grading plans submitted to the District of Columbia Government for compliance with the regulations. Inspections are conducted at construction sites to ensure that control devices are constructed in accordance with approved plans. In addition, the program is also responsible for investigating erosion, drainage and related complaints and providing recommendations towards their resolution.

4.4.2 Methodology and Assumptions

Soil impacts were qualitatively assessed using professional judgment based on investigations of soil characteristics and current conditions of the site within the project area.

4.4.3 No Action/No Build Alternative

Approximately 1.9 acres of soil is currently disturbed within the project area. Under the No Action/No Build Alternative, there would be no construction or other mechanical disturbance in the project area that would adversely affect the topography, geology, or soils in the area. However, soils would continue to erode and be transported into Klingle Creek in overland flows during rainfall events and as a result of unmanaged stormwater discharges into the creek, as well as associated stream bank and channel erosion. Undercutting of the existing Klingle Road would also continue into the future as a result of uncontrolled stormwater flows, resulting in an increase to the approximately 1.9 acres of existing soil disturbance in the project area. In addition, the topography in the Klingle Creek floodplain would continue to be altered from erosive forces of these discharges.

Conclusion

Uncontrolled stormwater flows and discharges would continue to erode area soils and alter topography adjacent to Klingle Creek, resulting in increased degradation to soils and an increased area of disturbance over time.

4.4.4 Alternatives B1, B2, C, D1, and D2

Construction Impacts

There would be little if any adverse impacts to undisturbed soils within the Klingle Road right-of-way as a result of construction activities. The majority of land within the right-of-way has already either been paved over, severely eroded, or is compacted. During construction activities, soils within the right-of-way may be lost as a result of erosion; however, this loss would be minimized through implementation of context sensitive design principles and properly designed and maintained erosion and sedimentation best management practices. Placement of fill over existing soils would also likely be necessary in areas to prepare the site for the reconstruction of the road.

The differences in soil impacts among the build alternatives are less than one acre, ranging from a total soil impact of approximately 1.6 acres in Alternative B1 to approximately 2.4 and 2.5 acres in Alternatives D1 and D2, respectively. Alternatives B2 and C would have the same impact to soils of approximately 2.0 acres.

Construction of any of the build alternatives would result in little to no adverse impacts to soils outside of the right-of-way within the project area as construction would be confined to the current roadbed, which has been disturbed by the construction of the existing road. Impacts to undisturbed soils would be expected as a result of grading, excavation, placement of fill, compaction, mixing, and augmentation to accommodate project development. Some compaction and disturbance of soils may also occur adjacent to the existing right-of-way within the project area as a result of restoration efforts along Klingle Creek resulting from the use of equipment or the moving of materials, these impacts would be remediated after completion.

During restoration efforts in Klingle Creek, it could be necessary in a few areas to move, excavate, or remove bedrock or large float (boulders) that occurs in or along the streambed in order to achieve desired flow patterns. Modification of existing stable channels would be minimized to the greatest extent possible to accommodate restoration design. As a result impacts to existing stable channels would be expected to be negligible.

Some potential impacts to the stream bank and bed of Klingle Creek could occur during construction of the new roadbed and the stormwater management system. Impacts would be short term and minor as the project area have previously been disturbed as a result of construction and degradation of the existing roadway and uncontrolled stormwater discharges. Implementation of properly designed and maintained erosion, sedimentation, and stormwater best management practices during and following construction activities will also minimize potential impacts to the creek

Mitigation

The District of Columbia's Soil Erosion and Sediment Control Program implements and enforces D.C. Law 2-23, (D.C. Erosion and Sedimentation Control Act of 1977), which regulates all land-disturbing activities to prevent accelerated erosion and transport of sediment to its receiving waters. Plans may call for the use of measures such as straw bale dikes, silt fences, brush barriers, mulches, sediment tanks or temporary sedimentation ponds, seeding or sodding, earth dikes, brickbats, stabilized construction entrances, vehicle wash racks, or a combination of measures to reduce the amount of soil washing away from construction sites during storm events. Inspections are conducted to ensure that erosion and sediment control best management practices are constructed in accordance with approved plans and are properly maintained. The potential for any soil erosion would be minimized by the use of Best Management Practices, including silt fences, erosion control blankets, streambank stabilization, and retaining walls.

Operational Impacts

After the completion of Klingle Road, the operation of any the build alternatives would result in stabilized soil surfaces and reduced erosion of the ground surface and streambanks as a result implementation of the associated stormwater conveyance improvements and the restoration of Klingle Creek.

Mitigation

During the operation of the road, maintenance of the roadway and stormwater management structures would be required to minimize impacts of the constructed alternatives; failure to maintain the action alternative could contribute to future surface soil erosion and destabilized stream banks.

Conclusion

All five build alternatives would have localized short-term adverse impacts on soils during construction activities, with the greatest disturbance to soils occurring within Alternatives D1 and D2. However, with mitigation measures in place, those impacts would be negligible compared to the overall benefits that would result from stormwater management actions and context sensitive design principles implemented in the build alternatives that would result in stabilization of soil resources in the valley.

4.5 BIOLOGICAL RESOURCES

4.5.1 Regulatory Framework

Endangered Species Act (16 U.S.C. 35)

Federal agencies are required to conserve plant or animal species that have been federally listed as endangered or threatened. Federal agencies should consult as necessary with the U.S. Fish and Wildlife Service (USFWS) to ensure that any actions authorized, funded, or carried out by the Federal agencies are not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction of or substantial damage to critical habitat.

Executive Order 13112, Invasive Species (February 3, 1999)

This E.O. directs Federal agencies to expand and coordinate their efforts to combat the introduction and spread of plants and animals not native to the United States. The Federal Highway Administration has developed guidance to implement the E.O. It provides a framework for preventing the introduction of and controlling the spread of invasive plant species on highway rights-of-way.

4.5.2 Methodology and Assumptions

Impacts to biological resources were both quantitatively assessed using field data collected during the surveys described in Chapter 3, Affected Environment, and qualitatively assessed using professional judgment based on the direct observation of the presence of wildlife and plant species, literature reviews, and by determining the number of acres of potential impacts to vegetation, and actual trees that would likely be impacted.

More specifically, characterization of vegetation was conducted, as described in Chapter 3, to determine the potential affects associated with the implementation of the build alternatives. The survey data collected provided the baseline data necessary to assess potential impacts to vegetation and vegetative communities associated with implementation of each of the alternative. The characterization and inventory of vegetative resources included a comprehensive survey of understory vegetation based on random sampling throughout the maximum potential extent of the project area, a general characterization of dominant tree species occurring within the project area, and the identification and location of all trees with diameters at breast height (dbh) of greater than 24 inches.

To determine potential impacts to trees from root damage, the lateral extent of roots from the main stem of the plant was estimated relative to the extent of proposed road reconstruction. In general, tree roots extend in an irregular pattern out from the main stem over an area four to seven times the width of the tree's crown. The outward edge of the tree's crown from the trunk is the drip line. Extensive damage to the root system within the drip line will typically eventually result in tree mortality. Examples of activities within the drip line that would impact tree roots include cutting or stripping surface soils, lowering grades, trenching, compacting soils, filling or storing soil or excavation materials, placement of impervious surfaces within the drip line, and removing ground cover. Similar activities outside of the tree's drip line, but within the extent of the root system would also impact the health of the tree, but typically to a lesser extent (ISU 2001).

Assessment of impacts to trees within the vicinity of the project area was based on a number of factors: 1) determination of the number of trees with a diameter breast height of greater than 1 foot that would likely be removed to accommodate road reconstruction and restoration and stabilization activities or to address safety issues; 2) the proximity of trees to the road reconstruction area; 3) location of tree roots; and, 4) other potential hazards or characteristics that could affect trees such as susceptibility to collision from vehicles, existing and potential limb breakage, and soil compaction within the root zone. The assessment considered all trees with a dbh of greater or equal to 2 feet (or 24 inches) within 25 feet of the existing road's center line (see Table 3-3), large diameter trees outside of the 25-foot area with potential for impact from road reconstruction or stream stabilization and restoration activities, and trees with a diameter breast height of greater than 1 foot that were likely to be removed as a result of project implementation. It was assumed that any tree that was located immediately adjacent to the current paved surface would be removed prior to construction.

4.5.3 No Action/No Build Alternative

Vegetation

Under the No Action/No Build Alternative there would be no improvements to the stormwater conveyance system or restoration or stabilization of unstable stream banks along Klingle Creek. As a result, accelerated erosion throughout Klingle Valley would continue, causing many of the valley's larger trees, located on either steep slopes or adjacent to eroding stream banks, to fall over time. In June 2000, a survey was conducted of trees within 25 feet of the center line of the existing Klingle Road with a diameter breast height (dbh) of greater than or equal to 24 inches. Of the 47 trees originally surveyed, five trees, or roughly 10 percent, have fallen in areas adjacent to Klingle Creek and Klingle Road due to soil being eroded from around the base of the tree, or as a result of windfall (see Table 3-3). Several smaller diameter trees (less than 24 inches dbh), not counted in the original survey, have also been lost.

Accelerated and uncontrolled stormwater runoff and associated soil erosion in the valley would continue to limit potential for the establishment of vegetation in currently eroded areas, further degrade habitat for the establishment of native plant species, and promote the spread of exotic invasive species such as garlic mustard, Japanese honeysuckle and English ivy, which currently occur in the valley.

Conclusion

Under this alternative, erosion within Klingle Valley would continue unabated degrading habitat for native vegetation, and creating favorable conditions for, the already present, exotic invasive plant species. In addition, trees would continue to be lost as the continual erosion removes soils from around the bases of trees or as a result of windfalls.

Aquatic Organisms

Under the No Action/No Build Alternative, deficiencies in stormwater management, accelerated stream bank erosion, and continued collapse of Klingle Road into the stream would not be corrected. The adverse impacts currently affecting aquatic organisms as a result of uncontrolled stormwater runoff, associated erosion and sedimentation, and degraded water quality would continue. This increased sedimentation and degraded water quality could adversely impact aquatic organisms in a number of ways, as listed below.

- Deposition of sediments in aquatic habitats can fill spaces between rocks and gravel increasing embeddedness, potentially suffocating aquatic organisms that utilize the areas, and decreasing the amount of available suitable substrate for species that utilize the habitat.
- Deposition of sediments can cover up or destroy suitable habitat for aquatic insects and other wildlife. For example, many fish species require a clean gravel substrate for spawning.
- Sediment carried in runoff can transport nutrients and toxic chemicals, which can degrade water quality, promote algal growth, and ultimately harm aquatic organisms.
- Increased suspended sediment in water decreases the amount of light that can penetrate the water, which can limit the growth of beneficial aquatic plants.

Within Klingle Creek and down stream in Rock Creek, deposited sediments would continue to modify the natural stream channel, and as the water tries to find new pathways, new areas of increased stream bank erosion would likely develop. During high flow events, uncontrolled runoff from the existing road and surrounding uplands would continue to result in erosion and transport of sediments and road related chemicals into Klingle Creek and then downstream into Rock Creek. Estimated two-year flows within Klingle Creek as it enters Rock Creek would be around 130 cubic feet per second (cfs). As a result, adverse impacts to water quality and aquatic habitat would be expected to continue to occur, affecting wildlife species that utilize the habitats.

Conclusion

Under this alternative, adverse impacts currently affecting aquatic organisms as a result of uncontrolled storm water runoff, associated erosion and sedimentation, and degraded water quality would continue.

Terrestrial Organisms

The No Action/No Build Alternative would result in continued uncontrolled stormwater runoff, and associated erosion of stream banks and soil in the valley would continue to degrade wildlife habitat. However, adverse impacts to wildlife species in the valley are not expected to be substantial. Wildlife in Klingle Valley are typically comprised of species adapted to the urban environment and existing conditions in the valley. Much use by wildlife in the valley is transient in nature. If habitat conditions in the valley bottom continue to degrade as a result of uncontrolled stormwater runoff, many species that use the valley could be displaced, and the loss of this habitat could compromise the integrity and diversity of local wildlife populations.

Conclusion

Under this alternative, impacts to terrestrial organisms are not expected to be substantial. Wildlife living within Klingle Valley has adapted to urban conditions, and if habitat degrades to the point where it cannot support the wildlife that lives there, these species would be expected to move to adjacent more suitable habitats in Rock Creek Park, the Indian Embassy grounds, and the historic property adjacent to the site.

Threatened and Endangered Species

A letter was sent to the USFWS, the National Park Service Center for Urban Ecology, and the D.C. Department of Health, Fish and Wildlife on November 9, 2004, requesting information regarding species of special status with the potential to occur on or in the near vicinity of the proposed project area. Responses from the agencies are included in Appendix E.

Under this alternative, there would be no effects to the Hay Spring amphipod (*Stygobus hayi*). The No Action/No Build Alternative represents the current condition found within Klingle Valley. Given the distance separating Klingle Road and the known habitat of amphipods, the topographic features separating the two areas, and the fact that and groundwater movement within these areas is generally along short flow paths from interstream recharge areas to the nearest stream (e.g., Rock Creek) (USGS 2002) the No Action/No Build Alternative would have no adverse impacts to the required habitat of the amphipod and would have no effects on this species.

Conclusion

Under this alternative, given the distance separating Klingle Road and the known habitat of amphipods, the topographic features separating the two areas, and the fact that and groundwater movement within these areas is generally along short flow paths from interstream recharge areas to the nearest stream , there would be no adverse effects to the Hay Spring amphipod.

4.5.4 Build Alternatives B1, B2, C, D1, and D2

Vegetation

Construction Impacts

Many of the trees expected to be impacted by the build alternatives in the short term would likely be lost or damaged due to accelerated soil erosion on steep banks and along unstable stream banks if the action alternatives were not implemented. For the purposes of this analysis, it is assumed that all vegetation located within and immediately adjacent to the Klingle Road right-of-way would be adversely affected during the construction phase. Vegetation could be removed entirely to accommodate road reconstruction, accidentally damaged by construction equipment, impacted by soil compaction, or physically altered (e.g., trees limbed to provide access to construction equipment), all of which could directly or indirectly result in the mortality of several trees, and a deterioration in the health of many other plants and trees within the project area. However, since many trees in Klingle Valley have been lost because of excessive erosion and other natural causes, preservation of the remaining trees is critical to the valley and mitigations would be put in place to minimize those impacts and loss of trees (please refer to the Mitigation Section).

Rock Creek Park is the only large area of mostly contiguous deciduous forest habitat in the Washington, D.C. metropolitan area, and the forests play a major factor in defining park character (*Rock Creek Park General Management Plan*). As such, changes in the area or character of the deciduous forest are important. Since the Klingle Road right-of-way within the project area is surrounded on both sides by approximately 8-acres of Rock Creek Park, adverse impacts to trees on National Park Service administered lands could occur, especially in Alternatives D1 and D2.

Direct impacts to vegetation associated with removal could also occur in areas where road reconstruction extended outside of the existing footprint of the road (Alternatives D1 and D2). While measures would taken to minimize the number of trees that would need to be removed, it may be necessary to remove several large trees where they occur adjacent to the road. In addition, several trees adjacent to Klingle Creek are severely undercut with exposed roots and may need to be removed as a component of the stabilization and restoration of Klingle Creek and for safety concerns. Additional direct and indirect impacts to trees and other vegetation outside of the footprint associated with road reconstruction could occur as a result of root damage, breakage, and soil compaction in staging areas. Removal of vegetation for safety purposes along the road alignment could also be necessary.

Of the five build alternatives, Alternatives D1 and D2 would potentially impact the greatest area, 2.4 and 2.5 acres of land, respectively, and include impacts to vegetation on NPS land outside the existing DDOT right-of-way. Alternatives B1 and B2 and Alternative C would result in impacts of approximately 1.6 acres and 2.0 acres of land within the existing footprint of the road. The degree of impact to area vegetation increases as the footprint of the build alternative also increases.

Figures 4-1 and 4-2 summarize the potential impacts to trees from construction in the following categories: mortality resulting from removal; mortality due to root impacts within the drip line; impacts to tree health (roots and other) possibly resulting in eventual mortality; impacts to tree health (roots and other) not expected to result in mortality; and no impacts to tree health are summarized. Table 4-1 compares the total tree mortality between the build alternatives and the No Build/No Action Alternative. Due to similarities in the build alternatives, these impacts are summarized in two groups: Alternatives B1, B2, and C; and Alternatives D1 and D2.

Of those trees surveyed, it was determined that, at most, approximately 21 trees would require removal during construction in all the build alternatives as illustrated in Figures 4-1 and 4-2. In addition, Alternatives D1 and D2 would potentially result in approximately 50% more mortality (23 trees) than the other build alternatives (11 trees) due to root and other related damage from construction. However, Alternatives B1, B2, and C could result in a greater impact to long-term tree health resulting in eventual mortality (12 trees) than in Alternatives D1 and D2 (1 tree). As summarized in Table 4-1, the potential mortality for all the Build Alternatives ranges from approximately 32 to 44 trees, with Alternatives D1 and D2 resulting in potentially greater mortality due to construction-related removal and damage. Mitigations would be put in place in order to minimize tree loss to the greatest extent possible.

TABLE 4-1: COMPARISON OF ESTIMATED TREE LOSS

Alternative	No Action/No Build 2000-2004 (24-inch dbh or greater)	Alternatives B1, B2, and C	Alternatives D1 and D2
Estimated Maximum Tree Mortality[1]	5 trees lost over past 4 years[2]; more loss anticipated in future	32 trees lost during construction and operation	44 trees lost during construction and operation
Maximum Mortality in Percent of Total Trees Surveyed	10 % of the 47 trees in the in original 2000 survey	61 % of the 52 trees in 2004 survey[2]	84 % of the 52 trees in 2004 survey [3]
Mitigations to Minimize Tree Loss	None, tree loss would continue over time with no mitigation to replace lost trees or slow the rate at which they are being lost.	▪ Replacing lost trees after construction is completed. ▪ Placing construction fencing at the outer drip line of trees to be saved and ensuring no activity occurs within the fencing. ▪ Minimizing activities outside of the tree drip line, but in close proximity to trees, as much as possible. ▪ Boring under root systems when trenching for utilities rather the cutting through them, where possible. ▪ Staging construction equipment to avoid compaction of soils over the root systems of trees. ▪ Limiting grading or the placement of fill as much as possible in close proximity to trees. ▪ Incorporating provisions to ensure supply and drainage of both water and air if fill is placed around a tree.	

[1] Includes only tree mortality from removal or tree damage; does not include potential mortality from construction or operation induced health issues.
[2] Tree loss under the No Action/No Build Alternative is not a rate (e.g., trees lost per year) it is the total number of trees lost.
[3] In the 2004 survey, several large diameter (greater than 24 inches dbh) and medium diameter (greater than 12 inches dbh) trees were added to the original survey because they were either missed or not included due to size. During the 2004 survey, those medium-sized trees added were either located immediately adjacent to the road or the stream bank, which would likely result in mortality during construction.

Figure 4-1 Tree Impacts for Alternatives B1, B2, and C

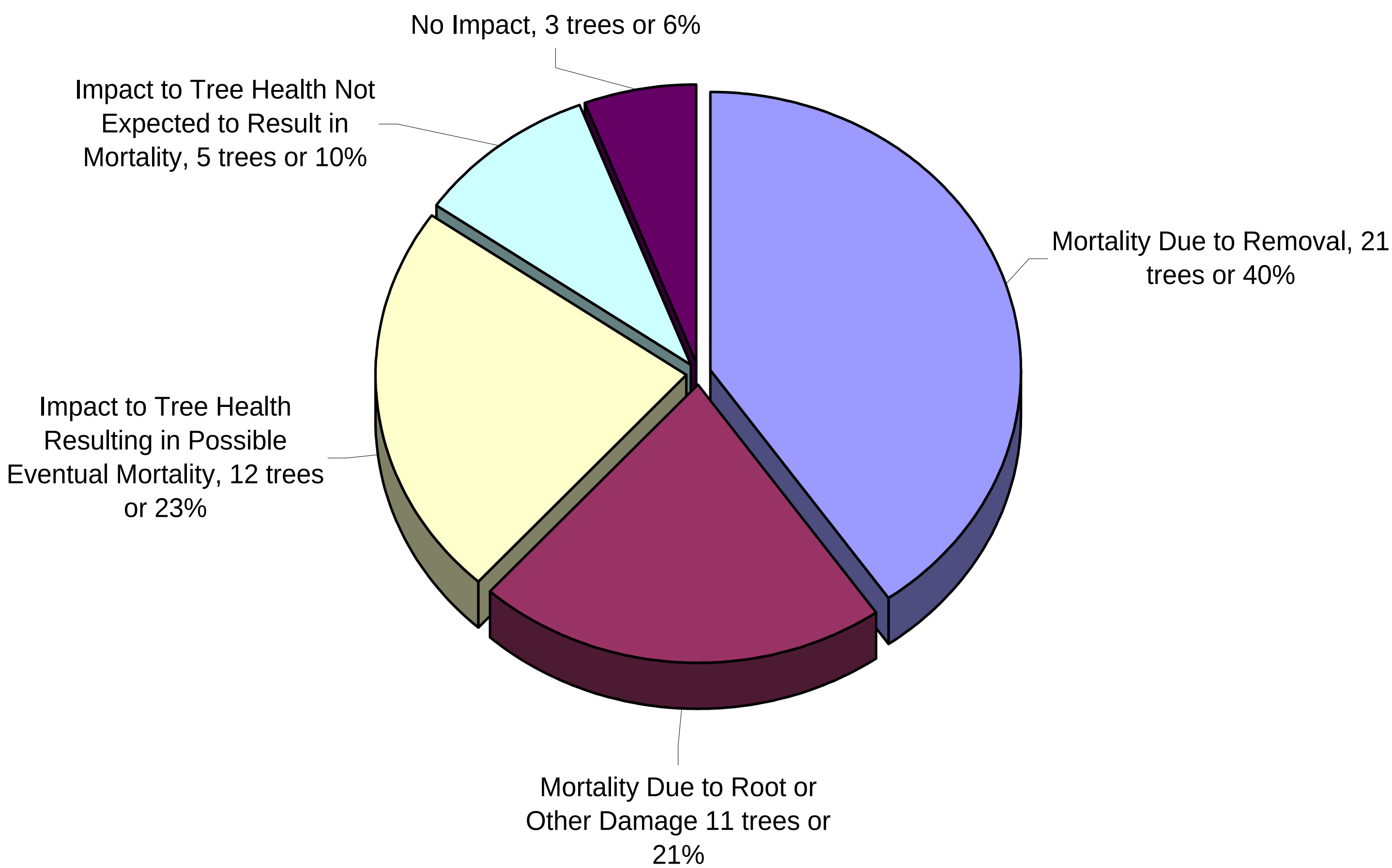
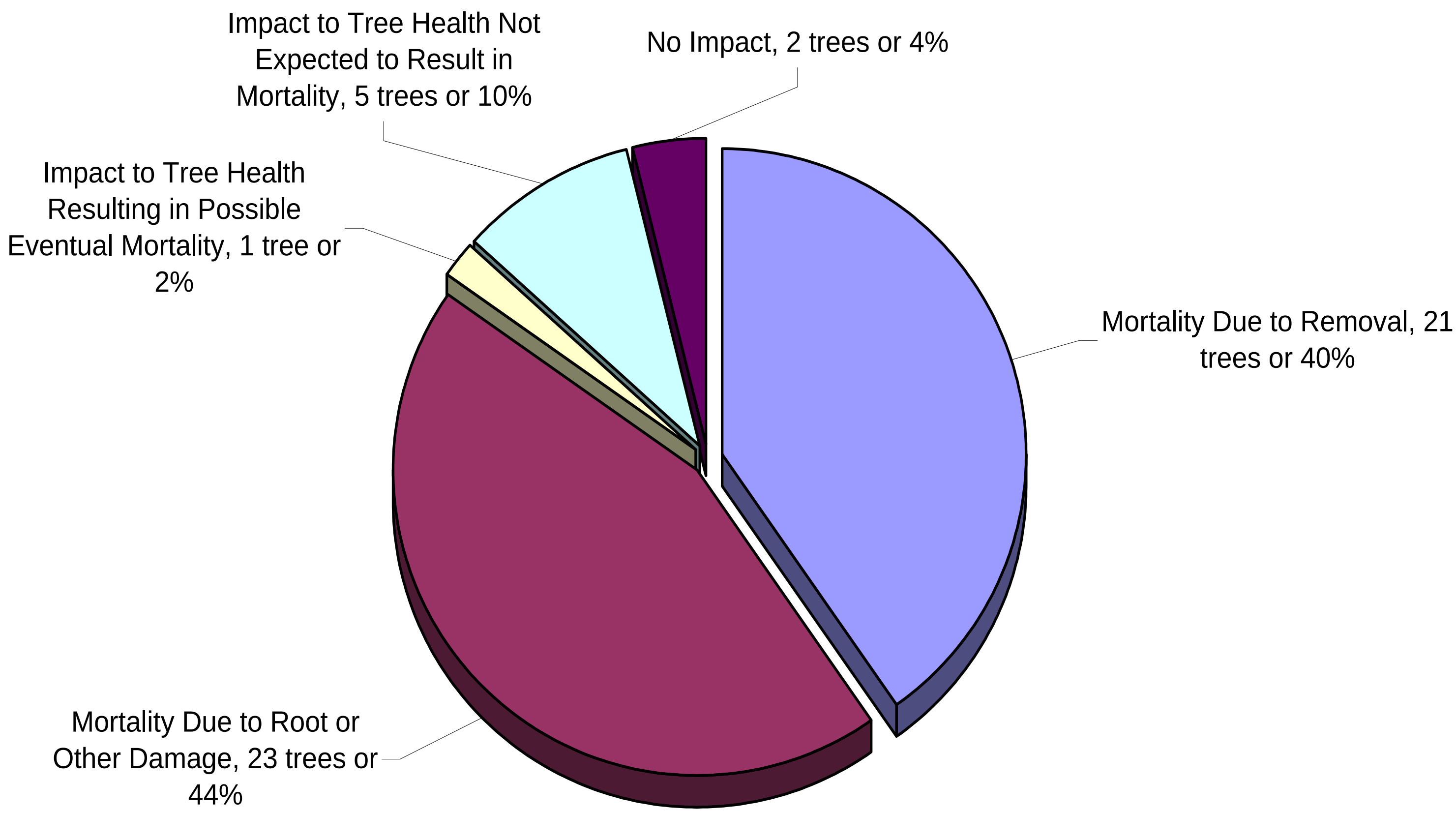


Figure 4-2 Tree Impact for Alternatives D1 and D2



The number of trees that would be impacted or lost as a result of implementing the build alternatives would likely be less than estimated in the above charts and table. The estimate is based on tree proximity to the proposed project areas and does not take into account site specific conditions such as steep topography or geologic constraints (e.g., shallow rock) that would alter patterns of root growth lessening the potential for, or the degree of, impacts to tree roots related to construction activities. Mitigation practices that would be implemented to lessen impacts to trees and other vegetation in and adjacent to the project area would likely decrease the number of trees lost (see mitigation discussion below).
Several species of exotic invasive plants occur along Klingle Road within the project area (see discussion of invasive plant species in Section 3). Many invasive species proliferate when existing ground cover is disturbed. Vegetated areas disturbed as a result of road reconstruction and stream restoration would be replanted with native species and maintained to ensure their establishment following rehabilitation activities.

Mitigation

Impacts to trees and other native vegetation would be minimized to the maximum extent possible by implementing management measures, including best management practices. The number of trees removed would be minimized as much as possible through actions such as incorporating existing trees into designs where possible. The extent of groundcover disturbed to accommodate project implementation would also be minimized. Areas that are disturbed would be replanted with native vegetation immediately following construction, and monitored to ensure successful establishment. All mitigation measures aimed at minimizing impact to vegetation on NPS lands within Klingle Valley would be coordinated with the NPS Chief Arborist from the National Capital Region Headquarters.

Two major sources of impacts to trees associated with construction related activities involve impacts to soils or the trees root system. Soil compaction within the area of a trees root system increases bulk density of the soil and results in a greater difficulty for the trees roots to grow and expand. A tree's roots are responsible for water and nutrient uptake, energy storage, and anchorage. If a trees root system is damaged its health will be impacted. In general the closer damage occurs to the trunk of the tree, the greater the damage to the tree. Extensive damage to the root system within the drip line will typically eventually result in tree mortality. Examples of activities within the drip line that will impact the plants roots include cutting or stripping surface soils, lowering grades, trenching, compacting soils, filling or storing soil or excavation materials, placement of impervious surfaces within the drip line, and removing ground cover. Similar activities outside of the tree's drip line, but within the extent of the root system will also impact the health of the tree, but typically to a lesser extent.

Mitigation measures that would be implemented to minimize impacts to soil and the trees root system include:

- Placing construction fencing at the outer drip line of trees to be saved and ensuring no activity occurs within the fencing
- Minimizing activities outside of the trees drip line, but in close proximity to trees, as much as possible
- Boring under root systems when trenching for utilities rather the cutting through them where possible
- Staging construction equipment to avoid compaction of soils over the root systems of trees
- Limiting grading or the placement of fill as much as possible in close proximity to trees
- Incorporating provisions ensure supply and drainage of both water and air if fill is placed around a tree.

Additional mitigation measures that would be implemented to reduce impacts to, and loss of, vegetation include:

- Planting of native trees and understory vegetation in areas disturbed as a result project implementation
- Minimizing trimming and removal of vegetation to accommodate construction equipment ingress and egress as much as possible
- Avoiding collision of equipment with trees and other vegetation and placing protective armoring around tree trunks in close proximity to construction activities to minimize potential adverse effects to bark, etc. resulting from collision
- Implementing erosion and sediment control practices to contain soils exposed during construction and to avoid offsite transport of soil on construction equipment and vehicles to ensure that the potential offsite related to the spread of exotic invasive species associated with construction activities are minimize.

Operational Impacts

As mentioned above, approximately ten percent of the large diameter trees with a diameter breast height of two feet or greater, surveyed within the project ROW in June 2000 have been lost due to uncontrolled stormwater runoff, soil erosion, and wind throw. Numerous additional smaller trees have also been lost within and adjacent to the ROW since the June 2000 survey. As noted in the analysis of the No Action/No Build Alternative, without stormwater management improvements, repairs to the degrading road surface, and steam bank stabilization along Klingle Creek, accelerated loss of trees within the valley would be expected to continue. In the long-term, once a build alternative is implemented within Klingle Valley, long-term positive effects to trees in the area would be expected over time as a result of stabilization of stormwater flows and the resulting decrease in soil erosion in the valley. A reduction in topsoil erosion over time would be expected to also result in the reestablishment of understory vegetation in areas that currently lack vegetative cover.

Few adverse impacts to vegetation would result from opening the road to traffic, except from some trampling of ground vegetation due to foot traffic that could occur along the road. Introduction of additional exotic invasive plant species to the area could be more likely as a result of increased use. However, the impact would be negligible because non-native invasive plants currently dominate and characterize the vegetation in much of the valley.

Mitigation

Maintenance of the roadway and stormwater management structures would be required to ensure that the stormwater conveyance system was functioning properly and effectively transferring overland flows along the designed course. Failure to maintain the action alternative could contribute to future soil and stream bank erosion resulting in associated loss of vegetation.

Conclusion

Impacts to vegetation from the operation of the road, stormwater conveyance improvements, and the restoration of Klingle Creek would be similar under all five build alternatives, although a greater number of trees would be potentially lost in the short-term under Alternatives D1 and D2 due to construction. In the long-term, the installation of a new stormwater system and restoration of Klingle Creek would reduce erosion and the number of large trees that could be lost due to undermining and wind throw resulting in benefits to trees in Klingle Valley.

Aquatic Organisms

Construction Impacts

Impacts to fish and other aquatic organisms and habitat found in Klingle Creek and downstream in Rock Creek could occur during construction activities that include site preparation, road reconstruction, stormwater improvements, and stream channel stabilization and restoration activities. Impacts to aquatic species associated with degraded water quality and increased deposition of sediments would be expected if properly designed and maintained erosion and sediment control and stormwater management practices were not implemented during all phases of construction. Impacts similar to those discussed under the No Action/No Build Alternative would occur if these best management practices were not implemented and properly maintained. However, if mitigation measures were implemented, construction-related impacts would be negligible to minor depending upon the alternative.

In Alternatives D1 and D2, approximately 865 feet of new retaining walls would be constructed in addition to the existing 270 feet of walls that would be rehabilitated, resulting in additional stream bank and bottom disturbance during construction. In addition, approximately 120 feet of headwalls would be constructed. As a result, adverse impacts to aquatic habitat would be expected to be potentially greater under these alternatives than Alternatives B1, B2, and C.

Mitigation

Measures to mitigate impacts to fish and wildlife would focus on mechanisms that limit water quality degradation and habitat loss. Mitigation aimed at minimizing the degradation of these resources during construction activities includes the use of:

- straw bale dikes
- silt fences
- brush barriers
- mulches
- sediment tanks or temporary sedimentation ponds
- seeding or sodding
- earth dikes
- brickbats
- stabilized construction entrances
- vehicle wash racks
- Or a combination of theses measures to reduce the amount of soil washing away from construction sites during storm events

Inspections would be conducted to ensure that erosion and sediment control best management practices are constructed in accordance with approved plans and are properly maintained. The sediment control program complements the water management program in an effort to meet the goals and objectives of the EPA Chesapeake Bay Program. The District strengthened its sediment control law by enacting D.C. Law 10-166 (D.C. Erosion and Sedimentation Control Amendment Act of 1994) to specifically remove the exemption provision for sediment control compliance associated with construction activities by federal agencies.

Operational Impacts

Once Klingle Road is open, long-term beneficial effects would be expected to aquatic habitat if erosion and sediment control and stormwater management practices were properly designed and maintained. The development of stormwater detention basins where possible would provide stormwater detention and sediment detention, allowing solids (e.g., litter, debris, and sediments) to settle out of the runoff in all alternatives. Measures such as these, in combination with reconstruction of the road, implementation of other stormwater management improvements, and stabilization of the stream channel would serve to stabilize conditions in the stream and result in a long-term improvement in water quality and aquatic habitat both in Klingle Creek and downstream in Rock Creek, particularly in Alternatives B1, B2, and C. However, the increased number of retaining walls in Alternatives D1 and D2 would result in greater streambed scouring during periods of high flow, resulting in higher sediment loads downstream and potential loss of aquatic habitat.

Adverse impacts to aquatic organisms and their habitats could also occur due to a degradation of water quality resulting from the transport of road chemicals associated with vehicles use and maintenance of the road (application of salt and other chemical in the winter) into the creek. Properly conveyed and managed stormwater flows would help to minimize these impacts.

Mitigation

Maintenance of the roadway and stormwater management structures would be required to ensure that the stormwater conveyance system was functioning properly and effectively transferring overland water flows along their desired course. Failure to maintain the stormwater conveyance system could result in the transport of road related chemicals to the stream and contribute to future soil erosion and sedimentation, destabilized stream banks, and degradation in water quality and aquatic habitats.

Conclusion

Reconstruction of the road, implementation of stormwater management improvements, and stream channel and restoration stabilization activities would be expected to stabilize conditions in the stream and result in an improvement in water quality and habitat both in Klingle Creek and downstream in Rock Creek in all alternatives. However, Alternatives D1 and D2 would result in additional instream work because of an increased number of retaining walls, which could minimize these benefits.

Terrestrial Organisms

Impacts to terrestrial wildlife and habitat found within Klingle Valley would occur from site preparation (e.g., excavation of old roadbed and regrading), stream restoration efforts, construction activities, operation of heavy machinery, hauling materials into and off of the site, and the operation of the road and stormwater conveyance system after construction activities have ended.

Construction Impacts

Impacts resulting from construction activities proposed under all five build alternatives would be similar in nature. Common fauna likely to occur in Klingle Valley are species adapted to disturbed habitats associated with adjacent high use urban environments and transient species associated with the adjacent wooded habitats. Wildlife species utilizing the habitats along and adjacent to the Klingle Road ROW would likely move out of the area or to adjacent wooded habitats in Rock Creek Park, the Indian Embassy grounds, and the historic property adjacent to the site during reconstruction of the road. Mortality of some smaller less mobile species could occur as a result of vegetation clearing or injury caused by construction equipment during road reconstruction and stream restoration. Following construction activities, some species, such as raccoons and opossum, would likely move back into the area.

There would likely be some loss of some nesting habitat for resident and migratory birds from the loss of trees during construction. Loss of this habitat is expected to be greater under Alternatives D1 and D2 as more trees are expected to be lost (see Figure 4-2). This loss of habitat however, is not expected to be great because of the abundant unaffected habitat in and around the project area and because mitigation measures would be implemented to minimize the loss of trees to the greatest extent possible.

Mitigation

Mitigations to reduce impacts to terrestrial organisms would be the same mitigations as those described under vegetation and aquatic organisms.

Operational Impacts

Stormwater management improvements throughout the valley would greatly reduce erosion, which would result in long-term beneficial impacts to terrestrial wildlife throughout the valley. A reduction in erosion over time would result in the reestablishment of understory vegetation, which in turn would improve the vigor of the habitat within the valley by increasing the amount of forage and vegetative cover available to resident wildlife.

However, while most of the animals that use the Klingle Valley are adapted to urban environments, the lack of traffic through the valley provides a quiet refuge for these and more sensitive animals. Individual animals are not exposed to vehicle noise or the potential for being in conflict with cars. Such a refuge makes an urban environment more tolerable for these wildlife species. Reopening the road could also disturb territories of some wildlife species currently found within Klingle Valley by bisecting habitats and creating an edge, causing some species to leave the area. It has been shown that even relatively narrow trails and roads can cause shy species to vacate territories. Edge effects have been documented for as little as 50 feet into a forest for some plants (Chen et al. 1992) to as much as 1,600 feet into a forest for some songbirds (Lynch and Whigham 1984).

In addition, 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 wildlife species. Reopening the road would reintroduce vehicular traffic along with additional pedestrian and bicycle traffic into the valley reducing its potential for use by wildlife.

Mitigation

Mitigation would be the same as those described under vegetation for minimization of impacts to terrestrial wildlife habitat.

Conclusion

Reconstruction of the road, implementation of stormwater management improvements, and stream channel and restoration stabilization activities would be expected to reduce erosion throughout the valley, which would be beneficial to wildlife habitat. However, there would be short-term adverse impacts to terrestrial and avian wildlife with the loss of trees as a result of construction. These losses would be minimized to the greatest extent possible through mitigation measures. Alternatives D1 and D2 would result in more tree loss than Alternatives B1, B2, and C. In addition, mortality of some smaller, less mobile species could occur as a result of vegetation clearing or injury caused by construction equipment during road reconstruction and stream restoration. Long-term adverse impacts to wildlife could occur with the operation of the road as a result of fragmented habitats, conflicts with automobiles, disturbance caused from increased human presence, and increased lighting associated with the installation of street lamps.

Threatened and Endangered Species

Construction Impacts

A letter was sent to the USFWS, the National Park Service Center for Urban Ecology, and the D.C. Department of Health, Fish and Wildlife on November 9, 2004, requesting information regarding species of special status with the potential to occur on or near the proposed project area. Responses from the agencies are included in Appendix E.

The endangered Hay's Spring amphipod (*Stygobus hayi*) is documented to occur in Rock Creek Park, and is only known to occur in a few groundwater springs near the National Zoological Park. This area is downstream of Klingle Valley.

These amphipods spend the majority of their lives in groundwater below the surface, feeding on detritus. Threats to this species include predation when they occur above ground, alterations of groundwater flows, groundwater pollution, loss of detritus as a food source, and disturbance of spring sites. Common pollution problems for amphipods are nitrates in fertilizers (which can result in groundwater oxygen depletion), pesticides, and petroleum leaking from underground storage tanks.

Given the distance separating Klingle Road and the known habitat of the Hay's Spring amphipods, the topographic features separating the two areas, the fact that and groundwater movement within these areas is generally along short flow paths from interstream recharge areas to the nearest stream (e.g., Klingle Creek and Rock Creek) (USGS 2002), and the fact that no springs were noted during field observations, the proposed construction activities associated with any of the build alternatives would have no adverse impacts to known populations of the Hay's Spring amphipod.

Mitigation

Since there would be no effects to this species as a result of construction activities associated with any of the build alternatives (B1, B2, C, D1, and D2), no mitigations would be necessary. However, construction design plans, environmental compliance, and implementation of best management practices, would be initiated to mitigate against and potential water quality impacts. These measures would include, but are not limited to:

- installing silt fences and sediment traps at the construction site
- installing erosion control blankets
- revegetating disturbed soil surfaces
- diverting the stream when construction occurs within the streambed
- creating a spill contingency plan
- refueling vehicles off site whenever possible to avoid fuel spills

Operational Impacts

Given the distance separating Klingle Road and the known habitat of amphipods, the topographic features separating the two areas, and because groundwater movement within these areas is generally along short flow paths from interstream recharge areas to the nearest stream (e.g., Rock Creek) (USGS 2002) the operation of Klingle Road under any of the build alternatives would have no adverse impacts to known populations of the Hay's Spring amphipod.

Mitigation

Since there would be no effects to this species as a result of the operation of Klingle Road under any of the build alternatives (B1, B2, C, D1, and D2), no mitigations would be necessary.

Conclusion

Reconstruction of the road, implementation of stormwater management improvements, and stream channel and restoration stabilization activities would have no adverse effects to the Hay's Spring amphipod.

4.6 WATER RESOURCES

4.6.1 Regulatory Framework

Clean Water Act (33 U.S.C. 26)

This statute seeks to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. The CWA identifies certain pollutants and sets required treatment levels for those pollutants. The CWA regulates both point source and non-point source discharges.

Executive Order 11990, Protection of Wetlands (May 24, 1977)

This E.O. requires Federal agencies to take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agencies' responsibilities for managing and disposing of Federal lands and facilities.

Executive Order 11988, Floodplain Management (May 24, 1977)

This E.O. requires Federal agencies to take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health and welfare, and to restore and preserve the national and beneficial values served by floodplains in carrying out their responsibilities for managing and disposing of Federal lands. Before taking an action, an agency must determine whether the proposed action would occur in a floodplain; if so, consideration must be made of alternatives to avoid adverse effects and incompatible development in floodplains. This executive order complies with the Flood Disaster Protection Act of 1973, which prohibits Federal actions in areas subject to flooding.

4.6.2 Methodology and Assumptions

An assessment of existing water resources within Klingle Valley and the potential effects of managing stormwater were developed using on-site reconnaissance, hydrologic modeling, and fieldwork to gather and confirm information and other sources of researched information including various documents and reports, maps, and aerial photographs.

Stream Modeling Data

To assess the hydrology of the watershed, the USDA Technical Release-55 (TR-55) urban hydrology model was used, and the Hydrologic Engineering Center River Analysis System (HEC-RAS) river analysis model was used to predict different flow scenarios for Klingle Creek.

TR55 Model

TR-55 is a model developed by the U.S. Department of Agriculture (USDA) Soil Conservation Service and is used estimate stormwater runoff volumes and peak rates of discharge from urban watersheds. The model imposes a specified amount of rainfall (which varies depending on the design storm being analyzed) on the watershed over a 24-hour period. The amount of runoff generated by the storm event is then calculated by applying a Curve Number (CN) to the mass rainfall. The CN is based on soils, plant cover, and amount of impervious areas. Essentially the higher the CN the more runoff that can be expected from a given area, i.e. more urbanized areas with greater impervious surfaces contribute greater volumes of runoff and therefore are assigned higher CN values. This information is utilized with additional information regarding the size of the watershed, stormwater travel distances and topography to estimate peak runoff volumes for particular storm events. This peak runoff data is then used as input into the river analysis model, HEC-RAS.

HEC-RAS

HEC-RAS is a river analysis model developed by the U.S. Army Corps of Engineers. The model is designed to simulate river flow in response to stormwater runoff. The model is set up by inputting geometric data and geomorphic information about the stream channel and banks of the river of interest. As described in Chapter 3 under Water Resources, a detailed field survey was conducted in July 2003 and geometric as well as geomorphic data were collected at 26 locations (called transects) along the length of the creek. This information was inputted into the HEC-RAS model along with peak stormwater runoff data from the TR-55 model. The model yielded water surface elevations (and profiles) and other useful data including the channel flow velocities.

Study Area Representation in the Model

The study watershed was delineated into seven distinct subwatersheds based on the existing stormwater pipe network. Table 4-2 describes the delineated stormwater areas. Figure 3-7 in Chapter 3 identifies the areal extent of these subwatersheds within the study area.

Stormwater Volume and Channel Velocity Estimations

Stormwater volumes were calculated using the rainfall conditions presented in Table 4-3. The resulting stormwater volumes for the seven delineated areas of the watershed are presented in Table 4-4. These estimated stormwater flows, when inputted into the HEC-RAS model with the visual and transect survey information, resulted in channel velocities for 2-, 10-, and 25-year rainfall events in the existing project area. These velocities are listed in Table 4-5 by each transect along Klingle Creek and Klingle Valley.

TABLE 4-2: MODEL REPRESENTATION KLINGLE VALLEY STORMWATER AREAS

Study Area ID	Description	Area (acres)
Q1	Stormwater collects in pipe network and discharges to Klingle Creek via outlet #1	54.6
Q2	Overland stormwater flow to Klingle Creek	23.0
Q3	Overland stormwater flow to Klingle Creek	52.3
Q4	Stormwater collects in pipe network and discharges to Klingle Creek via outlet #2	12.2
Q5	Overland stormwater flow to Klingle Creek	38.1
Q6[1]	Stormwater collects in pipe network and discharges to Rock Creek via outlet #3	71.5
Q7[1]	Stormwater collects in pipe network and discharges to Rock Creek via outlet #3	125.0

Source: Draft Klingle Creek Stormwater Management Plan (Louis Berger 2004)
[1] Since stormwater from both Q6 and Q7 is conveyed via pipe to Rock Creek and thus does not contribute stormwater runoff to Klingle Creek, these two areas were not considered in the management recommendations as part of the Stormwater Management Plan for Klingle Creek. These areas are considered in the Klingle Road EIS to determine the cumulative stormwater impacts on Rock Creek (see Chapter 6).

TABLE 4-3: SUMMARY OF RAINFALL INTENSITIES USED IN KLINGLE CREEK STORMWATER VOLUME ESTIMATIONS

Design Storm Return Frequency	Rainfall for 24-hr Design Storm
2 year	3 inches
10 year	5 inches
25 year	6 inches

Source: Draft Klingle Creek Stormwater Management Plan (Louis Berger 2004)

TABLE 4-4: SUMMARY OF KLINGLE CREEK PEAK RUNOFF FLOWS GENERATED BY SELECT DESIGN STORMS

Subwatershed	Flow (cfs)		
	2-yr storm	10-yr storm	25-yr storm
Q1	56	150	203
Q2	4	20	30
Q3	27	78	108
Q4	42	83	104
Q5	17	46	62
Q6[1]	136	269	338
Q7[1]	233	442	548

Source: Draft Klingle Creek Stormwater Management Plan (Louis Berger 2004)
[1] Since stormwater from both Q6 and Q7 is conveyed via pipe to Rock Creek and thus does not contribute stormwater runoff to Klingle Creek, these two areas were not considered in the management recommendations as part of the Stormwater Management Plan for Klingle Creek. These areas are considered in the Klingle Road EIS to determine the cumulative stormwater impacts on Rock Creek (see Chapter 6).

TABLE 4-5: MODEL RESULTS UNDER EXISTING CONDITIONS FOR ALL TRANSECTS

Transect	Profile	Total Flow (cfs)	Flow Area (sq ft)	Channel Velocity (ft/s)
24	2-yr flow	60	11.55	5.2
	10-yr flow	170	24.17	7.03
	25-yr flow	233	30.21	7.71
23	2-yr flow	60	11.94	5.03
	10-yr flow	170	26.59	6.39
	25-yr flow	233	35.49	6.57
22*	2-yr flow	60	12.96	4.63
	10-yr flow	170	25.83	6.58
	25-yr flow	233	32.68	7.13
21*	2-yr flow	60	11.37	5.28
	10-yr flow	170	24.37	6.97
	25-yr flow	233	30.62	7.61
20	2-yr flow	60	11.77	5.1
	10-yr flow	170	26	6.54
	25-yr flow	233	32.35	7.2
19	2-yr flow	60	10.5	5.71
	10-yr flow	170	22.05	7.71
	25-yr flow	233	27.76	8.39
18	2-yr flow	60	11.17	5.37
	10-yr flow	170	24.3	7
	25-yr flow	233	30.27	7.7
17*	2-yr flow	60	12.15	4.94
	10-yr flow	170	25.62	6.63
	25-yr flow	233	31.71	7.35
16	2-yr flow	60	12.87	4.66
	10-yr flow	170	22.56	7.54
	25-yr flow	233	28.21	8.26
15	2-yr flow	60	12.12	4.95
	10-yr flow	170	26.06	6.6
	25-yr flow	302	40.53	7.67
14	2-yr flow	60	16.06	3.74
	10-yr flow	170	31	5.48
	25-yr flow	302	43.71	6.91
13	2-yr flow	129	22.55	5.72
	10-yr flow	331	44.09	7.51
	25-yr flow	514	60.57	8.49
12	2-yr flow	129	45	3.07
	10-yr flow	331	66.81	5.76
	25-yr flow	514	87.04	7.41
11	2-yr flow	129	40.8	3.27
	10-yr flow	331	66.5	5.22
	25-yr flow	514	84.25	6.71
10	2-yr flow	129	34.41	3.33
	10-yr flow	331	63.37	5
	25-yr flow	514	87.62	5.39
9*	2-yr flow	129	26.04	4.95
	10-yr flow	331	64.07	5.17
	25-yr flow	514	87.42	5.88
8	2-yr flow	129	32.21	4.53
	10-yr flow	331	56.79	6.44
	25-yr flow	514	72.97	7.71
7	2-yr flow	129	22.07	5.9
	10-yr flow	331	47.56	7.31
	25-yr flow	514	66.9	8.18
6	2-yr flow	129	18.16	7.1
	10-yr flow	331	39.25	8.49
	25-yr flow	514	63.62	8.18
5*	2-yr flow	129	37.8	3.41
	10-yr flow	331	71.86	4.61
	25-yr flow	514	94.21	5.46
4*	2-yr flow	129	22.11	5.83
	10-yr flow	331	47.18	7.02
	25-yr flow	514	64.18	8.01

Transect	Profile	Total Flow (cfs)	Flow Area (sq ft)	Channel Velocity (ft/s)
3*	2-yr flow	129	23.87	5.4
	10-yr flow	331	44.78	7.45
	25-yr flow	514	62.1	8.32
2	2-yr flow	146	22.21	6.57
	10-yr flow	377	45.09	8.36
	25-yr flow	576	62.61	9.2
1	2-yr flow	379	509.91	0.91
	10-yr flow	819	958.05	1.03
	25-yr flow	1124	1306.35	1.03

Source: Draft Klingle Creek Stormwater Management Plan (Louis Berger 2004)
* = Critical transect, which is an area where the stream channel showed signs of significant erosion and scour.

4.6.3 No Action/No Build Alternative

Under this alternative, Klingle Road would not be rebuilt. Existing retaining walls along the creek would not be repaired, and stormwater damage would not be corrected and would most likely increase into the future. The roadbed and retaining walls would not be stabilized and would continue to erode into Klingle Creek. Although roadbed erosion would continue to occur, there would no discernable change in the existing impervious roadway surface (approximately 2.2 acres).

The stormwater volumes and channel velocities that currently occur within the project area and in Klingle Creek, as identified in Tables 4-4 and 4-5, would continue unabated in the No Action/No Build Alternative. The model showed that erosive and sometimes severe velocities are being generated by stormwater runoff and would continue into the future. Since no stormwater controls would be implemented to manage these volumes and velocities, continued erosion of the stream channel, sedimentation from overland erosion, erosion from uncontrolled storm sewer outfalls, and loss of streamside vegetation would continue. Erosion within the project area would also continue unabated contributing to degradation of Klingle Creek. High sediment loads to Rock Creek from erosion of Klingle Creek stream channel would continue.

A portion of existing Klingle Road lies within the 100-year floodplain. The No Action/No Build alternative would have no impact on the existing floodplain or flood level conditions.

There are no jurisdictional wetlands within the project area. A small wetland occurs on private property adjacent to the Klingle Road ROW in the northwestern portion of the project area. No adverse impacts to wetlands would occur from the No Action/No Build Alternative.

No impacts to groundwater volume or quality would be expected under the No Action/No Build Alternative. No addition of impervious surfaces, which could locally impact groundwater recharge, would occur under this alternative. In addition, there would be no potential for construction related spills or other development activities to impact groundwater quality because these operations would not occur under the No Action/No Build Alternative.

Conclusion

The No Action/No Build Alternative would continue to contribute to deteriorated water quality in Klingle Creek. The stream channel would continue to erode and no stormwater management plan would be implemented.

4.6.4 Build Alternatives (Alternatives B1, B2, C, D1, and D2)

General impacts to water resources from road construction would be similar among all build alternatives. The maximum difference in the impervious surface among the Build Alternatives is approximately 1.3 acres (Alternative B1 and Alternative D2), as presented in Table 4-6. The maximum impervious surface from a Build Alternative (Alternative D2) is approximately 2.8 acres, which is approximately 0.7 percent of the project watershed; this is approximately 0.7 acre more than the existing impervious surface of the closed roadway. Approximately 270 feet of the existing retaining walls would be rehabilitated in and along the creek bank and four culvert headwalls would be constructed across the creek. Under Alternatives D and D1, approximately 865 feet of new retaining walls would be constructed and approximately 270 feet of existing retaining walls would be rehabilitated in and along the creek bank. In addition, approximately 120 feet of headwalls would be constructed.

TABLE 4-6: IMPERVIOUS KLINGLE ROAD SURFACES OF THE PROJECT ALTERNATIVES

	Total Project Watershed (Q1, Q2, Q3, Q4, and Q5) (180.2 acres)	
Alternative	**Total Impervious Surface (acres)**	**% of Total Watershed**
No Action	**2.2**	**1.22 %**
B1	**1.6**	**0.88 %**
B2	**2.0**	**1.11 %**
C (Preferred)	**2.0**	**1.11 %**
D1	**2.5**	**1.39 %**
D2	**2.8**	**1.55 %**

Construction Impacts

Water quality impacts during construction would vary based on project construction schedule, amount, and type of construction activity and equipment used. Construction activities would include removal of the exiting roadbed, construction of stormwater conveyances, and outfalls, reconstruction of the new roadway, and construction of retaining walls. Short-term adverse impacts during construction would result from streambed disturbance and erosion, streambank disturbance from construction of outfall structures, some temporary loss of streambank vegetation, loss of tree canopy, and increased soil erosion. Examples of impacts include stormwater runoff from the construction sites, including construction-related chemicals such as concrete wash-down; sediments from runoff; resuspension of contaminants in the streambed; and, disruption of aquatic invertebrate habitats.

Road construction impacts under Alternatives B1, B2, and C would be similar and minor because the restored road would be no wider than the existing road. Under D1, the rebuilt roadway would be 6 feet wider than Alternative C; under Alternative D2, in addition to those 6 feet of added road width, a recreation path would require another 4 feet and be 10 feet wider than Alternative C. Alternatives D1 and D2 would likely entail grading of land beyond the existing Klingle Road right-of-way, resulting in additional ground disturbances. The area of construction impacts may extend into the Klingle Creek streambed for alternatives D1 and D2, depending on the construction methods used. Alternatives D1 and D2 could be expected to have some small additional water resources impacts beyond those of Alternative C. However, in the existing urbanized project area, the contribution of surface runoff to Klingle Creek by the build alternatives would be small and the differences among the alternatives would negligibly impact this total contribution.

A portion of the Build Alternatives for Klingle Road lies within the 100-year floodplain. Since all the Build Alternatives would occur on the existing Klingle Road alignment and follow the same road configuration, there would be no new impact on the floodplain or flood levels.

There are no jurisdictional wetlands within the project area. A small wetland occurs on private property adjacent to the Klingle Road ROW in the northwestern portion of the project area. No impact on the wetland from any of the Build Alternatives is expected.

Klingle Creek is considered “waters of the United States”. Clean Water Act Section 404 permitting for the placement of dredge or fill materials into waters of the U.S. and a Section 10 Water Quality Certification would likely be required for work within the stream banks of Klingle Creek. Requirements to implement management practices to minimize potential adverse impacts to water quality and habitat, and stream and floodplain flow dynamics both during and following construction, would be included as components of permitting requirements.

Impacts to groundwater associated with recharge would not be expected under alternatives B1, B2 and C. The area of impervious surfaces associated with the road would be expected to decrease under these alternatives when compared with existing conditions. Under alternatives D1 and D2 the area of impervious surfaces would be expected to increase by 0.3 or 0.6 acres respectively when compared to existing conditions. These increases in impervious surfaces across the extent of the project area (along the length of the road alignment) would be expected to have minimal impacts on groundwater recharge within the valley. Potential impacts to groundwater quality could occur under all build alternatives resulting from construction related fuel or other chemical spills during project development. Potential for spill related impacts would be minimized by implementing best management practices (e.g., spill contingency plans) to ensure rapid containment and management of spills if they occur. In addition, refueling of equipment will be conducted in a manner to minimize the potential for spills and to provide for containment if they do occur.

Mitigation

Construction design plans and environmental compliance, as well as implementation of best management practices, would be critical to mitigate potential water quality impacts. These measures would include, but are not limited to:

- installing silt fences and sediment traps at the construction site
- installing erosion control blankets
- revegetating disturbed soil surfaces
- diverting the stream when construction occurs within the streambed
- creating of a spill contingency plan
- refueling vehicles off-site whenever possible to avoid fuel spills

Section 404 will require that the area of impact be minimized to the maximum extent possible as a prerequisite of permitting. The actual areas of retaining wall development within the banks of Klingle Creek will be determined based in the final plan design and will determine permitting requirements under Section 404.

Operational Impacts

For all build alternatives, operation of the roadway and the associated stormwater management features would result in a major improvement over the current conditions of water resources conditions. After construction is completed, normal operation of the road itself would have some adverse impacts to the water quality of Klingle Creek and Rock Creek. Precipitation that falls on roadways and runs off into stormwater sewers can carry many types of pollutants that can impact water quality, such as sediments, oil, grease and toxic chemicals from motor vehicles, and road salts.

The stormwater management plan, which is a common element in all the build alternatives, would incorporate local stormwater detention basins where possible and practical. These detention basins would allow solids (i.e., litter, debris, and sediments) to settle out of the runoff prior to entering the natural watershed. Stormwater management improvements would include new conduit under Klingle Road to capture and convey to Rock Creek all the stormwater that currently flows through the existing conduit within Klingle Valley. All stormwater that flows overland (i.e., on the ground surface and not in a conduit) would flow into and be conveyed to Rock Creek in Klingle Creek. Stormwater flows generated within the sub-watersheds (see the Methodology section and Figure 3-7) would be distributed to the new conduit or into Klingle Creek as follows:

- Q1 piped flow is conveyed in new conduit;
- Q2 piped flow is conveyed in new conduit; and,
- Q1, Q2, and Q3 overland flows are conveyed in Klingle Creek.

The distribution of flows from these sub-watersheds to Klingle Creek and to the new conduit is shown in Table 4-7.

TABLE 4-7: STORMWATER FLOWS FOR BUILD ALTERNATIVES (B1, B2, C (PREFERRED), D1, D2)

Sub-Watershed ID	% of Flow Directed to Klingle Creek	% of Flow Diverted to New Conduit
Q1	100%	0%
Q2	0%	100%
Q3	100%	0%
Q4	0%	100%
Q5	100%	0%

The results of the HEC-RAS model for Klingle Creek flows assuming implementation of stormwater management measures under all the build alternatives are shown in Table 4-8 at select transect locations. Table 4-9 compares the differences in flow volumes and rates between the No Build Alternative and the Build Alternatives B1, B2, C, D1, and D2.

TABLE 4-8: SUMMARY OF MODEL RESULTS FOR STREAM FLOW AT SELECT TRANSECTS

Transect ID	Profile	Total Flow (cfs)	Flow Area (sq ft)	Channel Velocity (ft/s)
3	2-yr flow	31	9.6	3.23
	10-yr flow	98	21.22	4.62
	25-yr flow	138	26.74	5.16
5	2-yr flow	31	16.35	1.9
	10-yr flow	98	32.24	3.04
	25-yr flow	138	39.29	3.51
9	2-yr flow	31	9.11	3.4
	10-yr flow	98	21.26	4.61
	25-yr flow	138	27.35	5.05
17	2-yr flow	4	1.47	2.72
	10-yr flow	20	5.35	3.74
	25-yr flow	30	7.22	4.16
21	2-yr flow	4	1.21	3.32
	10-yr flow	20	4.76	4.2
	25-yr flow	30	6.49	4.62
24	2-yr flow	4	2.01	1.99
	10-yr flow	20	5.53	3.62
	25-yr flow	30	7.12	4.22

TABLE 4-9: COMPARISON OF KLINGLE CREEK FLOW AND VELOCITY ESTIMATES AT CRITICAL TRANSECTS FOR NO BUILD AND BUILD ALTERNATIVES

Transect	Design Flow	No Action/No Build Alternative (Existing Conditions)		Build Alternatives (B1, B2, C (Preferred), D1 and D2)	
		Flow (cfs)	Channel Velocity (ft/s)	Flow (cfs)	Channel Velocity (ft/s)
03	25-yr	514	8.32	138	5.16
04	25-yr	514	8.01	138	5.90
05	25-yr	514	5.46	138	3.51
09	25-yr	514	5.88	138	5.05
17	25-yr	233	7.35	30	4.16
21	25-yr	233	7.61	30	4.62
22	25-yr	233	7.13	30	3.94

As shown in Table 4.9, overland stormwater flows and channel velocities in Klingle Creek would be reduced in all of the build alternatives in comparison with existing conditions and the No Action/No Build Alternative. However, to obtain these flows and velocities, a combination of piping infrastructure and instream modifications would be required, as well as major engineering measures to dissipate the velocity of flows along the length of the new conduit and at the outlet into Rock Creek. Because of the valley's steep slope, numerous drop structures would be required in some locations along the conduit to decrease stormwater velocity as it moves through the pipe. These measures to reduce stormwater velocities would help reduce the overall velocity of water coming out of the outfall at Q3 (which also includes stormwater being conveyed to the outfall at Q3 from north of the Klingle Valley watershed) (see Figure 3-7). However, the degree at which this reduction in velocity would decrease the overall velocity would likely not be enough to greatly lessen the erosion that is currently taking place where the outfall enters Rock Creek. As a result, velocity dissipation measures would also be incorporated at the Rock Creek discharge location in order to prevent the continued erosion of the streambanks.

The overall water quality in both Klingle Creek and Rock Creek would be improved over current conditions as a result of the implemented stormwater management plan, which includes bank stabilization, stormwater erosion control, and stormwater management features, discussed above, such as new outlet structures, energy dissipation features, stormwater detention structures, streambed hardening, channel reconfiguration, and channel stabilization (see Appendix A, Stormwater Management Plan). These features would result in reduced sediment load, turbidity, and debris in the water column in Klingle Creek.

In addition, although the retention/detention measures were deemed infeasible as stand-alone methods of reducing peak flows to Klingle Creek, they could potentially be used locally in conjunction with the proposed storm water alternative to enhance storm water quality (see Chapter 5 of Appendix A, Storm Water Management Plan).

Minimal impacts to groundwater quality would be expected as a result of the operation of Klingle Road. Impacts to groundwater quality could occur as a result of infiltration of road related chemicals in runoff from Klingle Road. Maintenance of the stormwater conveyance system would reduce potential for adverse impacts to groundwater quality associated with runoff from the road.

Mitigation

No mitigation measures would be needed for normal operational impacts other than routine maintenance of the stormwater sewer and Klingle Road.

Conclusion

Implementation of any of the build alternatives would result in major reductions in stormwater flows and channel velocities in Klingle Creek that would decrease stormwater erosion and improve water quality. However, a combination of piping infrastructure, velocity dissipation measures within the conduit, and instream modifications would be required to obtain these benefits in Klingle Creek.

Klingle Creek is considered “waters of the U.S., and a Section 404 Permit would be required because of potential impacts to stream from construction activities. No impacts to floodplains or wetlands are expected from any of the Build Alternatives. Minimal impacts to groundwater recharge would be expected because the area of impervious surfaces would decrease under alternatives B1, B2 and C and only slightly increase over the length of the road under alternatives D1 and D2. Potential impacts to groundwater quality would be minimized by implementing best management practices to avoid the occurrence of chemical and fuel spills and to contain them if they do occur.

4.7 WILD AND SCENIC RIVERS

There are no rivers in the project area designated as “Wild and Scenic”; therefore, this topic has been dismissed.

4.8 COASTAL BARRIERS

There are no coastal barriers in the project area; therefore, this topic has been dismissed.

4.9 COASTAL ZONE IMPACTS

There are no coastal zone areas in the project area; therefore, this topic has been dismissed.

4.10 TRANSPORTATION

4.10.1 Regulatory Framework

National Highway System (NHS) Designation Act (23 U. S. C. 109) (November 1995)

The Act provides for that “a design for new construction, reconstruction, resurfacing, restoration, or rehabilitation of highway on the National Highway System (other than a highway also on the Interstate System) may take into account...[in addition to safety, durability and economy of maintenance]...

A. the constructed and natural environment of the area;
B. the environmental, scenic, aesthetic, historic, community, and preservation impacts of the activity; and
C. Access for other modes of transportation.”

4.10.2 Methodology and Assumptions

The traffic impact analysis has three main elements: 1) traffic estimates and forecasts, 2) a household travel survey, and 3) an intersection traffic condition analysis. The “immediate reopening” of Klingle Road is based on an estimate of 2007 as the earliest possible date for reopening. The long-term impact is examined for the year 2027. A flow chart of the methodology is shown in Figure 4-3.

A forecast of travel demand on Klingle Road was developed using the Metropolitan Washington Council of Governments (MWCOG) regional model, Version 2.1/TP+, Release C with Round 6.3 socioeconomic forecast database.

In an effort to understand the local travel patterns, a household travel survey was conducted as explained in Chapter 3 under Transportation. The household travel survey was conducted to better understand the traffic flow patterns of local residents. The survey sample for the study was accomplished through Random Digit Dialing with stratification by geography. The population of interest included people living in the census tracts that border either side of Klingle Road. The nine selected census tracts in the study area were divided into those that fell to the east of Klingle Road (census tracts 0004, 0006, 0501, 0502, and 1302) and to the west (census tracts 0026, 0039, 2701, and 2702). Two random samples were drawn with each encompassing one geographic area, east or west. These were used to assist in the travel demand forecast process.

A total of 108 households provided travel data for all household members (53 households east of Rock Creek Park and 55 households west of Rock Creek Park). The 108 households represented 201 persons with 122 vehicles available to them. Total recorded person trips were 1,039. The detailed traffic impact study, including results from the household survey, can be found in Appendix D.

As part of the Klingle Road EIS, a detailed traffic impact analysis was completed that measured the impacts of reopening the closed portion of Klingle Road. An extensive data collection effort was conducted in May and June of 2004 for the quantitative assessment of existing traffic conditions for the Klingle Road EIS study area. This effort was also supplemented through field observations and evaluations during weekday peak hours and mid-day Saturday hours. A total of 12 key intersections that could experience immediate impact from reopening the closed section of the Klingle Road were analyzed in detail. The following is the list of 12 key intersections:

I. Intersection of Connecticut Avenue and Porter Street

II. Intersection of Porter Street and Quebec Street

III. Intersection of Adams Mill Road and Klingle Road

IV. Intersection of Porter Street and 34th Street

V. Intersection of 34th Street and Woodley Road

VI. Intersection of Woodley Road and 32nd Street

VII. Intersection of Woodley Road and Klingle Road

VIII. Intersection of Woodley Road and Cathedral Avenue

IX. Intersection of Cleveland Avenue, Garfield Street and 32nd Street

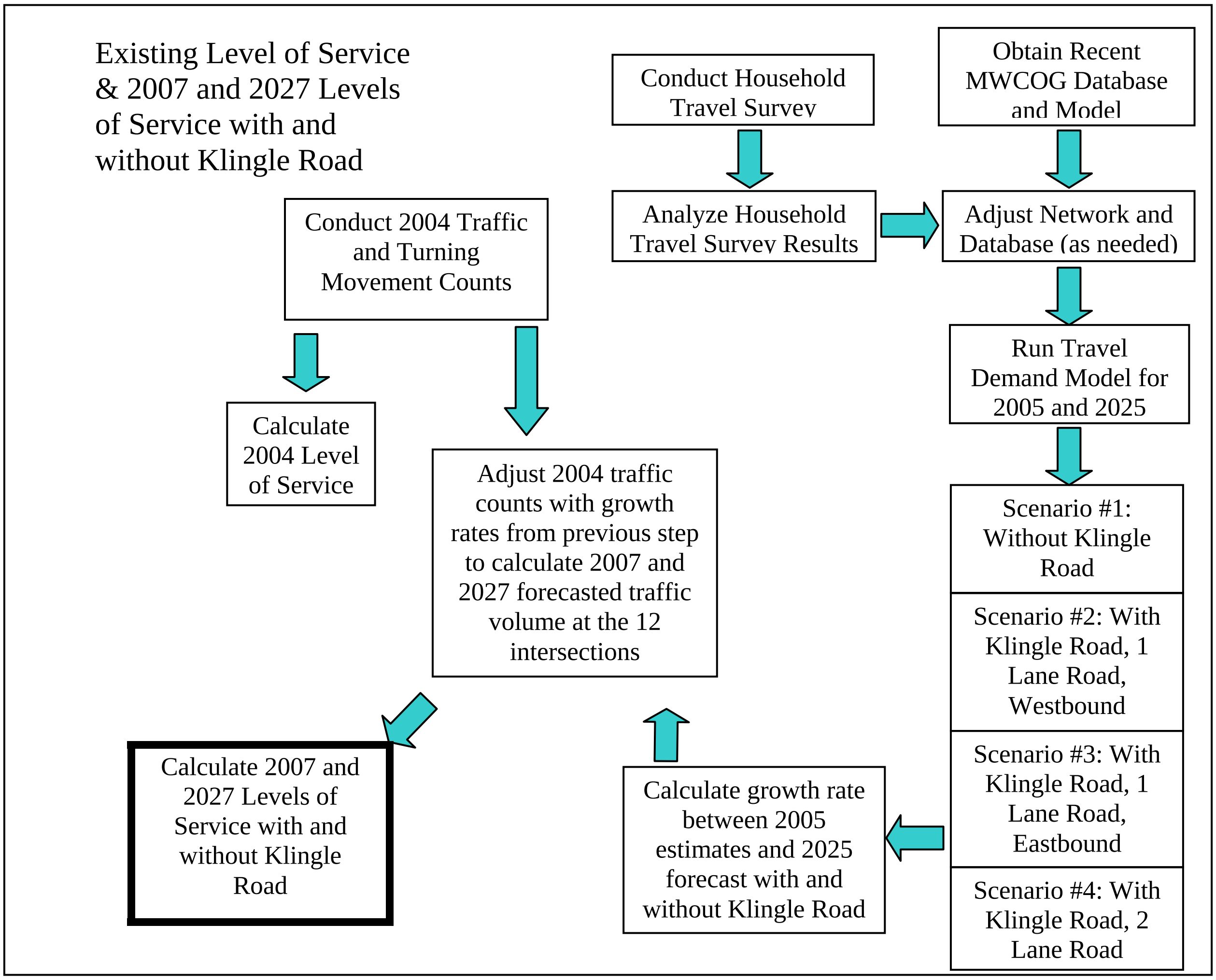
X. Intersection of Beach Drive and Porter Street

XI. Intersection of Adams Mill Road, Kenyon Street and Irvin Street

XII. Intersection of Park Road, Klingle Road and Walbridge Place

For the 12 key intersections, traffic conditions were analyzed for 2004 (existing) and for forecast years 2007 and 2027. The analysis was conducted for the Alternatives examined for the Klingle Road EIS. A more detailed discussion is contained in Appendix D.

FIGURE 4-3: METHODOLOGY



4.10.3 No Action/No Build Alternative

Under the No Build/No Action Alternative, Klingle Road would remain closed to traffic. Northwest Washington DC is a fully established area and no major land use changes are expected within and in the vicinity of the study area. Thus, if Klingle Road remained closed, long-term adverse impacts to traffic patterns would be minimal. Although intersections where congestion is currently experienced would gradually worsen over the years, all 12 key intersections examined in the study will maintain levels of service (LOS) D or better except at the Beach Drive/ Porter Street intersection. Due to its heavy directional traffic volume during peak hours, the am peak in 2007 will reach LOS E (delay time of 36 seconds). Over a 20-year horizon, AM peak traffic on Beach Drive is expected to continue to grow while traffic volume in afternoon peak hours will remain unchanged or decrease over the years. Therefore, the afternoon peak hour LOS remains as D with an almost imperceptible increase in delay.

Conclusion

Long-term adverse impacts to traffic would be minimal. Key intersections would maintain LOS D or better except at Beach Drive, where heavy directional traffic that is expected to increase in the long-term.

4.10.4 Build Alternatives

Construction Impacts

Reconstruction of Klingle Road, along with the installation of the stormwater sewer and the restoration of Klingle Creek, would temporarily affect local traffic. Site work would generate greater volumes of localized traffic due to workers arriving and departing the site, movement of materials and equipment, and removal of construction waste. Major interruptions of traffic would not be expected during the construction period. However, at some locations, worker and delivery trips for this project could exacerbate congested conditions. In addition, parking would also be affected during construction. Parking needs for workers' personal vehicles, trucks, and other construction equipment could have an adverse impact on local residents' parking needs.

Mitigation

Mitigations aimed at minimizing impacts to local traffic during the construction of any of the build alternatives includes:

- Work schedules for construction could be adjusted to minimize adverse impacts to local traffic.
- Workers would arrive before the morning rush hour period
- In the afternoon, workers would typically leave after school lets out and before the evening rush hour.
- Whenever possible, deliveries and other construction activities would take place during off-peak travel hours.
- Extra signage would be put in place along Porter Street, Connecticut Avenue, Wisconsin Avenue, and Woodley Road, which would direct truck traffic in to and out of the site, to reduce confusion.
- To minimize construction-related parking problems:
- A staging area within the work zone would provide parking for trucks and construction equipment.
- The time period during which workers would need parking spaces would generally coincide with the times local residents are away at work, minimizing adverse impacts to local parking requirements.

Operational Impacts

Under Alternatives B1 and B2, Klingle Road would be rebuilt as a one-way westbound road with and without a path, respectively. The directional traffic flow pattern on Klingle Road is not expected to be as distinct as the pattern observed on Connecticut Avenue. For example, the household travel survey conducted for the traffic impact study concluded that westbound movement from east of Connecticut Avenue is more pronounced than the eastbound movement from west of Connecticut Avenue (52% vs. 48%). Travel demand forecast results on Klingle Road also indicated that more vehicles would use the road if the one-way roadway is westbound rather than eastbound should the road be reopened. The one-way westbound roadway would carry almost 2,000 vehicles per day in the proposed 2007 reopening year of Klingle Road. This volume would grow to 2,300 daily vehicles in 20 years.

Tables 4-10 and 4-11 summarize the average increased or reduced delay time in seconds per vehicle in comparison between the No Build and Alternative B1 and B2. Under these two alternatives, none of the intersections in the study would experience any noteworthy increases or decreases in delay time and the LOS would remain the same compared to the No Action/No Build scenario. In the long term, none of the intersections would experience an increase in delay greater than six seconds per vehicle in the morning or afternoon peak; many would experience no change compared with the No-Build Alternative; and, the 34th Street intersections would actually experience a decrease in delay. Most notably, the morning peak hour delay time for the Beach Drive/Porter Street intersection decreases by almost 10 seconds. With this scenario, the southbound Beach Drive traffic volume would be expected to decrease when compared to the No Build scenario. Saturday mid-day impact would be very minor for all intersections and LOS would be C or better.

In Alternatives C, D1, and D2, Klingle Road would be reopened to two-way traffic. Similar to the Alternatives B1 and B2 analysis and as shown below in Tables 4-10 and 4-11, most intersections would show no considerable delay time changes compared to the No Action/No Build Alternative. Intersections where congestion is currently experienced would gradually worsen over the years; all 12 key intersections examined in the study would maintain levels of service (LOS) D or better except at the Beach Drive/Porter Street intersection. The Beach Drive/Porter Street intersection would experience dramatic increases in vehicle delay time, and a major deterioration in level of service, compared to the No Action/No Build Alternative. However, delay time still would be in a realistic range between 60 seconds and 75 seconds in the opening year and within a range between 98 seconds and 121 seconds in the long term, as usage is expected to increase. Tables 4-10 and 4-11 summarize the average increased or reduced delay time in seconds per vehicle in comparison between No Build and this alternative.

Reopening Klingle Road provides another east-west traffic roadway in the area and an alternative thoroughfare for cross-town access to schools, places of worship, commercial areas, and public buildings. The Two-way roadway would carry almost 3,850 vehicles per day in the proposed year of the Klingle Road reopening in 2007. This volume would grow to 5,000 daily vehicles over a 20 year period.

Although the Woodley Road intersections analysis show no considerable delay time increase with the reopening of Klingle Road, adverse impacts to traffic patterns would likely occur on Woodley Road during peak hours as direct access to and from Klingle Road would increase traffic volume in the area. In addition, Alternative D2 would provide east-west recreational accessibility.

TABLE 4-10: 2007 DELAY TIME (SECONDS PER VEHICLE) COMPARISON BETWEEN THE NO ACTION/NO BUILD AND BUILD SCENARIOS

Node #	Intersection	1-Way Westbound		2-Way	
		AM Peak	PM Peak	AM Peak	PM Peak
1	Connecticut Ave. @ Porter St.	(0.50)	(2.10)	(1.40)	(3.10)
2	Porter St. @ Quebec St.	(0.20)	(0.10)	(0.20)	(0.10)
3	Adams Mill Road @ Klingle Rd.	(0.10)	(0.10)	0.50	0.00
4	Porter St. @ 34th St.	(0.40)	(1.00)	(0.20)	(0.50)
5	Woodley Rd. @ 34th St.	(0.70)	(0.30)	(0.20)	0.00
6*	Woodley Rd. @ 32nd St.	0.70	0.60	0.50	0.50
7*	Woodley Rd. @ Klingle Rd.	(0.60)	0.10	(0.20)	0.20
8*	Woodley Rd. @ Cathedral Ave.	1.60	0.70	0.50	0.30
9	Cleveland Ave. @ 32n St. @ Garfield St.	0.00	0.00	0.00	0.00
10*	Beach Dr. @ Klingle Rd./Porter St.	0.00	3.70	26.00	17.50
11	Adams Mill Rd. @ Irving St. @ Kenyon St.	(0.40)	0.10	3.30	(0.20)
12	Klingle Rd. @ Park Rd.	1.10	0.10	0.90	0.00

Notes:
1. Unsignalized intersections are illustrated with asterisk **(*).**
2. Parenthesis () indicates negative values or a decrease in delay time.
3. Delay changes (increases or decreases) of five seconds are in Bold.

TABLE 4-11: 2027 DELAY TIME (SECONDS PER VEHICLE) COMPARISON BETWEEN NO BUILD AND BUILD SCENARIOS

Node #	Intersection	1-Way Westbound		2-Way	
		AM Peak	PM Peak	AM Peak	PM Peak
1	Connecticut Ave. @ Porter St.	2.10	3.60	(2.50)	(1.30)
2	Porter St. @ Quebec St.	0.00	0.00	(0.20)	(0.20)
3	Adams Mill Road @ Klingle Rd.	0.00	0.00	(0.20)	0.00
4	Porter St. @ 34th St.	(1.30)	(3.80)	(0.50)	(0.50)
5	Woodley Rd. @ 34th St.	(3.80)	(2.20)	1.60	1.60
6*	Woodley Rd. @ 32nd St.	0.80	0.80	1.90	1.50
7*	Woodley Rd. @ Klingle Rd.	0.00	0.40	0.30	0.40
8*	Woodley Rd. @ Cathedral Ave.	2.30	0.90	5.00	1.50
9	Cleveland Ave. @ 32n St. @ Garfield St.	1.00	0.00	0.70	0.10
10*	Beach Dr. @ Klingle Rd./Porter St.	(9.70)	6.00	48.30	71.70
11	Adams Mill Rd. @ Irving St. @ Kenyon St.	0.10	0.30	0.10	0.00
12	Klingle Rd. @ Park Rd.	1.60	0.10	5.40	0.70

Notes:
1. Unsignalized intersections are illustrated with asterisk **(*).**
2. Parenthesis ()indicates negative values or a decrease in delay time.
3. Delay changes (increases or decreases) of five seconds are in bold.

Mitigation

No mitigation measures would be needed for normal operational impacts other than routine maintenance of the stormwater sewer and Klingle Road.

Conclusion

Alternatives B1 and B2 (one-way westbound) would provide access on a one-way westbound Klingle Road for almost 2,000 vehicles per day in 2007 increasing to 2,300 daily vehicles in 20 years. None of the primary intersections surrounding Klingle Road would experience an increase in vehicle delay time greater than 6 seconds per vehicle; many would experience no change.

Alternatives C, D1, and D2 would provide two-way access on Klingle Road for almost 3,850 vehicles per day in 2007 increasing to 5,000 daily vehicles over a 20 year period. Similar to Alternatives B1 and B2, most intersections would experience no perceptible change in vehicle delay times, except at the intersection of Beach Drive and Porter Street. Both delay times and LOS would be increased in the short and long-term.

Although the Woodley Road intersection analysis resulted in no major delay time increase with the reopening of Klingle Road, adverse impacts to traffic patterns would likely occur on Woodley Road during peak hours as direct access to and from Klingle Road would increase traffic volume in the area.

4.11 CULTURAL RESOURCES

4.11.1 Regulatory Framework

National Historic Preservation Act of 1966

The National Historic Preservation Act of 1966, as amended through 2000 (NHPA) protects buildings, sites, districts, structures, and objects that have significant scientific, historic, or cultural value. The Act established affirmative responsibilities of Federal agencies to preserve historic and prehistoric resources.

Effects on properties that are listed in or eligible for the National Register of Historic Places (NRHP) must be taken into account in planning and operations. Any property that may qualify for listing in the NRHP must not be inadvertently transferred, sold, demolished, substantially altered, or allowed to deteriorate.

DC Law 2-144, the Historic Landmark and Historic District Protection Act of 1978

This law is the local ordinance that authorizes the designation and protection of historic landmarks and historic districts. While it puts in place a special review process for properties in a historic district, it also recognizes change as an important element in the city's evolution.

4.11.2 Methodology and Assumptions

In accordance with Section 106 of the National Historic Preservation Act, the DDOT has consulted with the District of Columbia Historic Preservation Office (DCHPO) regarding the proposed project alternatives for Klingle Road (Appendix E). Cultural resource investigations undertaken for this EIS were limited to a review of readily available information at DCHPO and National Park Service (NPS). As there has been no previous systematic archaeological or historic architectural survey of the project area, presence/absence of important cultural resources has not been determined at this time. Therefore, the following discussion of potential effects and mitigation procedures would be largely hypothetical.

Cultural resource impacts were qualitatively assessed through a presence/absence determination of important cultural resources and mitigation measures to be employed during construction activities.

4.11.3 No Action/No Build Alternative

Under this alternative, Klingle Road would not be rebuilt. Existing retaining walls along the creek would not be repaired, and stormwater damage would not be corrected. There would be no short-term or long-term direct impacts upon archaeological sites, historic districts or structures that may exist on the site. However, implementation of the No Action/No Build alternative could result in the gradual long-term loss of unknown archaeological resources that may occur on the site by erosion, particularly caused by uncontrolled stormwater effects. The retaining walls, which merit consideration as historic architectural features, would incur some adverse impacts under this option, because they would not be repaired or stabilized, as would occur under the other (build) alternatives.

4.11.4 Build Alternatives

General impacts to cultural resources road construction would be similar among all build alternatives. The cultural and historic resources of Klingle Valley (both above and below ground) are not part of Rock Creek Park, but park of Klingle Valley. They are cared for by Rock Creek Park administration. Based upon existing information, no previously identified archaeological properties eligible for the National Register of Historic Places are located within the Klingle Road right-of-way and its immediate surroundings. However, in view of the topography of the area and the presence of known prehistoric sites both to the northeast and southwest, the project's area of potential effect (APE) has the potential to contain archaeological resources. Therefore, if the DDOT implements any of the alternatives involving new construction or repairs to the stormwater drainage system, field surveys should be undertaken to determine whether or not archaeological properties eligible for the National Register are located within the APE associated with the undertaking.

Road construction under alternatives B1, B2, C, D1, and D2 would likely affect the existing retaining walls, which merit consideration as historic resources (either because of their structural association with thee mid-nineteenth-century road, or as contributing elements of the landscape of Rock Creek Park). The impact on the walls could vary, depending upon specific measures at different locations: negligible where there are no obvious changes; moderate adverse impact where walls are partially dismantled; and, beneficial impacts where the wall is maintained and preserved, and where a wall is stabilized.

Road construction under alternatives B1, B2, and C would be very unlikely to have more than a negligible effect on archaeological resources, because the restored road would be no wider than the existing road. Under D1, the rebuilt road would be 6 feet wider; under D2, in addition to those 6 feet of added road width, a recreation path would require another 4 feet—10 feet added in total. These alternatives would probably entail grading of land that may contain archaeological deposits. This action would probably cause a loss of integrity of any sites in the APE. However, no archaeological sites have been identified previously within or adjacent to the APE. If survey does identify a site in this area, and avoidance is not feasible, the project's adverse impact (adverse effect under Section 106 of NHPA) could be moderate (if mitigation measures are agreed upon by DDOT, NPS and DCHPO and implemented) or major (if no mitigation is implemented).

Stormwater management actions would entail stabilization of the stream channel and banks of Klingle Creek, and restoration of the stream meander. At present, the existence of archaeological deposits adjacent to the stream has not been established (a few isolated prehistoric artifacts have been observed within the stream bed, but these were obviously displaced from their original depositional context elsewhere). At other locations within Rock Creek Park, small, well-preserved prehistoric sites have recently been discovered on the floors of constricted stream valleys, so the potential for similar sites along Klingle Creek must be considered. If such sites do exist, their integrity could be affected adversely by planned stabilization measures (such as modifying slopes by cutting and/or filling). A field survey should be conducted to determine whether or not archaeological properties eligible for the National Register are located within the area of potential effect (APE) of stormwater management construction. If a survey does identify a site (or sites) in this area, and avoidance is not feasible, the project's adverse impact (adverse effect under Section 106 of NHPA) could be moderate (if mitigation measures are agreed upon by DDOT, NPS and DCHPO and implemented) or major (if no mitigation is implemented).

Mitigation

Where retaining walls must be altered by construction, planned mitigation would entail reconstruction using original or similar materials.

If road construction alternative D1 or D2 is selected, the DDOT, in consultation with DCSHPO and NPS, would undertake an archaeological survey of the APE associated with the construction zone to determine whether or not important archaeological resources are present. If so, the DDOT would develop a plan to avoid, minimize, or mitigate (by archaeological data recovery) adverse effects to such resources.

Prior to installation of the stormwater sewer, DDOT, in consultation with DCSHPO and NPS, would undertake an archaeological survey of the APE associated with the stream stabilization measures to determine whether or not important archaeological resources are present. If sites are identified, DDOT would develop a plan to avoid, minimize, or mitigate adverse effects to such resources.

Operational Impacts

After construction is completed, normal operation of the road would not have any measurable impacts on archeological resources that may occur on the site. After stormwater management features are installed and restoration efforts to Klingle Creek have been completed, erosion would decrease, and the net effect on any stream-side archaeological resources would be a beneficial impact (stabilization of the streambank). No mitigation measures would be needed for normal operational impacts. Long-term operation of the road could affect the structural integrity and appearance of the retaining walls by vibration and by air pollution, which could adversely affect stone surfaces.

Mitigation

No mitigation measures would be needed for normal operational impacts other than routine maintenance of the stormwater sewer and Klingle Road.

Conclusion

Currently, the only known cultural resources that require consideration are the retaining walls within the APE, and the nearby historic districts, even though the significance of the walls has not been formally assessed according to NHPA criteria. As no archaeological resources have been identified in the APE, surveys would be required to determine the various treatment and mitigation options that are necessary. If a site is identified, and avoidance is not feasible, a moderate to major adverse impact (under section 106 NHPA) would occur depending upon whether the impact is mitigated.

4.12 AIR QUALITY

4.12.1 Regulatory Framework

Clean Air Act Conformity and Transportation Improvement Plan

The 1990 Amendments to the Clean Air Act require federal sponsored actions (including finance support, review and approval activities) to show conformance with a State Implementation Plan (SIP) in areas that have not attained the NAAQS. Conformity to a SIP means conformity to a SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards. The guidelines for determining conformity are found in 40 CFR, Parts 6, 51, and 93 (November 30, 1993) for General Conformity requirement; or 40 CFR, Parts 51 and 93 (December 27, 1993 and August 15, 1997 revised) for Transportation Conformity requirement; as well 40 CFR 93 Transportation Conformity Rule Amendments for the New 8-Hour Ozone and PM2.5 NAAQS (July 1, 2004). A federal action will fall under the jurisdiction of either the General Conformity Rule or the Transportation Conformity Rule. The Transportation Conformity Rule covers highway and transit projects. Any federally sponsored projects that are not funded or approved by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA) will fall under the General Conformity Rule. Because the proposed improvements at Klingle Road comprise a federal action within the support and jurisdiction of the FHWA, the project is subject to the Transportation Conformity Rule.

All rules for conformity of federally sponsored or approved activities should be followed in meeting NAAQS and SIP requirements. The EPA has developed criteria and procedures for determining conformity to State or Federal Implementation Plans. For determining whether the proposed Klingle Road project an action conforms to the SIP's purpose, this project:

- Shall not cause or contribute to any new violation of the standard;
- Shall not increase the frequency or severity of any existing violation; and
- Shall not delay timely attainment of the standards.

Conformity is defined in Section 176(c) of the CAA, amended in 1990, as conformity to the SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of those standards, as described above.

4.12.2 Methodology and Assumptions

In order to demonstrate compliance to conformity rules, the vehicular pollutants of a transportation project are generally evaluated on two scales: the micro-scale air quality impacts of CO which is the predominant pollutant emitted by the project related motor vehicles; and meso-scale impacts of NOx and

VOC which are regional concerns as included in the MWCOG conforming transportation improvement plans.

CO Hot Spot Analysis

For the proposed action, a CO hot spot analysis was conducted by utilizing a series of project-related information, plans and designs of roadways, emission sources data, traffic information, and construction schedule, etc. Traffic data were obtained from traffic survey, existing documents review, and future forecast. Data used for air quality analysis include ambient air quality status and classification from EPA and MWCOG (Metropolitan Washington Council of Governments); and traffic survey data or forecast information from the project traffic team. Specifically, these data included worst-case peak hour traffic volumes, vehicle classifications, travel speeds, turning movements (movement per lane), capacity, levels of service (LOS), volume-to-capacity (v/c) ratios, delays, signal timing, saturation flow, and roadway geometry at analyzed intersections, etc., under build 2-Way, 1-way westbound, 1-way eastbound and no-build alternatives for existing 2004, baseline year 2007, and future year 2027, respectively. CO hot-spot impacts of vehicular emission sources were analyzed by using the following protocol:

- The prediction for emissions of motor-vehicle-generated pollutants within the study area was first characterized by analyzing meteorological phenomena, traffic conditions, and physical configurations. Air pollutant dispersion models were then used to simulate mathematically how traffic, meteorology, and geometry combine to affect pollutant concentrations. Procedures for determining maximum one-hour and eight-hour CO (carbon monoxide) concentrations followed the EPA-developed Guideline for Modeling Carbon Monoxide from Roadway Intersections, (EPA-454/R-92-005), and Guidelines for Air Quality Maintenance Planning and Analysis, Volume 9 (Revised).
- Selected intersection locations and sensitive sites for micro-scale analysis were based on a screening analysis of traffic conditions. The receptor locations for microscale analysis were placed at affected intersections and sensitive areas. The analysis sites were selected based upon potential air impacts and expected maximum changes in air pollutant concentrations; including residential areas, parks, schools, other sensitive areas, and locations where the traffic conditions will be changed due to the project deployment. At each analyzed site, a series of multiple receptor locations were examined in accordance with federal and local guidelines. All corners of each analyzed intersection and the locations near approach and departure links were included in the modeling to ensure that the worst-case concentrations are calculated. All receptors were placed at 1.8 meters above the ground. In summary, four major study sites or intersections were selected for detailed microscale hot-spot analysis based on the traffic conditions. These four affected intersections within project vicinity are: Connecticut Avenue and Porter Street/Quebec Street (Intersection ID# 1 and 2, 40 receptor locations), Woodley Road/Klingle Road and 32nd Street (ID# 6 and 7, 55 receptor locations), Cleveland Avenue and Garfield Street and 32nd Street/Woodley Road (ID# 9, 40 receptor locations), and Porter Street/Klingle Road Ramp and Beach Drive (ID# 10, 20 receptor locations).
- Vehicular cruise and idle emissions for the dispersion modeling were computed using EPA's MOBILE6.2. Roadway vehicular emissions factors were determined mathematically as a function of route speed, vehicle classification, ambient temperature and other factors (assuming "worst-case" meteorological conditions).
- Impacts were calculated by using EPA's CAL3QHC dispersion model to simulate mathematically how traffic, meteorology and geometry combine to affect pollutant concentrations. A refined intersection model CAL3QHCR was also ready for any locations where the predicted impact levels that exceed standards or noteworthy air quality impacts are predicted. In the Klingle Road

Reconstruction project impact analysis, the CAL3QHC modeling was sufficient, and the CAL3QHCR was not required.

- Except those survey data obtained from project traffic analysis, regional summaries and programs of traffic used in the emissions analysis were based on the EPA's survey and report, and are consistent with the air quality conformity analysis for the FY 2004-2009 TIP (Transportation Improvement Programs) and 2003 CLRP Constrained Long Range Plan approved by the MWCOG and the Transportation Planning Board (TPB). In the microscale CO analysis, background CO levels were added to calculated impacts to obtain total ambient concentrations. The background levels used were 6.0 ppm (parts per million) for 1-hour and 3.0 ppm for 8-hour concentrations. A persistence factor of 0.7 was used to convert the 1-hour CO concentrations to 8-hour concentrations. This factor represents timely changes of traffic and meteorological conditions. Both backgrounds and persistent factor were recommended in an Environmental Assessment for Kennedy Center Access Improvements by FHWA for Washington DC area (October 2003).
- At each receptor site, calculate maximum 1- and 8-hour carbon monoxide concentrations for existing 2004, future baseline 2007 and build year 2007 without the project, and the future years with the project were calculated. In CAL3QHC modeling, the principal meteorological factors which influence the transport and concentration of pollutants from vehicular sources are wind speed, wind direction and mixing height, among others. Following the EPA's recommendations, a worst-case wind speed of 1 meter/second (m/s); a mixing height of 1000 meters; and wind angle search at 5 degree increments to determine the worst-case wind direction and maximum concentration at each receptor location were used in the impact analysis. Identified emission control or implementation programs mandated by the local or federal for the study area were also included in the modeling. The total impact and background CO concentrations were summed up to compare with NAAQS standards.

Predicted Existing CO Concentrations

By utilizing the site selection methodologies and models described above, a hot-spot CO impact analysis based on micro-scale level was conducted for four affected intersections within project vicinity: Connecticut Avenue and Porter Street/Quebec Street (Intersection ID# 1 and 2, 40 receptor locations), Woodley Road/Klingle Road and 32nd Street (ID# 6 and 7, 55 receptor locations), Cleveland Avenue and Garfield Street and 32nd Street/Woodley Road (ID# 9, 40 receptor locations), and Porter Street/Klingle Road Ramp and Beach Drive (ID# 10, 20 receptor locations) under existing 2004 conditions. In microscale CO analysis, background CO levels were added to calculated impacts to obtain total ambient concentrations. The background levels used are 6.0 ppm (parts per million) for 1-hour and 3.0 ppm for 8-hour concentrations, as recommended in an Environmental Assessment for Kennedy Center Access Improvements by FHWA for Washington DC area.

The predicted 2004 worst-case receptor CO (carbon monoxide) concentrations for these analyzed intersections under worst peak-hour period are presented in Table 4-12 below.

TABLE 4-12: PREDICTED EXISTING 2004 AMBIENT CO CONCENTRATIONS WITHIN THE PROJECT'S VICINITY

Intersection	Ambient CO Concentration		NAAQS	
	1-hour* (ppm)***	8-hour** (ppm)	1-hour (ppm)	8-hour (ppm)
Connecticut Avenue and Porter Street / Quebec Street (Int. 1 and 2)	10.70	6.29	35.0	9.0
Woodley Road and Klingle Road and 32nd Street (Int. 6 and 7)	6.7	3.49	35.0	9.0
Cleveland Avenue and Garfield Street and 32nd Street/ Woodley Road (Int. 9)	7.30	3.91	35.0	9.0
Porter Street/Klingle Road Ramp and Beach Drive (Int. 10)	9.50	5.45	35.0	9.0

*: Including a conservative 1-hour background concentration 6.0 ppm
**: Including a conservative 8-hour background concentrations 3.0 ppm, and a persistent factor 0.7
***: ppm = parts per million

Regional Air Pollutant Emissions

Regional air quality resulting from concerned regional pollutants and ozone precursors (VOC and NOx) were reviewed to ensure the project compliance with the Ambient Air Quality Standards and SIP requirements. This procedure is a requirement in the compliance rules for conformity of transportation activities that have been adopted by both Federal and State regulatory agencies, as described in EPA developed *Criteria and Procedures for Determining Conformity to State or Federal Implementation Plans of Transportation Plans, Programs, and Projects* (EPA 40 CFR Parts 51 and 93, November 24, 1993, and Amendments August 15, 1997 and July 1, 2004). The regional air pollutants relevant to the proposed project shall not cause or contribute to any new violation of the standard; shall not increase the frequency or severity of any existing violation; and shall not delay timely attainment of the standards.

Because ozone is a regional rather than local air quality problem, the evaluation of ozone impacts shall base upon the analysis performed by the Metropolitan Washington Council of Governments (MWCOG) which includes representatives of the District, Maryland, and Virginia. The section describes the regional cumulative emission conformity analysis conducted by the MWCOG and address the TIP/SIP conformity determination. In the future years, a SIP prepared by the District and the states to further control 8-hour ozone levels shall be submitted to EPA by spring 2007. Through this plan, COG shall design the approach for reducing the ozone level in the air and emissions of ozone precursors. The comprehensive approach taken by the Clean Air Act covers the control on many different sources and a variety of clean-up methods. The air pollution control programs could include special rules in New Source Review program, federal General Conformity and Transportation Conformity programs, the industrial facilities, power plant programs, etc.; as well as could implement programs to further reduce emissions of ozone precursors from sources such as vehicles, fuels, and other activities; to improve future ambient air quality.

4.12.3 No Action/No Build Alternative

A hot-spot CO impact analysis based on micro-scale level was predicted 2004 worst-case receptor CO (carbon monoxide) concentrations for these analyzed intersections under worst peak-hour period are presented in 4-11. The air quality analysis under future no-build conditions were conducted to determine the baseline CO concentration levels within the study areas in 2007 project completion year and 2027 future year based on future land use, population, employment, regional traffic growth rates and traffic conditions. These full analysis years are consistent with the year for project opening forecast and traffic impacts analysis. By utilizing the same analysis methodologies and emission models as described in methodology section and use to predict for existing 2004 condition, the predicted 2007 and 2027 CO concentrations for the No Action/No Build Alternative are presented in Table 4-13.

For all cases examined, ambient CO concentrations predicted at all sites would be below (within) the NAAQS standards. Due to the vehicular engine improvement; state inspection and maintenance programs; and other regional control measures, the engine exhaust emissions will be reduced in the future years. Therefore, the combined effect of future traffic volume and decreased exhaust engine emissions will have lower total ambient concentrations in year 2007 and 2027 under no-build conditions comparing to those under 2004 existing conditions. The predicted 2007 maximum baseline ambient 1-hour and 8-hour CO concentrations within the study area occur at the intersection of Connecticut Avenue and Porter Street and are 9.40 ppm and 5.38 ppm, respectively. The predicted 2027 maximum future no-build (Alternative A) ambient 1-hour and 8-hour CO concentrations within the study area are 8.30 ppm and 4.61 ppm, respectively.

Conclusion

Under the No Action/No Build Alternative, there would be no change in ambient air quality.

TABLE 4-13: PREDICTED AMBIENT CO CONCENTRATIONS FOR YEARS 2004, 2007, AND 2027

Intersection	Ambient CO Concentration		NAAQS for all Years	
	1-hour* (ppm)***	8-hour** (ppm)	1-hour (ppm)	8-hour (ppm)
Connecticut Avenue and Porter Street / Quebec Street (Int. 1 and 2)	2004 – 10.70 2007 - 9.40 2027 – 8.30	2004 – 6.29 2007 - 5.38 2027 – 4.61	35.0	9.0
Woodley Road and Klingle Road and 32nd Street (Int. 6 and 7)	2004 – 6.7 2007 – 6.4 2027 – 6.3	2004 – 3.49 2007 – 3.35 2027 – 3.21	35.0	9.0
Cleveland Avenue and Garfield Street and 32nd Street/ Woodley Road (Int. 9)	2004 – 7.30 2007 – 7.20 2027 – 6.80	2004 – 3.91 2007 – 3.84 2027 – 3.56	35.0	9.0
Porter Street/Klingle Road Ramp and Beach Drive (Int. 10)	2004 – 9.50 2007 – 8.60 2027 – 7.80	2004 – 5.45 2007 – 4.82 2027 – 4.26	35.0	9.0

*: Including a conservative 1-hour background concentration 6.0 ppm
**: Including a conservative 8-hour background concentrations 3.0 ppm, and a persistent factor 0.7
***: ppm = parts per million

4.12.4 Build Alternatives (Alternatives B1, B2, C, D1, and D2)

Construction Impacts

Klingle Road is located in an area classified by the U.S. Environmental Protection Agency as severe nonattainment for ozone. Pollutant emissions resulting from the construction of the road and installation of the new stormwater sewer could potentially create increases in emissions that could impact local residents. Air quality impacts during construction include the impacts resulting from construction activities, traffic diversion, construction procedures, and equipment utilization. The impacts are various based on project construction schedule, amount and type of construction activity and equipment, security measures imposed during the course of construction, and construction plans and phases. Air pollutants from construction would contain mobile source emissions from construction equipment and worker and delivery vehicles; the related CO, PM, fugitive dust, and other criteria pollutants. Examples of fugitive dust include windborne particulate matter from earth-moving and material handling during construction activities.

These impacts however would be minimized through implementation of best management practices (BMPs) during construction activities and environmental compliance critical to mitigate potential air impacts (e.g., mitigation measures/BMPs below).

Mitigation

- Use low sulfur diesel fuel in off-road construction equipment.
- Where practicable, use diesel engine retrofit technology in off-road equipment to further reduce emissions. Such technology may include Diesel Oxidation Catalyst / Diesel Particulate Filters, engine upgrades, engine replacements, or combinations of these strategies.
- Limit unnecessary idling times on diesel powered engines to 3 to 5 minutes.
- Locate diesel powered exhausts away from fresh air intakes.
- Utilize water or appropriate liquids for dust control during demolition, land clearing, grading, on materials stockpiled on the ground surfaces, and other activities.
- Cover open-body trucks for transporting materials.
- Control dust related to the construction site through a soil erosion sediment control procedure that includes, among other things:
    - Spraying of a suppressing agent on dust pile (non-hazardous, biodegradable);
    - Containment of fugitive dust; and
    - Adjustment for meteorological conditions as appropriate.

The benefits of these commitments will help proactively avoid or reduce potential impacts to prevent air quality deterioration. The current emission removal technologies applied to diesel engines can reduce air emissions by approximately 40% for PM, and 50% for CO and other pollutants. Federally regulated low sulfur diesel fuel, expected to be used in heavy-duty engines and construction vehicles in 2006, is expected to further reduce emissions for PM and NOx up to 75%. Any construction activities that occur after year 2006 will have even smaller impacts on air quality, since the EPA is proposing new emission standards for construction diesel vehicles. As a result of all present and future regulations, practices, and construction plans, the construction impacts of the proposed project will be inconsequential.

Operational Impacts

CO Analysis

The detailed microscale air quality impact evaluation and assessment for years 2007 and 2027 build alternatives were conducted based upon traffic analysis data for future years build alternatives by utilizing the same models (MOBILE6.2 and CAL3QHC) and procedures described in the methodology section above. The analysis of operation impact includes three potential factors:

- Effect of traffic-generated emissions—including those related to queuing and free flow traffic on criteria pollutant levels at locations within the study area, and also at peripheral locations along the major feeder roadways to and from the project area;
- Consistency with the applicable State Implementation Plan (SIP); and
- Compliance with the Federal Conformity requirements and procedures.

The microscale analysis results for all build alternatives (One Lane B1 and B2, Original Alignment C, and Two Lanes D1 and D2) at various analysis sites in year 2007 and 2027 are presented in Table 4-14 and Table 4-15, respectively.

TABLE 4-14: PREDICTED 2007 BUILD ALTERNATIVE(S) AMBIENT CO CONCENTRATIONS

Intersection	Ambient CO Concentration						NAAQS for all Years	
	1-hour* (ppm)***			8-hour** (ppm)			1-hour (ppm)	8-hour (ppm)
	Alt B	Alt C	Alt D	Alt B	Alt C	Alt D		
Connecticut Avenue and Porter Street / Quebec Street (Int. 1 and 2)	9.50	9.40	9.40	5.45	5.38	5.38	35.0	9.0
Woodley Road and Klingle Road and 32nd Street (Int. 6 and 7)	6.60	6.50	6.70	3.42	3.35	3.49	35.0	9.0
Cleveland Avenue and Garfield Street and 32nd Street/ Woodley Road (Int. 9)	7.20	7.20	7.20	3.84	3.84	3.84	35.0	9.0
Porter Street/Klingle Road Ramp and Beach Drive (Int. 10)	8.50	8.70	8.80	4.75	4.99	4.96	35.0	9.0

*: Including a conservative 1-hour background concentration 6.0 ppm
**: Including a conservative 8-hour background concentrations 3.0 ppm, and a persistent factor 0.7
***: ppm = parts per million

TABLE 4-15: PREDICTED 2027 BUILD ALTERNATIVE(S) AMBIENT CO CONCENTRATIONS

Intersection	Ambient CO Concentration						NAAQS for all Years	
	1-hour* (ppm)***			8-hour** (ppm)			1-hour (ppm)	8-hour (ppm)
	Alt B	Alt C	Alt D	Alt B	Alt C	Alt D		
Connecticut Avenue and Porter Street / Quebec Street (Int. 1 and 2)	8.30	8.20	8.20	4.61	4.54	4.54	35.0	9.0
Woodley Road and Klingle Road and 32nd Street (Int. 6 and 7)	6.40	6.40	6.50	3.28	3.28	3.35	35.0	9.0
Cleveland Avenue and Garfield Street and 32nd Street/ Woodley Road (Int. 9)	6.80	6.80	6.80	3.56	3.56	3.56	35.0	9.0
Porter Street/Klingle Road Ramp and Beach Drive (Int. 10)	7.90	7.90	7.90	4.26	4.33	4.33	35.0	9.0

*: Including a conservative 1-hour background concentration 6.0 ppm
**: Including a conservative 8-hour background concentrations 3.0 ppm, and a persistent factor 0.7
***: ppm = parts per million

The analysis results show that ambient CO concentrations predicted at all sites for all years are well below (within) the NAAQS standards. The predicted 2007 maximum ambient 1-hour and 8-hour CO concentrations, occurring at the intersection of Connecticut Avenue and Porter Street, under all build alternatives are 9.50 ppm and 5.45 ppm, respectively. The predicted 2027 maximum ambient 1-hour and 8-hour CO concentrations under all build alternatives are 8.30 ppm and 4.61 ppm, respectively.

The traffic changes within the study areas between no-build and build conditions will be minor. By comparing the predicted air quality concentrations under project build and no-build conditions, the 8-hour CO impact resulting from the project in year 2007 and 2027 will only be approximately 0.1 ppm. Therefore, the impacts of the proposed alternatives in year 2007 and 2027 will be very minor.

Particulate Matters (PM) Emissions

The current PM status for Washington DC area is designated as attainment for PM10, and therefore a hot-spot conformity analysis is not required. However, the EPA has revised nationwide recommendations of the upcoming PM2.5 new designation on June 28, 2004, and will finalize the designation by December 31, 2004. The proposed project area is also listed as a nonattainment area based on EPA PM2.5 designation recommendation. To follow EPA's regulation and clean air goal, the MWCOG shall prepare a SIP by spring 2007, and will continue to apply stricter permitting of certain larger new and expanding industrial sources, ensure transportation activities conformity, and adopt nitrogen oxides control and new diesel fuel standard. The approval of new PM2.5 implementation plans by EPA are due February 2008, and the proposed attainment dates will occur sometime between 2010 and 2015.

The project-level PM2.5 hot-spot analysis for the proposed Klingle Road project would be similar to, and consistent with, the conformity demonstration contained in upcoming SIP conducted by MWCOG, and would comply with all federal conformity regulations.

Conformity of Regional Air Pollutant Emissions

As one of the major projects in Washington DC area, the proposed Klingle Road Reconstruction has been included in 2003 CLRP (Constrained Long Range Plan) and FY 2004-2009 TIP (Transportation Improvement Program); as well as the Air Quality Conformity Analysis as adopted by Metropolitan Washington Council of Governments (MWCOG), Transportation Planning Board (TPB) on November 19, 2003. The proposed project is included in the regional or mesoscale corridor emissions (VOC, NOx, and CO) analyses conducted in the cumulative conformity analysis. Therefore, the proposed project would conform to the SIP/TIP conformity requirement described in the methodology section

To follow EPA's regulation and clean air goal, the COG shall continue to apply stricter permitting of certain larger new and expanding industrial/stationary sources, and shall continue adopt nitrogen oxides control and new diesel fuel to ensure transportation activities conformity, in addition to a new SIP that shall be submitted by Spring 2007.

With all existing measures applied to the Washington, D.C., the 8-hour ozone levels within the project area shall meet the NAAQS and federal/ State requirements and clean air goal by the required attainment date. By using adopted SIP measures; MWCOG will start a new conformity demonstration based on 8-hour ozone standard in the upcoming FY 2006-2011 TIP. Therefore, the future ambient air quality condition with the proposed project would also conform to the new 8-hour ozone standards and rules.

Mitigation

No mitigation measures would be enacted for normal operational impacts of the road.

Conclusion

General impacts to local air quality would be similar among all five build alternatives.
When comparing the predicted air quality concentrations under the build and no-build conditions, the 8-hour CO concentrations resulting from the project in year 2007 and 2027 will only increase by approximately 0.1 ppm. Therefore, the impacts of the proposed alternatives in year 2007 and 2027 would be negligible.

To ensure the compliance with NAAQS, Federal Conformity Rules, and SIP requirements, the air quality analysis results demonstrate that the proposed project:

- would not cause or contribute to any new violation of the standard
- would not increase the frequency or severity of any existing violation
- would not delay timely attainment of the standards
- Therefore, the project will have an negligible impact on air quality and will comply with the rules and the requirements of the Clean Air Act.

4.13 NOISE

4.13.1 Regulatory Framework

Noise Control Act of 1972 (NCA)

The Noise Control Act of 1972 gives the EPA the primary role for controlling environmental noise. Under the authorities, the EPA has the responsibility for coordinating all Federal programs in noise research and control.

The FHWA, the EPA, and OSHA have all developed standards to minimize the effects of noise associated with the construction and operation of transportation facilities. The standards protect, among others, workers involved in the construction of the transportation facilities, near-by residents that may be affected by the operational transportation facilities, and the general public that may be subjected to noise from the transportation facility.

4.13.2 Methodology and Assumptions

Potential traffic noise impacts for the proposed alternatives were analyzed based on FHWA and DDOT policies and procedures. Noise levels were measured from September 11 through 15, 2004 with B&K 2236 and Rion NL-22 noise measuring equipment. Unusual noise events were noted during the entire measurement period. Along with the noise measurements, site photographs and Field Noise Monitoring Data Sheets were prepared to record variables such as: site surface, pavement type, nearby landmark, distance to landmark, land direction, address, observer, grade, temperature, wind speed, measurement time periods, and a sketch of the study area.

Calculation of future year traffic noise levels within the project area was conducted for each design alternative and the No-Build alternative utilizing the FHWA Traffic Noise Model (TNM) Version 2.5. TNM is a state-of-the-art computer model developed by FHWA for the evaluation of highway traffic noise and its mitigation. In predicting noise levels and assessing noise impacts, traffic characteristics that will yield the worst-case hourly (both weekday and weekend) traffic noise impact on a regular basis for the design year were used. Roadway and terrain features, ground types, and any nature and man-made obstructions were also input into the model.

Traffic noise impacts for each design alternative were quantified to include the type (e.g., residential, nonresidential, other) and number of receptors impacted by each design alternative. As mentioned in earlier section, a noise impact was assumed as occurring wherever and whenever the predicted traffic noise level approaches (within 1 dBA of) or exceeds the FHWA Noise Abatement Criteria, or exceeds the existing noise level by 6 dBA. If any impacted area was identified, noise abatement measures were investigated to reduce the noise impact, giving primary consideration to exterior use areas. Usually, abatement is necessary only where frequent human use occurs and a lowered noise level would be of benefit, in accordance with the FHWA Noise Regulation 23 CFR 772.

4.13.3 No Action/No Build Alternative

Predicted future 2007 noise levels for the No Action/No Build Alternative are presented in Table 4-16. Under this alternative, traffic noise levels would range between 29.1 and 56.6 dBA and would not approach or exceed the FHWA NAC of 67 dBA for category B receptors. It should be noted that 2007 no-build traffic noise levels would be between 0.6 and 20.5 dBA less than the 2004 existing measured noise levels at all 12 receptor sites evaluated. Future 2007 No Action/No Build noise levels, after taking into consideration all background noise sources at these sites, would be similar to the existing measured levels, since the noise environment would remain unchanged under the No Build condition.

Predicted future 2027 No Action/No Build noise levels are presented in Table 4-17. Under future 2027 No Build condition, traffic noise levels would range between 29.1 and 56.6 dBA and would not approach or exceed the FHWA NAC of 67 dBA for category B receptors. Future 2027 No Build traffic noise levels would also be less than 2004 existing measured noise levels.

Conclusion

Short-term and long-term noise levels, after taking into consideration all background noise sources at these sites, would be similar to the existing measured levels, since the noise environment would remain unchanged under the No Build condition.

TABLE 4-16: 2007 NO-BUILD NOISE LEVELS (DBA)

Site ID	AM Peak			PM Peak			Saturday Peak		
	2004 Measured	2007 No Build	Differences	2004 Measured	2007 No Build	Differences	2004 Measured	2007 No Build	Differences
1	53.3	33.0	-20.3	47.8	29.7	-18.1	47.6	29.1	-18.5
2	54.2	47.4	-6.8	49.7	43.5	-6.2	50.2	43.2	-7.0
3	56.7	54.6	-2.1	54.4	50.6	-3.8	53.0	50.4	-2.6
4	52.2	47.2	-5.0	52.0	43.7	-8.3	51.8	43.3	-8.5
5	55.1	42.9	-12.2	49.1	39.5	-9.6	51.2	32.7	-18.5
6	54.3	36.6	-17.7	49.8	33.2	-16.6	51.0	32.7	-18.3
7	54.3	39.7	-14.6	49.9	36.3	-13.6	49.6	35.8	-13.8
8	57.2	56.6	-0.6	54.0	53.0	-1.0	53.5	52.7	-0.8
9	56.2	51.8	-4.4	56.8	48.0	-8.8	57.2	47.7	-9.5
10	55.8	38.9	-16.9	53.5	35.3	-18.2	54.5	34.8	-19.7
11	53.3	37.2	-16.1	49.4	33.2	-16.2	49.7	32.7	-17.0
12	50.4	33.1	-17.3	50.0	29.5	-20.5	45.6	29.1	-16.5
Max	57.2	56.6	-0.6	56.8	53.0	-1.0	57.2	52.7	-0.8
Min	50.4	33.0	-20.3	47.8	29.5	-20.5	45.6	29.1	-19.7
Source: The Louis Berger Group, Inc. Sep-04									

TABLE 4-17: 2027 NO-BUILD NOISE LEVELS (DBA)

Site ID	AM Peak			PM Peak			Saturday Peak		
	2004 Measured	2027 No Build	Differences	2004 Measured	2027 No Build	Differences	2004 Measured	2027 No Build	Differences
1	53.3	33.0	-20.3	47.8	29.6	-18.2	47.6	29.1	-18.5
2	54.2	47.4	-6.8	49.7	43.4	-6.3	50.2	43.2	-7.0
3	56.7	54.7	-2.0	54.4	50.5	-3.9	53.0	50.4	-2.6
4	52.2	47.2	-5.0	52.0	43.6	-8.4	51.8	43.3	-8.5
5	55.1	42.9	-12.2	49.1	39.4	-9.7	51.2	39.0	-12.2
6	54.3	36.6	-17.7	49.8	33.1	-16.7	51.0	32.7	-18.3
7	54.3	39.7	-14.6	49.9	36.2	-13.7	49.6	35.8	-13.8
8	57.2	56.6	-0.6	54.0	52.9	-1.1	53.5	52.7	-0.8
9	56.2	51.8	-4.4	56.8	47.9	-8.9	57.2	47.7	-9.5
10	55.8	38.9	-16.9	53.5	35.2	-18.3	54.5	34.8	-19.7
11	53.3	37.2	-16.1	49.4	33.1	-16.3	49.7	32.7	-17.0
12	50.4	33.1	-17.3	50.0	29.4	-20.6	45.6	29.1	-16.5
Max	57.2	56.6	-0.6	56.8	52.9	-1.1	57.2	52.7	-0.8
Min	50.4	33.0	-20.3	47.8	29.4	-20.6	45.6	29.1	-19.7
Source: The Louis Berger Group, Inc. Sep-04									

4.13.4 Build Alternatives

Construction Impacts

For the proposed project, temporary increases in noise levels would most likely occur during construction. Overall, construction activities along the Klingle Road corridor would result in short-term impacts to sensitive receptors in the immediate vicinity of the construction site including two separate apartment buildings. Construction activities associated with the proposed project will include clearing, grubbing, rough grading, structures and paving. Equipment such as bulldozers, backhoes, graders, loaders, cranes and trucks would be used for the construction of the proposed project and will be subject to local construction noise ordinances for construction.

The extent of the construction associated noise impact depends on the nature of the design, the construction schedule and the noise characteristics of the construction equipment. To mitigate potential construction noise impacts, construction activities would comply with District regulations.

Mitigation

Standard construction noise specifications, which require the contractor to make every reasonable effort to minimize noise through abatement measures, would be incorporated in the development of construction plans. Abatement measures could include:

- All construction equipment powered by an internal combustion engine shall be equipped with a properly maintained muffler.
- Air compressors shall meet current EPA noise emission exhaust standards.
- Using new construction equipment as much as possible, since it is generally quieter than older equipment.
- Minimizing potential nighttime construction activities.

Mitigation of noise levels may occur at the noise source, along the path of the noise, or at receiver locations. Mitigation of noise levels occurs in nature to varying degrees as sound propagates from the source over terrain surfaces (scattering and ground attenuation), as the distance between the source and receiver increases (dispersion), and when intervening natural terrain features intersect the path of the noise source to the receiver (diffraction).

Operational Impacts

Build Alternatives B1 and B2

Predicted future 2007 noise levels for Alternatives B1 and B2 are presented in Table 4-18. In these two alternatives (for either one-way eastbound or one-way westbound), traffic noise levels would range between 30.4 and 59.4 dBA and would not approach or exceed the FHWA NAC of 67 dBA for category B receptors. However, future 2007 traffic noise levels for Alternatives B1 and B2 would experience between 6.5 and 9.6 dBA increase over those of existing condition and exceed the FHWA and DDOT substantial increase of 6 dBA criteria at Site 6, which is located approximately 50 feet from the edge of pavement of Klingle Road. This site is a single family residence located approximately 50 feet from the edge of pavement of Klingle Road.

Predicted future 2027 Alternative B1 and B2 noise levels are presented in Table 4-19. Under these alternatives, traffic noise levels would range between 30.0 and 59.4 dBA and would not approach or exceed the FHWA NAC of 67 dBA for category B receptors. However, future 2027 Build traffic noise levels would experience a 9.6 dBA increase over existing noise levels during PM peak traffic hours and exceed the FHWA and DDOT substantial increase criteria of 6 dBA at Site 6.

TABLE 4-18: 2007 ALTERNATIVE B1 AND B2 NOISE LEVELS (DBA)

Site ID	AM Peak			PM Peak			Saturday Peak		
	2004 Measured	2007 Build	Differences	2004 Measured	2007 Build	Differences	2004 Measured	2007 Build	Differences
1	53.3	33.8	-19.5	47.8	31.1	-16.7	47.6	30.4	-17.2
2	54.2	47.7	-6.5	49.7	43.8	-5.9	50.2	43.5	-6.7
3	56.7	55.0	-1.7	54.4	51.1	-3.3	53.0	50.8	-2.2
4	52.2	47.5	-4.7	52.0	43.8	-8.2	51.8	43.5	-8.3
5	55.1	49.5	-5.6	49.1	49.6	0.5	51.2	48.2	-3.0
6	54.3	58.2	3.9	49.8	59.4	9.6	51.0	57.5	6.5
7	54.3	45.8	-8.5	49.9	45.5	-4.4	49.6	44.4	-5.2
8	57.2	56.8	-0.4	54.0	53.4	-0.6	53.5	53.0	-0.5
9	56.2	52.0	-4.2	56.8	48.0	-8.8	57.2	47.8	-9.4
10	55.8	41.2	-14.6	53.5	39.4	-14.1	54.5	38.6	-15.9
11	53.3	37.7	-15.6	49.4	34.0	-15.4	49.7	33.5	-16.2
12	50.4	47.6	-2.8	50.0	47.7	-2.3	45.6	46.7	1.1
Max	57.2	58.2	3.9	56.8	59.4	9.6	57.2	57.5	6.5
Min	50.4	33.8	-19.5	47.8	31.1	-16.7	45.6	30.4	-17.2

TABLE 4-19: 2027 ALTERNATIVE B1 AND B2 NOISE LEVELS (DBA)

Site ID	AM Peak			PM Peak			Saturday Peak		
	AM Peak	PM Peak	Saturday Peak	AM Peak	PM Peak	Saturday Peak	AM Peak	PM Peak	Saturday Peak
	2004 Measured	2027 No Build	Differences	2004 Measured	2027 No Build	Differences	2004 Measured	2027 No Build	Differences
1	53.3	34.0	-19.3	47.8	31.1	-16.7	47.6	30.0	-17.6
2	54.2	47.8	-6.4	49.7	43.8	-5.9	50.2	43.5	-6.7
3	56.7	55.1	-1.6	54.4	51.1	-3.3	53.0	50.8	-2.2
4	52.2	47.6	-4.6	52.0	43.8	-8.2	51.8	43.5	-8.3
5	55.1	50.2	-4.9	49.1	49.6	0.5	51.2	46.5	-4.7
6	54.3	59.0	4.7	49.8	59.4	9.6	51.0	55.6	4.6
7	54.3	46.5	-7.8	49.9	45.5	-4.4	49.6	42.8	-6.8
8	57.2	56.9	-0.3	54.0	53.4	-0.6	53.5	53.0	-0.5
9	56.2	52.1	-4.1	56.8	48.0	-8.8	57.2	47.9	-9.3
10	55.8	41.5	-14.3	53.5	39.4	-14.1	54.5	37.6	-16.9
11	53.3	37.8	-15.5	49.4	34.0	-15.4	49.7	33.3	-16.4
12	50.4	48.3	-2.1	50.0	47.7	-2.3	45.6	44.7	-0.9
Max	57.2	59.0	4.7	56.8	59.4	9.6	57.2	55.6	4.6
Min	50.4	34.0	-19.3	47.8	31.1	-16.7	45.6	30.0	-17.6

Build Alternatives C, D1, and D2

Predicted future 2007 noise levels for the two-way traffic options, Alternatives C, D1, and D2 are presented in Table 4-20. Under these three alternatives, traffic noise levels would range between 30.4 and 61.3 dBA and would not approach or exceed the FHWA NAC of 67 dBA for category B receptors. However, future 2007 traffic noise levels for Alternatives C, D1, and D2 would experience a between 6.5 and 11.5 dBA increase over those of existing condition and exceed the FHWA and DDOT substantial increase of 6 dBA criteria at Site 6, which is a single family residence located approximately 50 feet from the edge of pavement of Klingle Road.

TABLE 4-20: 2007 ALTERNATIVE C, D1, AND D2 NOISE LEVELS (DBA)

Site ID	AM Peak			PM Peak			Saturday Peak		
	2004 Measured	2007 Build	Differences	2004 Measured	2007 Build	Differences	2004 Measured	2007 Build	Differences
1	53.3	34.3	-19.0	47.8	32.1	-15.7	47.6	30.4	-17.2
2	54.2	47.7	-6.5	49.7	44.0	-5.7	50.2	43.5	-6.7
3	56.7	55.1	-1.6	54.4	51.4	-3.0	53.0	50.8	-2.2
4	52.2	47.4	-4.8	52.0	43.9	-8.1	51.8	43.5	-8.3
5	55.1	51.9	-3.2	49.1	51.8	2.7	51.2	48.2	-3.0
6	54.3	61.2	6.9	49.8	61.3	11.5	51.0	57.5	6.5
7	54.3	48.1	-6.2	49.9	48.0	-1.9	49.6	44.4	-5.2
8	57.2	56.9	-0.3	54.0	53.6	-0.4	53.5	53.0	-0.5
9	56.2	51.9	-4.3	56.8	48.0	-8.8	57.2	47.8	-9.4
10	55.8	42.5	-13.3	53.5	41.3	-12.2	54.5	38.6	-15.9
11	53.3	37.9	-15.4	49.4	34.6	-14.8	49.7	33.5	-16.2
12	50.4	50.3	-0.1	50.0	50.5	0.5	45.6	46.7	1.1
Max	57.2	61.2	6.9	56.8	61.3	11.5	57.2	57.5	6.5
Min	50.4	34.3	-19.0	47.8	32.1	-15.7	45.6	30.4	-17.2

Source: The Louis Berger Group, Inc. Sep-04

Predicted future 2027 noise levels For Alternatives C, D1, and D2 are presented in Table 4-21. Traffic noise levels under these alternatives would range between 30.8 and 62.4 dBA and would not approach or exceed the FHWA NAC of 67 dBA for category B receptors. However, future 2027 traffic noise levels would experience between 7.8 and 12.6 dBA increase over those of existing condition and exceed the FHWA and DDOT substantial increase criteria of 6 dBA at Site 6, which is located approximately 50 feet from the edge of pavement of Klingle Road.

TABLE 4-21: 2027 ALTERNATIVE C, D1, AND D2 NOISE LEVELS (dBA)

Site ID	AM Peak			PM Peak			Saturday Peak		
	AM Peak	PM Peak	Saturday Peak	AM Peak	PM Peak	Saturday Peak	AM Peak	PM Peak	Saturday Peak
	2004 Measured	2027 No Build	Differences	2004 Measured	2027 No Build	Differences	2004 Measured	2027 No Build	Differences
1	53.3	34.7	-18.6	47.8	32.6	-15.2	47.6	30.8	-16.8
2	54.2	47.9	-6.3	49.7	44.3	-5.4	50.2	43.7	-6.5
3	56.7	55.3	-1.4	54.4	51.7	-2.7	53.0	51.1	-1.9
4	52.2	47.6	-4.6	52.0	44.0	-8.0	51.8	43.6	-8.2
5	55.1	52.9	-2.2	49.1	52.9	3.8	51.2	49.3	-1.9
6	54.3	62.3	8.0	49.8	62.4	12.6	51.0	58.8	7.8
7	54.3	49.1	-5.2	49.9	49.1	-0.8	49.6	45.5	-4.1
8	57.2	57.2	0.0	54.0	53.9	-0.1	53.5	53.2	-0.3
9	56.2	52.1	-4.1	56.8	48.1	-8.7	57.2	47.9	-9.3
10	55.8	43.2	-12.6	53.5	42.2	-11.3	54.5	39.4	-15.1
11	53.3	38.2	-15.1	49.4	35.0	-14.4	49.7	33.8	-15.9
12	50.4	51.4	1.0	50.0	51.6	1.6	45.6	47.9	2.3
Max	57.2	62.3	8.0	56.8	62.4	12.6	57.2	58.8	7.8
Min	50.4	34.7	-18.6	47.8	32.6	-15.2	45.6	30.8	-16.8

Source: The Louis Berger Group, Inc. Sep-04

Mitigation

Mitigation of noise levels may occur at the noise source, along the path of the noise, or at receiver locations. Mitigation of noise levels occurs in nature to varying degrees as sound propagates from the source over terrain surfaces (scattering and ground attenuation), as the distance between the source and receiver increases (dispersion), and when intervening natural terrain features intersect the path of the noise source to the receiver (diffraction).

Within practical limits, these same principles would be applied to the mitigation of noise levels from traffic operations. Mitigation of the noise source is achieved by regulatory limits on vehicle emissions by mufflers and exhaust systems. A variety of mitigation measures, as specified in 23 CFR Part 772, could also be considered either at the source, along the path of the noise, or, in limited situations, at the receiver. The FHWA recognizes five methods of noise mitigation for the reduction of traffic noise levels. These methods include:

- Traffic management strategies
- Roadway alignment alternations
- Property acquisition to create a buffer zone between source and receptor
- Noise insulation of public buildings
- Installation of noise barriers within the right of way

Traffic management measures, which alter vehicle type, speed, volume, and/or time of operations, can be effective noise abatement measures if they don't conflict with roadway capacity and safety requirements. The proposed project would ban all truck traffic on Klingle Road and post a relatively low (20 mph) speed limit, and, in effect, minimize potential noise impacts generated from traffic on Klingle Road.

Alternatives B1 and B2 would further reduce noise levels at the receptor locations evaluated due to the reduced traffic volumes under these alternatives. Any effects on noise level reduction from further reduction of traffic volume and/or speed would be very limited without negatively affecting the roadway capacity and functionalities.

Highway alignment alterations, such as shifting the roadway away from sensitive receptors or depressing the roadway into the ground, can potentially reduce noise impacts. However, the selection of alternative alignments and profiles for noise abatement purposes must consider the balance between noise impacts and other engineering and environmental parameters. For this project, the alignment would be placed at original location and any alteration of the alignment would result in serious impacts on the right-of-way and other environmental parameters. The existing alignment is considered to be the optimum configuration when all of these various parameters are considered. Besides, shifting roadway alignments would not result in any substantial reductions in noise levels, since most of the sensitive receptors are located on the hill side overlooking the Klingle Road. Therefore, this mitigation measure is not considered feasible.

Acquisition of real property or interest therein to serve as a buffer zone is impractical and infeasible for this project, given the close proximity of noise-sensitive receptors to the highway right-of-way. Therefore, this mitigation measure is not considered feasible.

Noise insulation of public buildings, such as schools, provides an additional type of mitigation. However, this mitigation measure is not applicable for the project, since no schools or public buildings are impacted.

The most common type of designed mitigation is the construction of physical barriers, typically in the form of noise walls and/or earth berms between the roadway (noise source) and the receiver locations. For a noise wall/barrier to be effective, it has to be constructed with sufficient length and heights to break the "line-of-the-sight" between the receptors and sources. Construction of any noise barrier along Klingle Road would not be feasible, due to the presence of local access driveways, which precludes the construction of a contiguous noise wall. It should be noted that there are various trees and bushes in the proximity of the project area, which may result in some noise shielding as well as provide visual screening for the sensitive receptors adjacent to the Klingle Road. Trees and shrubs are only effective in reducing noise levels if they are planted densely together and at least 100 feet in depth. Therefore, planting additional trees and shrubs as mitigation measure is not considered to be effective for this project due to right-of-way limitations.

Conclusion

Alternatives B1 and B2 (one-way westbound) would result in a 6.5 and 9.6 dBA increase over existing conditions, increasing to 9.6 dBA in 2027. Alternatives C, D1, and D2 would increase existing dBA levels between 6.5 and 11.5 dBA in 2007, increasing to between 7.8 and 12.6 dBA in 2027. Noise levels would exceed the FHWA standard of no greater than a 6 dBA increase at one single-family residence (Site 6) in all build alternatives. Based on FHWA and DDOT guidelines, there would be no additional feasible and reasonable noise mitigation measures available to mitigate increase noise at Site 6, due to the limited right-of-way and environmental constraints.

4.14 SOCIOECONOMICS

4.14.1 Regulatory Framework

Executive Order 12898, Environmental Justice

This E.O. requires Federal agencies to make 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.

4.14.2 No Action/No Build Alternative

The No Action/No Build alternative would result in actions that would correct dangers to human health and safety posed by leaving Klingle Road in its present unsafe condition. Impacts to local social and economic factors would be unlikely. Klingle Road has been closed since 1991, and in that time, the population total for the study area has increased 0.6 percent while the overall city wide population decreased by 5.7 percent. Two census tracts on the west side of the study area lost population while one gained population. On the east side of the study area, three census tracts lost population while two gained population. Overall, the increase in population in the study area indicates the desirability of these communities as places to live within the city as a whole regardless of the state of Klingle Road. In addition, there would be no environmental justice issues. There would be no disproportionately high and adverse human health or environmental effects resulting from the implementation of the No Action/No Build Alternative on minority populations and low income populations that may live within the study area.

Conclusion

No impacts would result to socioeconomic factors from the No Action/No Build Alternative.

4.14.3 Build Alternatives (B1, B2, C, D1, and D2)

Construction Impacts

Construction impacts would be negligible on social and economic factors in the study area. Noise, dust and potential inconveniences relating to construction traffic would be the only likely adverse impacts on the surrounding communities. Given the relative isolation of the road within park service land, these impacts, while adverse in nature, would be negligible and most likely experienced by only the residents living in closest proximity to the area. Adverse construction impacts would be short term in nature.

Mitigations

No mitigation is planned or appears necessary as there would be negligible impacts

Operational Impacts

Under the build alternatives impacts to local social and economic factors would be similar to those in the No Build/No Action Alternative. Rebuilding Klingle Road for vehicular use would most likely have only negligible impacts since the road is located adjacent to National Park Land that would remain undeveloped. For example, persons living closest to Klingle Road may experience operational impacts such as vehicular noise. This portion of Klingle Road has been closed since 1991, since that time the study area as a whole has seen little if any decline in economic standards, population or housing values. The overall study population has increased even as the city wide population decreased. It is also unlikely that reopening the road would impact economic factors in the study area. There is no indication that traffic on this road will affect incomes or house values in the study area. In addition, there would be no environmental justice issues. There would be no disproportionately high and adverse human health or environmental effects resulting from the implementation of any of the build alternatives on minority populations and low income populations that may live within the study area.

Mitigations

No mitigation is planned or appears necessary as there would be negligible impacts.

Conclusion

Under the build alternatives, impacts to socioeconomics would be negligible to non-existent.

4.15 RELOCATION

Under any of the proposed alternatives (No Action/No Build, B1, B2, C (Preferred), D1, and D2) there would never be a need for the relocation of individual or families; therefore this topic was dismissed from further consideration.

4.16 INFRASTRUCTURE

Impacts to infrastructure were qualitatively assessed by determining how each of the proposed alternatives could affect those utilities found within the ROW of Klingle Road, which includes a sanitary and stormwater sewer system, electrical conduits, and a gas line. Impacts were also determined on whether the proposed actions would have any affect on the demand on these services.

4.16.1 No Action/No Build Alternative

The No Action/No Build alternative would have no impacts on the sanitary sewer, gas lines, or electrical conduits that are present beneath Klingle Road, as these are necessary utilities for the residents and businesses of the area. It is the responsibility of the respective utility company (WASA, Washington Gas, or PEPCO) to maintain these systems, in the event that any were in need of repair. However, under this alternative, the stormwater sewer system would not be repaired and remain not functional.

Conclusion

The No Action/No Build Alternative would result in no impacts to existing utilities. However, the stormwater sewer system would remain in disrepair and not functional.

4.16.2 Build Alternatives (B1, B2, C, D1, D2)

Construction Impacts

Impacts to infrastructure would be similar under all five build alternatives. Under the build alternatives, there would likely be no physical impacts to sanitary sewer, gas lines, and electrical conduits, as care would be taken to avoid all underground utilities during construction. Services may be temporarily affected during construction activities to avoid potentially unsafe working situations (e.g., cutting into an electrical conduit, or rupturing a gas line). This loss of service would most likely be short-term, a matter of hours, and conducted during times when most people would be away from their homes.

After the old roadbed has been removed, a detailed survey of the existing infrastructure would be conducted to assess the current condition of these systems and to determine whether any maintenance or improvements are necessary. This survey would also reveal if the systems meet their current and future capacity needs. If it was discovered that any of the utilities were in need of maintenance or repair, needed to be upgraded, or needed to be replaced entirely, these actions would occur prior to the reconstruction of the road proposed under all build alternatives. This would ensure that the utilities were functioning properly at the desired capacity, and would also prevent the need to tear up the road in the near future in order to get to these utilities for maintenance or repair. DC WASA has indicated that any remaining combined sewers would also be replaced with separated systems in conjunction with any of the proposed build alternatives, which would resolve any future problems associated with sanitary sewer overflows in Klingle Valley.

During installation of the new stormwater sewer system, the old system would first have to be removed, leaving the area without a functioning stormwater sewer system for a period of time. However, since mitigation measures would be utilized during the installation to protect soils, water, and vegetation, adverse impacts to the resources of Klingle Valley would be less than those that would occur under the No Action/No Build Alternative.

Mitigations

Care would be taken during construction activities so as to avoid all underground utilities. This would be done through consultations with each of the respective utilities to determine exactly where, and to what depth the utilities are buried. These areas would then be marked off and carefully excavated.

Any utility discovered to be in need of repair upon the removal of the road surface, would be repaired before road construction takes place.

In addition, for safety purposes, it may be deemed necessary to shut down those utilities during construction to avoid potential dangers (e.g., cutting into an electrical conduit, or rupturing a gas line). To minimize this impact, if services were determined necessary, advanced notice would be given to those affected, and most likely the interruption of service would coincide with periods when people would most likely be away from their homes.

Operational Impacts

After construction is complete there would be no adverse impacts to infrastructure from the operation of any of the build alternatives. As stated in the Section 4.11, the proposed actions would not result in any increases in local development, which would not increase demands for gas or sanitary services. There would a negligible increase in electrical needs to power the street lights installed along Klingle Road, but would not require the installation of new lines.

The installation of a new stormwater sewer system would have long-term beneficial impacts by replacing the current non-functioning system, with one that effectively controls overland stormwater flow.

Mitigation

No operational mitigation would be necessary other than the regular maintenance of the stormwater sewer system.

Conclusion

Under Alternatives B1, B2, C, D1, and D2, there would be no likely impacts to the sanitary sewer system, gas line, or electrical conduits that lie adjacent or beneath Klingle Road. During the course of removing the old road bed, if it were discovered that are problems with any of the existing infrastructure beneath Klingle Road, those problems would be resolved prior to the construction of the new road. There would also be no added or diminished demand on any of these services as a result of any of the proposed alternatives. Under the No Action/No Build Alternative, the current stormwater sewer system would remain in disrepair and non-functional. Under all five of the build alternatives, the old storm sewer would be replaced with a fully functioning system that effectively controls overland stormwater flow, which would have long-term beneficial impacts to the areas in and around Klingle Road.

4.17 ENERGY

4.17.1 No Action/No Build Alternative

The No Action/No Build Alternative reflects the current condition of the site, therefore there would be no additional energy requirements.

4.17.2 Build Alternatives (B1, B2, C, D1, D2)

Construction Impacts

Construction of any of the proposed build alternatives would require the use of fossil fuels for construction vehicles, construction equipment, and construction personnel vehicles. Electrical energy would also be used onsite to power maintenance trailers and other equipment. Fossil fuels and electrical energy would be expended to manufacture the materials and products associated with roadway construction. In addition to those materials, other materials such as concrete, sand, aggregate, and steel would be used. While these resources are not retrievable, the proposed project would not have an adverse effect on their continued availability.

Mitigations

No specific mitigation measures would be required for any of the alternatives presently under consideration.

Operational Impacts

During operation, vehicles traveling along the constructed alternative would use fossil fuels. However, none of the proposed build alternatives would increase the total number of cars in the study area; there would be no change in the overall amount of fossil fuels burned required for driving. In the event streetlights were installed, there would be increased energy use associated with the site. However, these increases would be slight because the lights used would be energy efficient, have light sensitive switches, and overall there would be few lights because the proposed project area is only 0.7 miles long.

Mitigations

Light sensitive switches would be installed on all streetlights, which would minimize the total amount of time the lights remained lit.

Conclusion

In general, energy requirements would be expected to be less under the No Action/No Build Alternative than the five build alternatives, because currently there are no energy requirements for the study area, while for the build alternatives, there would be slight increases in energy needs for both the construction and operation of the road.

4.18 PUBLIC HEALTH AND SAFETY

4.18.1 No Action/No Build Alternative

Under the No Action/No Build Alternative there would be no improvements to either the road or the stormwater sewer system, causing the current condition of Klingle Road to deteriorate further, adversely impacting the public health and safety of those who use Klingle Road illegally for recreation. Adverse impacts to public health and safety would include hazards to cyclists and runners from obstacles created by broken pavement and potholes that can cause trips and falls; and there is a risk of injury to those who walk of cycle over areas of pavement weakened by subsurface erosion, which could cause the pavement to collapse; in addition, anyone utilizing the area would be at risk of lead poisoning until the area of lead contamination has been abated, which is scheduled for the summer of 2005.

Under the No Action/No Build Alternative, DDOT would continue to keep the area closed to the public, and as hazards increased along the roadway, they would continue their standard practice of marking off dangerous areas and removing trees that have fallen. The area contaminated with lead below Connecticut Avenue Bridge would eventually be cleaned up regardless of whatever alternative is chosen. Areas that are determined to be unsafe along the roadway because of sub-grade erosion would be cordoned off to warn people of potential dangers.

Conclusion

Under the No Action/No Build Alternative, there would be no improvements to the current hazards to public health and safety that occur along Klingle Road. As the conditions Klingle Road continues to deteriorate, these hazards will continue to worsen, until the area is totally unsafe for public use.

4.18.2 Build Alternatives

Construction Impacts

During the construction phase of any of the build alternatives the area would be closed off to public use via fences, signage, and construction personnel, and there would be no appreciable effects on public health or safety.

Mitigation

Under Build Alternatives, the area under construction would to be kept closed to the public.

Operational Impacts

Improvements to Klingle Road, the installation of a new stormwater sewer system, the restoration of Klingle Creek, and the removal of lead contaminated soil would help do away with the current hazards to human health and safety that currently exist within Klingle Valley. The area would ultimately shift from being an unofficial, unsanctioned recreation area, to an operational roadway.

Alternatives B2 and D2 would provide users with the use of a four-foot wide trail that runs along Klingle Road. This trail would provide users with a safe corridor for different recreational activities without being in conflict with traffic. However, those alternatives that do not include a recreational path, Alternatives B1, C, and D1, conflicts could potentially arise between automobiles, pedestrians, and cyclists. These conflicts are not expected to have an appreciable effect on public health and safety. People throughout the city currently bike and jog on public roadways without much adverse impacts to public safety. In addition, those people driving on Klingle Road would be restricted by slow speed limits, which would provide both driver and recreational user more reaction time to avoid an accident.

Mitigation

Guard rails and street lights would also be installed, as AASHTO standards dictate, in order to improve safety along Klingle Road for both drivers and other users.

Conclusion

Under the five build alternatives, a new stormwater sewer system would be installed, providing long-term benefits. The other utilities that lie adjacent or beneath Klingle Road would most likely not be affected.

4.19 HAZARDOUS MATERIALS

4.19.1 Regulatory Framework

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.

4.19.2 No Action/No Build Alternative and Build Alternatives

Prior to the start of any of the proposed alternatives (No Action/No Build, B1, B2, C, D1, and D2) DDOT is responsible for removing all lead contaminated soils in the areas beneath and adjacent to Connecticut Avenue Bridge. Lead paint that is currently peeling off the bridge would be removed, and the bridge would be repainted to avoid further contamination.

Sampling results presented in the Soil Remediation Plan prepared for the site (EEE Consulting 2003) would be compared with the proposed site layout to determine whether the existing sampling data adequately cover the planned construction area. Additional sampling may be needed to determine current conditions, depths and lateral extent of contamination, disposal options, and control measures appropriate to prevent airborne and downstream hazards. Areas of lead contamination encountered during the road development will be remediated in accordance with the order prior to or in conjunction with other construction activities at the site. Proper site controls and construction safety measures will need to be implemented to protect workers and the public during on-site field activities and construction.

In addition, under any alternative selected, DDOT will perform a Phase I Environmental Site Assessment in accordance with the American Society for Testing and Materials (ASTM) Standard E1527-00 to determine whether any additional hazardous materials or wastes are present on site. All potential above-ground and underground sources of hazardous waste in the project area should be investigated.

Conclusion

All lead contaminated soils in the areas beneath and adjacent to Connecticut Avenue Bridge would be removed. A Phase I Environmental Site Assessment in accordance with the ASTM Standard E1527-00 should also be conducted to determine whether any additional hazardous materials or wastes are present on site.

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