IV. ENVIRONMENTAL CONSEQUENCES

MD 210 MULTI-MODAL STUDY

IV. ENVIRONMENTAL CONSEQUENCES

A. Social, Economic and Land Use

1. Displacements and Property Impacts

Residential, business/commercial and religious facility property acquisition and relocations will be required in certain areas by SHA-Selected Alternative 5A Modified (as shown on Figures II-3 through II-17). All properties will be acquired in accordance with the requirements of the Uniform Relocation and Real Property Acquisition Act of 1970, as amended in 1987.

Alternative 5A Modified will require the displacement of fifteen residences, thirteen businesses and one religious facility, Shalom Ministries Worship Center at 515 Kerby Hill Road, within the project area.

Property acquisition required for Alternative 5A Modified includes both unimproved property not owned by SHA that does not require the acquisition of a structure and acquisitions that will require the displacement of a structure. Most of the residences are one-to-two story detached dwellings. Table IV-1 shows the number of relocations and estimated right-of-way requirements of the SHA-Selected Alternative.

Alternative 5A Modified would require fifteen residential displacements as a result of this alternative and property acquisition from 96 residential properties. This would allow for intersection improvements, roadside safety modifications and improved signalization. The cost of the residential displacements ranges from $157,000 to $448,000. In addition, 165.1 acres of property acquisition would be required.

Alternative 5A Modified would require thirteen commercial displacements as a result of this alternative and property acquisition from 40 commercial properties. The costs of the commercial displacements range from $297,000 to $2,163,000.

Additionally, 1.51 acres of additional right-of-way outside of existing right-of-way has been proposed for potential stormwater management facilities and 63.4 acres right-of-way outside of existing right-of-way has been proposed for mitigation sites.

Research to determine availability of housing in the study area was undertaken. As of November 2003, over 250 residential units were available in the Oxon Hill, Ft. Washington and Accokeek areas. The list price of housing ranged from $55,000 to $1,900,000.

2. Relocation Process

Relocation of any individuals, families, or businesses displaced by this project would be accomplished in accordance with the Uniform Relocation Assistance and Real Property Acquisition Polices Act of 1970 as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987, and would be executed in a timely and humane fashion (refer to *Appendix C*, Summary of the Relocation Assistance Program of the State Highway Administration of Maryland). In the event comparable replacement housing is not available for displaced persons, or available replacement housing is beyond their financial means, replacement "housing as a last resort" will be utilized to accomplish the rehousing.

Summary of SHA's Equal Opportunity Program/Title VI Statement

It is the policy of the Maryland State Highway Administration to ensure compliance with the provisions of the Title VI of the Civil Rights Act of 1964 and related civil rights laws and regulations which prohibit discrimination on the grounds of race, color sex, national origin, age, religion, physical or mental disability or sexual orientation in all State Highway Administration projects funded in whole or part by the Federal Highway Administration. Title VI Statement requires federal agencies to ensure that their programs, policies and activities do not have the effect of excluding populations from the benefits of, or subject persons and populations to discrimination based on race, color or origin. The State Highway Administration will not discriminate in highway planning, design, or construction, the acquisition of right-of-way, or the provision of relocation advisory assistance. This policy has been incorporated into all levels of the highway planning process to ensure that proper consideration may be given to the social, economic and environmental effects of all highway projects. Alleged discriminatory actions should be addressed to the Equal Opportunity Section of the Maryland State Highway Administration for investigation.

3. Effects on Elderly and Handicapped Groups

The average population of elderly residents for all 11 census tracts in the study area is 8.6%. Census tract 8013.09, in the Fort Washington portion of the study area, has the highest proportion of elderly residents at 13.0%. Therefore, adverse impacts to the elderly community are not anticipated as a result of the proposed improvements.

Although there are no known concentrations of elderly residents in the study area, there are known elderly residents and property owners who would be affected by the proposed SHA-Selected Alternative.

There are no known concentration of handicapped individuals in the study area, and adverse impacts to this population group are not anticipated by the Alternative 5A Modified. Facilitating pedestrian mobility would be an integral aspect of the Build Alternative. All sidewalks, crosswalks, pedestrian ramps, etc. would be in compliance with Americans with Disabilities Act (ADA).

Appropriate relocation advisory services would be offered to displaced elderly and handicapped individuals.

4. Environmental Justice

African-Americans are the predominant minority population in Prince George's County and the predominant population in the portion of the County comprising the MD 210 study area. African-Americans make up 71.7% of the study area population, which is 80.6% minority overall. No exclusive concentrations of minority residents are known to exist. Throughout the extensive community involvement, public meetings and Environmental Justice outreach processes, it has appeared that the study area is fairly well integrated with minority and non-minority populations

This information may not be indicative of the local racial population group composition where displacements are projected to occur. In a public outreach effort to supplement the census tract information, and Focus Group/Public Involvement, the SHA sent correspondence to over 100 area churches and community centers requesting their assistance in informing their members of the project and helping identify minority and low income concentrations in the project area. SHA also offered to meet with the churches to discuss the project.

As a result of the letter writing campaign to area churches, in request for a meeting was received from the Whitehall Baptist Church and few others requested information packets. A meeting was held on November 16, 2000 at the Whitehall Baptist Church located in the Accokeek community and was attended by ten people. An overview of the MD 210 project was presented and the project alternatives under consideration were described in detail, discussing the possibility of providing HOV facilities and attendees were encouraged to participate and provide comments at a planned public hearing scheduled for June 2001.

Some minority residential displacements would likely be required as a result of the proposed roadway improvements. The largest concentration of residential displacements that would occur as a result of the proposed improvements is associated with Alternative 5A Modified in the vicinity of the proposed Livingston Road/Kerby Hill Road interchange with MD 210. Of the nine residential displacements that would occur at the Kerby Hill Road location,

three of the residents have met with SHA representatives, including an additional resident who would be displaced under the Option C interchange configuration at Old Fort Road North. None, to date are of a minority or low income population.

On February 6, 2001, a meeting was held with the property owners of the proposed displacements that could result from the MD 210 project. Seventeen people attended the meeting and less than half of the attendees were minority. A description of the project was given and it was mentioned that, if constructed, the project would most likely start at the northern end and proceed south, down the corridor. Attendees were informed and encouraged to participate and provide comments at planned public hearing to be held in June 2001. Also, the project development process and the amount of time involved in the various steps was described.

On July 30, 2002, a second meeting was held with property owners of potential residential displacements associated with improvements to MD 210. The project and relocation process was described to the nine people in attendance including a presentation by SHA District III Office of Real Estate (ORE) explaining property owner's rights and benefits.

In general, Alternative 5A Modified will generate impacts, in terms of right-of-way and displacements, on minority communities within the study area (see Figures II-3 thru II-17 for Alternatives Mapping). The number of minority or low income displacements is not disproportionately high compared to the non-minority displacements. However, the impacts would be offset by improved traffic operations especially the proposed overpasses of MD 210, which would substantially improve community accessibility and connectivity from one side of MD 210 to the other, something that is inhibited by the existing heavily congested at-grade intersections. Each of the proposed overpasses would promote safe and efficient vehicular, bicycle and pedestrian passage across MD 210. The result would be improved and safer access to jobs, community facilities and services for the general public including minority and low income populations living in the study area.

As many as thirteen business displacements could occur as a result of Alternative 5A Modified and several of these appear to have minority ownership and/or operation but the number of minority displacements is not disproportionately high compared to the non-minority displacements. The business displacements consist of:

- Contractor (Kerby Hill Road)
- Shell Gas Station (Kerby Hill Road)
- Texaco Gas Station (Palmer/Livingston Road)

- Laundromat (Palmer/Livingston Road)
- Restaurant (Palmer/Livingston Road)
- Rental Business (Palmer/Livingston Road)
- Restaurant (Palmer/Livingston Road)
- Law Office (MD 210 Mainline)
- Unknown Business (MD 210 Mainline)
- Commercial Property-Currently Unknown Business (Fort Washington Road)
- Gas Station (Swan Creek Road)
- Auto Service Center (Swan Creek Road)
- Vacant Gas Station (Old Fort Road South)

There has been considerable discussion throughout the project planning study among the SHA, elected officials, the Focus Group, business owners and other citizens concerning the general impact of the proposed improvement alternative on businesses. In particular, there has been concern raised regarding potential adverse impact to the tenants of the various shopping centers as a result of reduced visibility, accessibility and lost parking spaces for the businesses if interchanges were to be built.

On October 20, 1999, a meeting was held between SHA Office of Planning and Preliminary Engineering Director Neil Pedersen and the late County Councilman Ike Gourdine to discuss the issues of visibility and accessibility to the Livingston Square Shopping Center. Councilman Gourdine was initially opposed to the interchange options at Old Fort Road North because the bridge and ramps would reduce shopping center visibility and make drivers less willing to leave the highway to patronize the shopping center.

On February 3, 2000, a meeting to present a description of the project was held among business owners and operators in the MD 210 project area. It was pointed out that for Livingston Square and several of the other shopping centers along MD 210 (e.g., Tantallon, Old Forte Village and Forest Plaza), accessibility would be improved by reducing the amount of delay to be experienced by motorists turning off of MD 210 to access the shopping centers, particularly for the left turn movements. Patrons of these shopping centers, of which repeat shoppers are a large majority, are familiar with the area. Therefore, if a loss of shopping center visibility does

occur as a result of bridges or ramps, little or no reduction in patronage should result. Design techniques to maintain visibility (e.g., keeping ramp profiles as low as possible) and signing to advise motorists as to how to access the various establishments, will be considered with the SHA-Selected Alternative. During the design process of the study, refinements will continue to be included in the SHA-Selected Alternative.

On August 12, 2002, a second meeting was held with business owners of potential displacements associated with the MD 210 project. Seven people were in attendance. A presentation included a project description and explanation of owner's rights and benefits.

The analysis of minority population groups and low income population groups in the study area indicates that no disproportionate amount of adverse impacts would occur as a result of the Alternative 5A Modified.

Appropriate relocation advisory services will be offered to all displaced persons including minority or low income persons, if required. Related environmental justice impacts will be addressed according to the provisions of Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low income Populations." Also, Title VI of the Civil Rights Act, as highlighted previously in the "Residential Displacements" discussion of this Chapter, ensures that no person will be discriminated against by actions of the SHA, relating to the project.

5. Effects on Community Facilities and Services

Religious Facilities

Three religious facilities would potentially be directly impacted by the SHA-Selected Alternative 5A Modified. They consist of the Shalom Ministries Worship Center, the Fort Washington Memorial Church and the Fort Washington United Methodist Church.

Shalom Ministries Worship Center

Relocation of the Shalom Ministries Worship Center would be required with the SHA-Selected Alternative. The proposed grade of Kerby Hill Road would need to be raised eight to twelve feet above the existing grade to facilitate the western approach to the overpass. Although retaining walls could be used to support the higher Kerby Hill Road grade without substantially impacting parking or the building location, the entrance to the parking area would need to be prohibitively steep (approximately 12%), and grading to support the entrance would impact several parking spaces. The cost of Shalom Ministries Worship Center displacement would be $1,419,000.

Fort Washington Memorial Church

Alternative 5A Modified would require property acquisition from the Fort Washington Memorial Church. Approximately 0.8 acre of right-of-way would be required. The cross located adjacent to the parking area would not require relocation. Access to the church would change, as the direct connection from MD 210 to the east side service road would be removed. Traffic from the south would have the choice of either using the service road which runs north-south from Livingston Road to the Church or the proposed Relocated Fort Washington Road interchange, which connects to the service road. Traffic from the west on Fort Washington Road would use Relocated Fort Washington Road to the bridge over MD 210 to the service road, which connects to the church parking area. Southbound MD 210 traffic would exit onto the ramp connecting to Relocated Fort Washington Road and travel across the bridge over MD 210 to the service road, which connects to the church parking area. Egress routes from the church would basically mirror the ingress routes.

Overall, the SHA-Selected Alternative would result in substantial access changes and travel distances would be somewhat longer as compared to existing conditions. Travel times would be the same or less due to shorter signal cycles along the route and fewer conflicts with other traffic.

Fort Washington United Methodist Church

SHA-Selected 5A Modified would require property acquisition from the Fort Washington United Methodist Church. Under Alternative 5A Modified, the proposed Ft. Washington Road Option D interchange requires approximately 0.62 acre of right-of-way from church property for the southbound MD 210 exit ramp and the higher grade necessary for Old Fort Road South. The higher grade would probably not necessitate the elimination of any church parking, but would require reconfiguration of the parking areas and entrance to be compatible with the higher grade on Old Fort Road South.

Other than a slightly reconfigured entrance, access to Fort Washington United Methodist Church would remain basically the same under the SHA-Selected Alternative.

Publicly-Owned Public Parks

Right-of-way acquisition would be required from one publicly-owned public park as part of the proposed SHA-Selected Alternative. Approximately 0.2 acre would be required from the Henson Creek Steam Valley Park for the construction of an interchange ramp for Palmer/Livingston Road Option E interchange. A new hiker/biker trail connection would be

constructed parallel to the new ramp. The right-of-way requirement would not impact or diminish any of the park activities. (Refer to chapter V Section 4(f) Evaluation for additional information.)

The Department of Transportation Act, 49 U.S.C. 303(c) requires a Section 4(f) evaluation of the use of land from a significant publicly-owned public park as part of a federally funded or approved transportation project. Any conversion of land acquired or developed under a State grant from Program Open Space requires approval of the Secretary of the Department of Natural Resources, the Secretary of the Department of Budget and Fiscal Planning and the Director of the Department of Planning, and requires replacement with land of at least equivalent area and of equal recreation or open space value.

Other Community Facilities

Of the major categories of community facilities included in the study inventories (indicated on Figures III-2A and Figures III-2B), and not otherwise discussed in this section, no libraries, police services, governmental facilities, or other points of interest would be displaced or require land acquisition by the proposed alternatives.

Right-of-way (11.97 acres) would be required from the Lexington Health Care Center for Alternative 5A Modified at Livingston Road/Swan Creek Road interchange to construct the northbound MD 210 exit ramp and northbound MD 210 entrance ramp. Neither accessibility nor parking would be affected.

Right-of-way (0.26 acre) would be required from Fort Washington Hospital for Alternative 5A Modified at Livingston Road/Swan Creek Road to construct the Swan Creek Road to Livingston Road Connector in the northwest quadrant and for improvements to Livingston Road in front of the hospital. Neither accessibility nor parking would be affected.

The SHA-Selected Alternative would require no school displacements or property acquisition from active schools. Right-of-way (0.93 acre) would be required from the Oxon Hill Staff Development Center to construct the proposed ramp connecting Livingston Road/Kerby Hill Road to northbound MD 210. Grading associated with this ramp would impact a portion of the parking lot immediately adjacent to MD 210, displacing 5 - 15 parking spaces and requiring some modification to parking lot circulation patterns.

6. Disruption of Neighborhoods and Communities

Effects to the existing level of community cohesion are anticipated with Alternative 5A Modified. Although this alternative will not physically bisect any communities not already

divided by MD 210 and the existing side roads, it would create residential relocations as previously identified in Tables IV-1 through IV-4 and would temporarily disrupt the cohesion of several communities by the construction phase of proposed work which may lead to increased travel times as detours and delays in flow of traffic are enacted with residences located on both sides of MD 210 in the study area. Ultimately, positive effects of the SHA-Selected Alternative would improve safety on the east and west side of MD 210 for motorists, bicyclists and pedestrians and provide safer community travel options.

Alternative 5A Modified has a median barrier incorporated into the design in several areas. The median barrier is a physical barrier, allowing right in/right out access to and from the existing roadway. The barrier would change access and travel patterns compared to the existing limited northbound and southbound access MD 210 currently provides. For example, a resident who lives on the northbound side of MD 210 and wants to go somewhere located on the southbound side would have to drive northbound to the nearest intersection or interchange and perform a U-turn.

Because of projected heavy traffic volumes causing safety concerns, interchanges are proposed at several intersections with Alternative 5A Modified mostly at the northern end of the study area. These proposed interchanges would create residential displacements thereby impacting several communities with residences located on both sides of MD 210. Five scattered residences east of MD 210 and nine residences west of MD 210, mostly clustered in the Kerby Hill Road area, would be impacted.

Because of median access closure, the Brookside Park Condominiums located at Wilson Bridge Drive would only have right in/right out access. Persons wanting to travel southbound would continue to use the existing configuration; however, persons wanting to travel northbound would, without entering MD 210 traffic, use a proposed Kerby Hill Road Interchange Option C Access Road. The access road is a two-lane roadway, which would upgrade the existing service road that runs parallel to MD 210, from the south end of the Brookside Park Condominiums into a proposed realigned Kerby Hill Road. (See Figures II-5 and II-6). The Wilson Towers Apartments, with access changed by the proposed interchange, would also have access to the proposed two-lane access road. Traffic wanting to travel northbound on MD 210 would cross over MD 210 eastbound using the grade separated structure to access a northbound interchange ramp.

Alternative 5A Modified includes a Kerby Hill Road Interchange Option C which would require the acquisition of nine residences, clustered mostly west of MD 210, the highest number of residential displacements out of all of the interchange options under consideration. East of

MD 210 along the relocated Kerby Hill Road and existing Murray Hill Road, the community cohesion would be temporarily disrupted by the construction phase of the proposed interchange which may lead to increased travel times as detours and delays in the flow of traffic are enacted to allow construction equipment access to the project area. Overall the proposed interchange would improve safety between neighborhoods on the east and west side of MD 210 for motorists, bicyclists and pedestrians, providing opportunities for better community cohesion because of improved and safer access to community facilities and services.

River View Townhomes, located east of MD 210 south of Kerby Hill Road, would have median access prohibited by a median barrier creating right in/right out access only. Motorists wanting to travel to southbound destinations would have to drive northbound to the proposed Kerby Hill Road Interchange to access southbound MD 210. This option may lead to increased travel times but would improve MD 210 mainline safety for motorists.

The Palmer/Livingston Road Interchange Option E for Alternative 5A Modified would require the acquisition of one residence on the east side of MD 210. The proposed northbound ramp to Palmer Road would temporarily cause disruption and inconvenience to the community with several driveways requiring relocation. Ultimately, the proposed interchange option would improve safety on the east and west side of MD 210 for motorists, bicyclists and pedestrians, providing opportunities for community cohesion.

The proposed ramp in the northeast quadrant of the proposed Old Fort Road North Interchange for Alternative 5A Modified would disrupt access to and from the Friendly Hills Community with the closure of the Old Palmer Road service road connection from the Broadview Road/Centennial Drive intersection to Old Fort Road North, necessitated by the proposed interchange ramp. Instead of using the existing Old Palmer Road connection, community residents would have to access MD 210 via the Broadview Road intersection with Old Fort Road North or the Old Palmer Road connection with Palmer Road. Several residents along Broadview Road and Centennial Drive have expressed concern with any option proposing removal of the existing service road. It is perceived by a few members of the community as a disruption to their established community and quality of life. Several design options were studied to alleviate the community concerns about the proposed closure of the existing service road by attempting to replicate the current connection, but it was determined they were not reasonable because of the high cost, right-of-way and environmental impacts and possible additional residential displacements. Residents of the affected community will retain two means of ingress/egress to and from their neighborhood.

The southwest quadrant of the proposed MD 210/Old Fort Road North intersection for Alternative 5A Modified would result in grading impacts in the vicinity of Kay Dot Road because of the vertical and horizontal relocation of Old Fort Road North necessitated by the proposed overpass. One residential displacement would be required. Kay Dot Road makes a loop, intersecting Old Fort Road North in two places, providing access to several properties. The easternmost access point would need to be closed; however, motorists could still use the second existing access point 350 linear feet to the west. The community would feel minimal travel time disruption.

Alternative 5A Modified includes a Fort Washington Road interchange Option D that would require acquisition of one residence west of MD 210, and the reconstruction of several residential driveways and a church entrance causing temporary impacts and inconvenience for the persons involved. Fort Washington Road Option D includes a 3/4 diamond interchange with a relocated Fort Washington flyover north of the existing Tantallon Shopping Center. The existing access road east of MD 210 would flyover MD 210 and tie into existing Fort Washington Road west of MD 210 at the existing Livingston Road intersection. The existing Fort Washington Road then becomes a right in/right out only intersection at MD 210. Motorists wanting to travel to southbound destinations, east and west of MD 210, would have to drive on relocated Fort Washington Road to a proposed access road, which ties into the existing Fort Washington Road. Persons wanting to travel northbound on MD 210, from west of MD 210, would have to access the relocated Fort Washington Road cross over MD 210, using the grade separated structure, to use an interchange ramp northbound. Tantallon Shopping Center would gain a new access from the relocated Fort Washington Road Option D at a new intersection just west of the proposed structure over MD 210. Overall, the proposed interchange, which has been presented at a public hearing, three public workshops and focus group meetings, would improve safety between neighborhoods on the east and west side of MD 210 for motorists, bicyclists and pedestrians, providing opportunities for better community cohesion.

The southwest quadrant of the Old Fort Road South interchange Option C for Alternative 5A Modified includes relocation of the existing service road entrance to opposite Lampton Lane moving it away from the proposed interchange ramps. The existing properties would be allowed to access the relocated road and drive northbound to the proposed Old Fort Road South intersection. Community cohesion would be temporarily disrupted by the construction phase of the proposed interchange which may lead to increased travel times as detours and delays in the flow of traffic are enacted.

East of MD 210 north of Farmington Road, residents of the White Hall community who use The Mall roadway to access MD 210 would have their access restricted to a right in/right out

only movement for Alternative 5A Modified, because of a proposed MD 210 mainline median barrier. The barrier would change access and travel patterns because this community currently has a median opening. These options would increase travel times but would improve MD 210 mainline safety for motorists. Some citizens of the White Hall Community have expressed their concern for maintaining the MD 210 median opening.

MD 210 is classified as an arterial highway with partial control of access. Therefore, given its functional classification, bicyclists and pedestrians are discouraged from using mainline MD 210 but will not be prohibited from using the outside shoulder as they do today. However, both pedestrians and bicyclists will continue to be able to use the various service roads and parallel County roads such as Oxon Hill Road and Livingston Road for north-south travel as exists today.

Bicycle and pedestrian access is included in the interchange designs to accommodate the crossings of MD 210.

All proposed crossroads assume a five-foot wide bike lane outside the travel lanes in each direction within the limit of improvement. No shoulders are proposed on the crossroads. A five-foot wide sidewalk on each side of the crossroad has been assumed for each overpass design.

Any intersections that are proposed to remain at-grade have been evaluated on a case-by-case basis for pedestrian/bicycle accommodation (e.g., sidewalk connections, cross-walks, etc.). Coordination between SHA and community residents will be maintained throughout the project planning and design phases to ensure appropriate accommodation of bicyclists and pedestrians with the proposed improvements. A bicycle/pedestrian meeting was held on July 23, 2002 with community representatives to discuss access associated with Alternative 5A Modified improvements. (Refer to Chapter VI Comments and Coordination for meeting minutes)

Emergency Services

MD 210 is the primary north/south route in southern Prince George's County. SHA has met with several emergency service providers in the area, as well as the Fort Washington Hospital, and received numerous written comments. According to the Prince George's County Director of Public Safety, in a letter dated May 30, 2000 (see DEIS Section VI Comments and Coordination, page VI-57), the current amount of traffic congestion has, at times, hampered the ability of emergency vehicles to respond to critical incidents in the MD 210 study area.

Representatives of the Fort Washington Hospital reported concern regarding the poor existing signing of the access to the hospital. They also expressed concern about accessibility to

the hospital under the Capacity Option 2 (interchange option) scenario with all alternatives. The concern was that an interchange at Livingston Road/Swan Creek Road would cut-off access to the hospital from northbound MD 210 and westbound Livingston Road approaching the MD 210 overpass. The Alternative 5A Modified interchange option at this location proposes a loop ramp from northbound MD 210, a single lane ramp from southbound MD 210 and a new access road, behind the existing Old Forte Village Shopping Center, from existing Swan Creek Road to the relocated Livingston Road. This connection will allow accessibility similar to existing conditions.

Upon review of the proposed alternatives, the Prince George's County Chief of Police stated that the completion of this project should reduce response time of emergency vehicles, although it is acknowledged that emergency response times may temporarily increase during the construction period due to traffic congestion, temporary roadway closings or detours. (See letter dated May 26, 2000, in DEIS Section VI Comments and Coordination, page VI-55.) It should be noted that during the construction phase, temporary roadway closings or detours may be required which would temporarily increase response times.

Comments by the Fire Chief of the Prince George's County Fire and EMS Department (see memorandum and brochure response form dated May 15, 2000, in DEIS Section VI Comments and Coordination, page VI-51) remain valid given the extent of similarity in emergency vehicle access for Detailed Alternatives presented in the DEIS, as compared to the SHA-Selected Alternative.

It is noted that plans are underway to expand the Silesia Fire Company #47 site on Fort Washington Road to include additional service bays. Ingress and egress to this station will be affected by Alternative 5A Modified Interchange Option D at Fort Washington Road. Coordination with representatives of Fire Company #47 will be maintained through SHA-Selected Alternative and Final Design process to maintain optimal emergency vehicle access.

Overall, response times throughout the MD 210 corridor would generally be reduced, especially during the peak hours, as emergency vehicles would not need to negotiate around long traffic queues at signalized intersections in the northern part of the corridor. Some of the proposed interchanges may slightly increase response distance; however, response times do not appear to be significantly impacted because fire and EMS vehicles will no longer have to negotiate dangerous intersections. With traffic signals and at-grade intersections eliminated on MD 210, there will be a reduction in motor vehicle crashes. Additionally the elimination of signals will result in less abuse to emergency vehicle apparatus since vehicles would not be subjected to the sudden stops and starts required under signalized conditions. Response times

could be slightly higher in the northern portion of the Brookside Park Condominium property as a result of the need to come into the property from Kerby Hill Road interchange instead of the previous entrance location, Wilson Bridge Drive. The distance that emergency responders would need to travel would only be approximately 500 feet longer than under current conditions; however speeds may be slightly lower. A proposed two-way access road, that is included with Alternative 5A Modified to provide access to the Brookside Park Condominiums from relocated Kerby Hill Road, has been designed to handle emergency equipment, as well as school and transit buses. (Refer to Chapter VI Comments and Coordination for EMS correspondence.)

7. Effects on Public Transportation Services

Public transportation in the project area is currently provided by the Maryland Transit Administration (MTA), in the form of long distance commuter service from LaPlata into Washington, D.C. and Washington Metropolitan Area Transit Authority (WMATA), in the form of local service into Washington, D.C.

Currently, commuter bus service utilizing MD 210 consists of one MTA route and one WMATA route. The MTA's 901 Route includes 49 trips (24 northbound morning trips and 25 southbound evening trips) that operate during morning and evening peak periods, with an average headway of 10 minutes. The average daily ridership is approximately 1,100 with no stops in Prince George's County. WMATA's W19 Route provides connections between the Southern Avenue Metro Station, on the Green Line, to Accokeek and several locations, along MD 210 in Charles County as far south as Indian Head. The W19 Route includes 14 northbound trips (four of which are reverse commute) and 15 southbound trips (five of which are reverse commute).

Of the two stops in the MD 210 project area, the W19 Route has one stop along MD 210, at the MD 373 intersection. The other project area W19 stop is at the recently completed Accokeek Village Park and Ride, just east of MD 210 off of MD 373. The effect to either of the commuter bus service routes resulting from the SHA-Selected Alternative would be decreased travel time savings, from MD 228 to Oxon Hill, of as much as approximately 13 minutes in the design year 2020.

Local bus service originating or utilizing MD 210 in the project area is provided by WMATA's Metrobus D13, D14, W15, W17, P17, P18 and P19 lines. These seven routes, five of which operate only during weekday peak hours, generate a total daily ridership of approximately 500. The "W" lines utilize MD 210 from Old Fort Road North to the northern project limit and include stops at the Former ABC Drive-In Park and Ride Lot and the Wilson Towers

Apartments. Several of the "W" lines originate at the Accokeek Park and Ride Lot at the MD 210/MD 373 intersection, but do not currently use the southern segment of MD 210.

The "P" lines originate at the Fort Washington Park and Ride Lot, on Swan Creek Road, west of MD 210 and use the local road network (e.g., Livingston Road, Fort Foot Road and Oxon Hill Road) to reach the Oxon Hill Park and Ride Lot.

Nearly all of the approximately 16 stops associated with the "D" and "W" Metrobus Routes in the project area would be impacted by the SHA-Selected Alternative. These 16 stops are generally located on both sides of MD 210 between Wilson Bridge Drive and Livingston Road/Palmer Road.

The SHA-Selected Alternative requires the elimination of the W15 bus stops on the east service roadway, along Route 210 north of Palmer Road in the vicinity of the former ABC Drive-In. In this case approximately twelve persons taking round trips on the typical weekday would be deprived of service due to the elimination of the break in the highway median that permits southbound buses to turn left from the main roadway to enter the north end of the service roadway. However, in view of the present and growing safety issue currently posed by the maneuvers required by buses to access the service roadway and return to the main roadway in both directions, WMATA has expressed the likelihood that Metrobus service will have to be withdrawn from this segment of service roadway at some point in the future for safety reasons, even if the median were not closed and MD 210 interchanges not constructed.

The Brookside Condominiums and Wilson Towers Apartments on the west side of Indian Highway between Wilson Bridge Drive and Kerby Hill Road average 74 boardings northbound and 64 boardings southbound daily on weekdays, primarily in the AM rush and PM rush respectively. In order to maintain service for these patrons with the SHA-Selected Alternative, WMATA recommends a diversion of the D13 and D14 routes. The route diversion would take northbound buses off of MD 210, over the new Livingston Road/Kerby Hill Road overpass, followed by a loop through the condominium/apartment complex utilizing the turnaround included in the SHA-Selected Alternative and return to MD 210 via the same interchange. This route would delay passengers already on the bus by an estimated six minutes and would lengthen the walk of some Brookside Condominium residents by up to 800 feet, as compared to current conditions. However, northbound patrons from the Brookside Condominiums and Wilson Towers Apartments would no longer need to cross MD 210 or stand along its shoulder, two increasingly unsafe situations. No diversion of southbound buses currently accessing the condominium and apartment complexes at Wilson Bridge Drive would be necessary, as buses can complete the U-turn inside the complex and return to southbound MD 210, as they do today.

Therefore, the southbound Wilson Bridge Drive stop can be retained but without a corresponding northbound stop. WMATA staff supports the use of Routes D13 and D14 to make these diversions, as that line provides seven-day-a-week service and is the only line in the area not operating during rush periods only. The W15 route could also be so diverted in order to provide more frequent service, although its capacity would not be needed.

Consideration of shuttle service in this area was dropped in lieu of route diversion based on WMATA analysis concluding that diversion of through service would be the less objectionable option. A short shuttle merely connecting Wilson Towers and the residential area to the north with D13/D14 and W15 would force a second transfer on patrons who are already transferring to Metrorail or to another bus, thus resulting in additional travel times and potential for missed connections. The use of such a shuttle would be expected to be minimal by persons with transportation choices.

Outside of the above-described stops associated with former ABC Drive-In, the Brookside Condominiums and the Wilson Towers Apartments, the Metrobus stops in the vicinity of MD 210 can be retained in-place, or with slight shifts in location to safely conform to the proposed Kerby Hill Road or Palmer Road interchange designs associated with the SHA-Selected Alternative.

All Route W19 stops in the North Accokeek area are planned to be retained with the SHA-Selected Alternative.

The MD 210 SHA-Selected Alternative does not affect any possible plans for metrorail expansion or stations in the Oxon Hill area being addressed as part of the Capital Beltway Corridor Transportation Study and the Woodrow Wilson Bridge Project.

B. Economic Environment

1. Effects on Regional Business Activities

MD 210 provides a critical link to the movement of goods and services between Washington, D.C. and southern Prince George's County or points south. Roadway improvements can be an incentive to businesses to relocate or remain in an area by providing a safer, more efficient transportation system.

Although there are no specific industries associated with the MD 210 study area, MD 210 is the primary access route for employees and customers of regional businesses. Employment in

the region is anticipated to grow substantially with the continued planned commercial development in the area, particularly the National Harbor. Commuting times to all businesses, attractiveness of regional businesses to patrons and safety would all be enhanced under the build alternatives.

2. Effects on Existing Businesses

The effects that Alternative 5A Modified would have on existing businesses in the project area can be summarized into three primary categories: displacement, fee simple right-of-way acquisition and modifications to accessibility/visibility.

Business/commercial property acquisition and relocation will be required in certain areas by Alternative 5A Modified (as shown on Figures II-3 through II-17). Business/commercial property acquisition includes unimproved property not owned by SHA that does not require the acquisition of a structure and acquisitions that will require the displacement of a structure. Table S-2 and S-3 show the number of relocations and estimated right-of-way cost.

Alternative 5A Modified would require property acquisition from 40 commercial properties. Thirteen commercial displacements would occur as a result of this alternative. The costs of the commercial displacements range from $297,000 to $2,163,000.

Table IV-1 provides a list of the thirteen possible business displacements with Alternative 5A Modified.

TABLE IV-1
SUMMARY OF POTENTIALLY DISPLACED BUSINESSES

Business	Location
Contractor	Kerby Hill Road
Shell Gas Station	Kerby Hill Road
Texaco Gas Station	Palmer/Livingston Road
Laundromat	Palmer/Livingston Road
Restaurant	Palmer/Livingston Road
Rental Business	Palmer/Livingston Road
Restaurant	Palmer/Livingston Road
Law Office	MD 210 Mainline
Unknown Business	MD 210 Mainline
Vacant Business	Fort Washington Road
Gas Station	Swan Creek Road
Auto Service Center	Swan Creek Road
Vacant Gas Station	Old Fort Road South

Including the thirteen possible displacements, the number of business properties from which in fee right-of-way acquisition would be 40 properties requiring 34.0 acres for Alternative 5A Modified. Except for the displaced businesses, the amount of right-of-way required for any individual business property would not result in an adverse effect on the viability of that business.

There are several business properties for which parking impacts will occur. Table IV-2 summarizes the anticipated parking impacts corresponding to Alternative 5A Modified.

TABLE IV-2
PARKING IMPACTS

PROPERTY	SPACES ELIMINATED
Livingston Square Shopping Center	-25 +13 (replaced) Net – 12 Spaces
Tantallon Shopping Center	-10 + 3 (replaced) Net –7 Spaces
Law Office Fort Washington Road	-7
Old Forte Village Shopping Center Northwest Quadrant Swan Creek Road	-50 (Spaces are located behind the shopping center and are seldom used)
Old Fort Square Professional Center	-14 Spaces Temporarily During Retaining Wall Construction
Forest Plaza Shopping Center	-45 +49 (replaced) Net + 4 Spaces[1]
(MD 373) Realty Office	-6
Oxon Hill Development Center	-6
Day Star Nursery	-11 +11 (replaced)[2] Net 0 Spaces

[1] If Exxon Gas Station being displaced property could be used for additional parking
[2] Parking lot reconstruction assumed

The indirect effects on existing businesses in the project area in terms of accessibility and visibility would vary somewhat according to location and type of business, but would generally be favorable. Travel times for patrons to local businesses would be substantially decreased under Alternative 5A Modified, as the elimination of traffic signals on MD 210 and the grade separation of side roads across MD 210 would greatly reduce delays for vehicles turning off of MD 210 (particularly left turns) and for those coming from the east side of MD 210.

Of specific concern in this study has been the economic effect to the four shopping centers immediately adjacent to MD 210 in the corridor: Livingston Square Shopping Center (Old Fort Road North), Tantallon Shopping Center (Fort Washington Road), Old Forte Village Shopping Center (Swan Creek Road) and Forest Plaza Shopping Center (Old Fort Road South).

Under Alternative 5A Modified at the Livingston Square Shopping Center, access patterns would be substantially different than under the No-Build Alternative. The proposed interchange would necessitate closure of the entrance adjacent to the McDonald's Restaurant, and an 80'± westerly shift of the main entrance off of Old Fort Road North. This would result in the net loss of approximately 12 parking spaces, as indicated in Table IV - 2. No change in the means of access for vehicles coming from southbound MD 210 or westbound Old Fort Road North would occur.

3. Tax Base Effects

Residential, commercial and institutional property will be displaced for this project by the SHA-Selected Alternative. An adverse effect on the tax base is not anticipated with the right-of-way acquisition and displacements associated with the proposed roadway improvements as it is anticipated that residential, business/commercial and church relocations would occur within the vicinity of the project area or within the county. The differences in traffic volumes would not be substantial enough between the No-Build and Alternative 5A Modified to affect the value of properties fronting the roadway or the tax base.

C. Land Use

1. Existing Land Use in the Study Area

Existing land use would not be altered by the No-Build Alternative, but would be altered by the SHA-Selected Alternative. Current land use would be altered through the conversion of residential, business/commercial, parkland or recreational and public use to transportation use. Table IV-3 presents the additional right-of-way required by Alternative 5A Modified.

TABLE IV-3
ADDITIONAL RIGHT-OF-WAY REQUIRED

Alternative	Additional Right-of-Way Required (Acres)					
	Residential	Business/ Commercial	Parkland or Recreational	Church/ School	Historic/ Archeological	TOTAL
5A – Mod.	126.7	34.0	0.2	4.0	0.2	**165.1**

2. Future Land Use in the Study Area

Prince George's County's population has grown from 660,567 in the year 1970 to an estimated 833,423 today, and is projected to grow to 933,500 by the year 2020. New residential development, businesses, community facilities and services will likely be needed to accommodate the anticipated growth in the County's population. There does not appear to be any planned development in the study area that is dependent on the SHA-Selected Alternative for access. Access to land areas adjacent to MD 210, which currently have access, will remain in place with all of the build alternatives. There is some median closures associated with converting MD 210 to a controlled access facility that would result in right in/right out access. No additional access points are available along MD 210 since there is a right-of-way line of through highway established.

The actual growth distribution will depend on the adherence to established land use controls, designed to focus potential growth into appropriate planned areas. The responsibility for administering such controls rests with the Maryland-National Park and Planning Commission.

Of the ten-mile long portion of MD 210 in the project area, all but approximately 1.3 miles is within a Priority Funding Area (PFA) designated by Prince George's County under the State's Priority Places Strategy. As shown on Figure IV-1, PFA gaps are present at two locations - between Old Fort Road North and Fort Washington Road, and at the crossing of Piscataway Creek. Some of the proposed MD 210 mainline and intersection improvements are located just outside the PFA. The Maryland Department of Planning has concurred (Documentation dated February 18, 2004 in Section VI) that the proposed project is consistent with the Linear Features Regulations and is Smart Growth consistent.

D. Cultural Resources

Regulations 36 CFR 800 implement the requirements of the National Historic Preservation Act (NHPA) by regulating the Advisory Council on Historic Preservation and establishing the procedures for compliance with Section 106 of the NHPA.

If historic properties listed in or determined eligible for the National Register of Historic Places are identified (36 CFR 800.4), the agency must assess how its project will affect them. Throughout this assessment, the agency will work with the SHPO and consider the views of others, such as representatives of local governments, property owners, members of the public, and the Advisory Council. The agency's assessment will use the criteria found in the Advisory Council's regulations and guidance (36 CFR 800.5).

According to the current guidance, "An adverse effect is found when an undertaking may alter, directly or indirectly, and of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative."

Also, according to the current guidance, examples of adverse effects on historic properties include, but are not limited to:

- Physical destruction of or damage to all or part of the property;
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines;
- Removal of the property from its historic location;
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;

- Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features;
- Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and
- Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.
- In considering the potential effects of the project on the identified resources, the agency may make one of the following three determinations:
- No historic properties affected,
- No historic properties adversely affected, or
- Historic properties adversely affected.

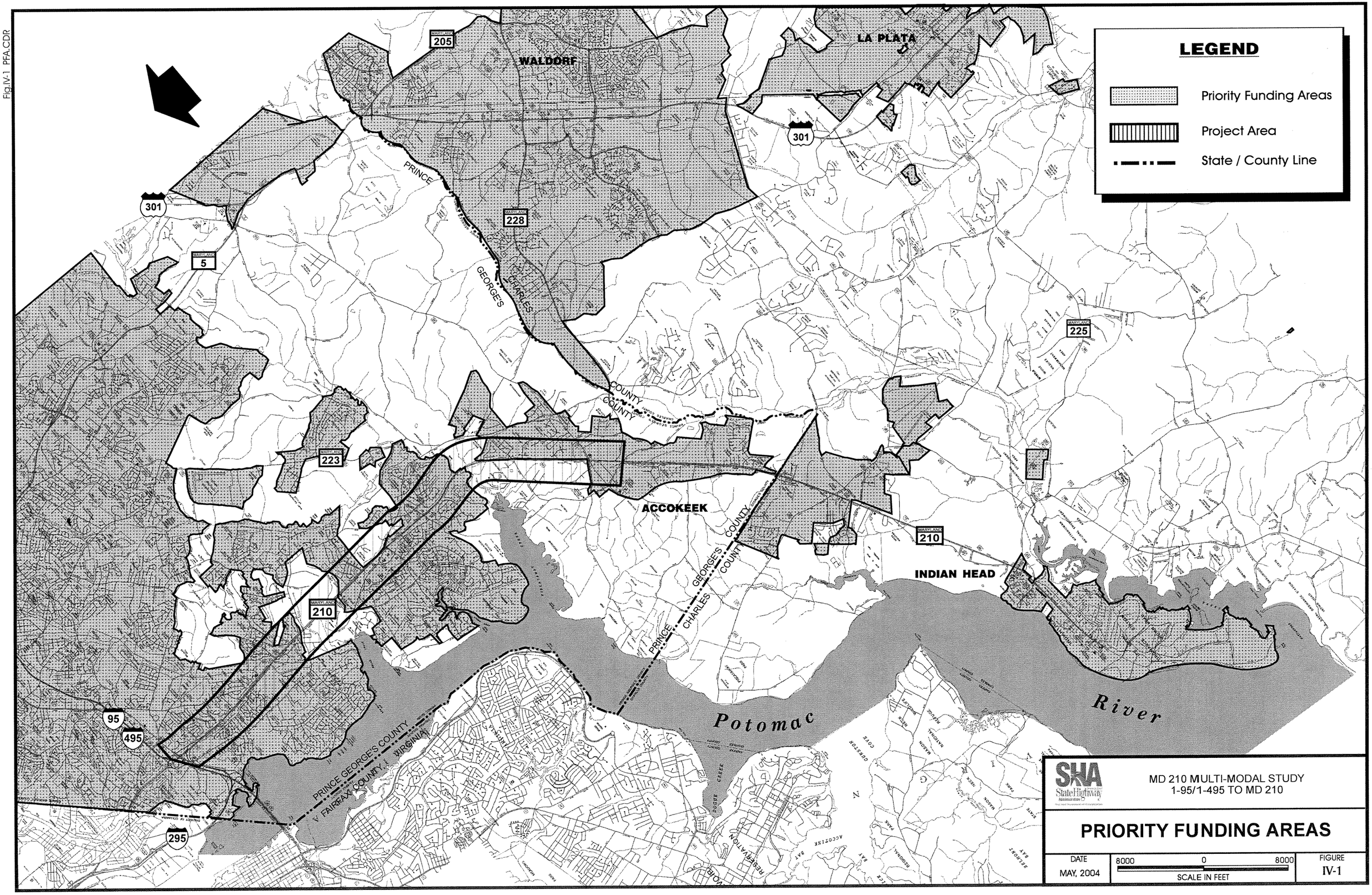
The agency has identified four historic properties in the APE for the project. It has consulted with the SHPO and others - Broad Creek Historic District Local Advisory Committee, the Oxon Hill Manor Foundation, the National Park Service, and the Prince George's County Historic Preservation Commission - to determine the potential effects of the project on the historic properties.

1. Historic Sites

a. Broad Creek Historic District (PG: 80-24)

Alternative 5A Modified would require the acquisition of 0.21 acres of grassy area within the Broad Creek Historic District for roadside grading associated with intersection improvements at Old Fort Road. This area is located entirely within Parcel 189, which the SHA has determined to be not contributing to the historic district. Based on this determination and consideration the proposed acquisition represents 0.035 percent of the overall land area of the historic district, the project will have no adverse effect on the Broad Creek Historic District. The SHPO has concurred with this determination. Because the impact occurs to a non-contributing element within the Broad Creek Historic District, evaluation under Section 4(f) of the United States Department of Transportation Act is not required.

Fig.IV-1 PFA.CDR



b. Hovermale's Taste Best (PG: 80-25)

Alternative 5A Modified would require the reconfiguration of the existing Palmer/Livingston Road intersection as an interchange, and the resource, located on the west side of Livingston Road, will be in the area of potential effects. The Palmer/Livingston Road Interchange Option E, illustrated in Figure II-7, includes a new access road in front of the resource but will have no physical impact to the property. The interchange option will permit the continued visibility of the resource from MD 210 and Livingston Road and the new access road will enable the continued historic use of the property. Because the visibility of the property and the use of the property will be maintained throughout the project, Option E will not adversely affect the historic property. The SHPO has concurred (Documentation dated March 9, 2001 in Section VI) that the Palmer Road/Livingston Road Interchange Option E will have no adverse effect on the historic property provided that SHA provide the SHPO with a plan of the Selected Alternative at 60% completion for final review and approval regarding any changes in access to Hovermale's Taste Best.

c. J.R. Lee Manning House (PG: 83-16)

The SHA-Selected Alternative includes limited intersection improvements at the southern end of the project. No construction activities will be visible from the J.R. Lee Manning House for Alternative 5A Modified. As a result, the project will have no effect on the historic property. The SHPO has concurred with this determination (Documentation dated March 9, 2001 in Section VI).

2. Archeological Sites

Identification and evaluation of archeological resources was completed in accordance with the requirements of 36 CFR 800.4 for the SHA-Selected Alternative.

No National Register eligible archeological resources would be impacted by the SHA-Selected Alternative, as concurred upon by the SHPO on April 23, 2004, and documented in Section VI, page VI-339G.

The design of the Parker Farm wetland creation area (see Sections IV.F. and IV.G.) includes measures to avoid the significant Late Woodland component of site 18PR622, and to provide a 50-foot buffer around the site. SHA will further ensure avoidance by erecting a temporary chain link fence during construction that prohibits any activity immediately adjacent to, or within, the fenced buffer.

The SHA-Selected Alternative will have no adverse effect on Broad Creek Historic District or Hovermale's Taste Best and will have no effect on the J.R. Lee Manning House. The SHA-Selected Alternative will have no impact on archeological resources along mainline MD 210 or areas slated for wetland mitigation and stream mitigation. FHWA has determined that no historic properties are adversely affected by the proposed project under Section 106. Furthermore, FHWA has determined that the project will not require the use of historic properties under Section 4(f). The SHPO has concurred with this determination on April 23, 2004.

E. Effects on Geology, Topography and Soils

1. Geology and Topography

The SHA-Selected Alternative under consideration would alter the existing topography within the project area. None of the grades associated with the proposed SHA-Selected Alternative would exceed six percent, however, cutting and filling would be involved. Cut and fill slopes would not exceed a ratio of two horizontal to one vertical from the hinge point of the proposed typical section to the existing ground. The maximum depth cut associated with Alternative 5A Modified would be 75 feet and the maximum fill would be 25 feet.

2. Soils

The SHA-Selected Alternative would result in disturbance of soils, including erosion and increased runoff due to construction activities and loss of vegetation in the project area.

A majority of the soils in the study area occur on moderate and steep slopes and have a severe erosion hazard classification. Measures to protect soils from erosion would be implemented in accordance with an approved Erosion and Sediment control Plan prepared in accordance with the "Maryland Standards and Specifications for Soil Erosion and Sediment control." Control measures would include: utilizing vegetation to stabilize sediment, reducing the amount of time and the area of a surface exposed to erosion; and utilizing appropriately sized sediment traps and sediment basins. Additional protection of surface water quality from impacts due to soil erosion are reported for highway construction projects in Maryland due to the designation of construction contractors as co-permit tees on the NPDES Permit that is issued under Maryland's General Permit for construction activities, and implementation of a regular inspection program for construction site sediment control devices that includes penalties for inadequate maintenance.

3. Prime Farmland Soils and Soils of Statewide Importance

Alternative 5A Modified would result in impacts to prime farmland soils and soils of statewide importance. Alternative 5A Modified would impact 4.5 acres of prime farmland soils and 14.5 acres of soils of statewide importance.

None of the impacted prime farmland soils areas or soils of statewide importance areas are in areas zoned agriculturally or currently in agricultural use. A U.S. Department of Agriculture Farmland Conversion Impact Rating (Form AD-1006) was completed for this project and submitted to the Natural Resources Conservation Service for Prince George's County. The completed form is included in Section VI Comments and Coordination in the Draft Environmental Impact Statement and Section 4(f) Evaluation.

F. Water Resources and Fish Fauna

Potential impact to water resources and fish fauna associated with Alternative 5A Modified would result from:

- Construction: These include impacts associated with physical disturbances, such as accidental spills, sediment spills, and reductions in base flow caused by paving and soil compaction.

- Facility Use: These include impacts associated with runoff quality and quantity such as chemical contamination, thermal loads from heated surfaces, increased erosive flows and reduced base flows.

The effects on water resources from spills, sedimentation, and leaks from construction equipment may be reduced by both structural and non-structural methods. Effective sediment and erosion control measures may help contain surface spills, sediment spills and leaks. Secondary containment for portable equipment fueling tanks may also help control accidental spills or leaks. Vegetation, when established rapidly, may attenuate and absorb contaminants from spills or leaks and serves to reduce sediment loads by stabilizing recently disturbed solid.

Construction operation and maintenance practices that prevent sediment releases are the most effective measures to prevent off site contamination. Well-controlled oil changing, lubrication, fueling operations, and immediate repair of any fuel or hydraulic fluid leaks may eliminate the source of potential hydrocarbon contamination. An intensive dust control program on construction travel ways may reduce off-site sedimentation from airborne particulates.

The deleterious effects of imperviousness, reductions in groundwater recharge and associated stream base flow; increases in the peaks, duration, and frequencies of erosive flows; increases in chemical contaminant mass in runoff; and increases in runoff temperature extremes, may be mitigated to various degrees by Stormwater management. The minimal technique would consist of 12 or 24-hour extended detention. However, advanced Stormwater quality and quantity controls, including Low Impact Development techniques, are available that can more effectively mitigate the effects of the build alternative. Optimal techniques involve simple, well-designed facilities that require low maintenance and, commonly, include infiltration. These designs, founded on sound geotechnical data, may function well in mitigating quality and quantity impacts.

1. Surface Water Resources

Alternative 5A Modified would impact surface water resources, to varying degrees, in the study area. Most of the stream impacts that would result from the SHA-Selected Alternative are due to culvert extensions and grading for proposed fill slopes. A new ditch will be cut where a proposed fill slope would impact an existing ditch/stream. Approximately 1,160 linear feet (LF) of stream relocation would be necessary. 500 LF at Carey Branch for the Kerby Hill Road Interchange Option C ramp acceleration lane widening to MD 210 and 660 LF at Broad Creek for Ft. Washington Road interchange Option D ramp and grading associated with Alternative 5A Modified.

The additional impervious surface from Alternative 5A Modified could affect stream base flows by increasing peak flows and reducing the rate and quantity of infiltration. The effects would be most pronounced in the smaller sub watersheds where the area of reduced recharge is proportionately larger. Stream temperature and quality can be adversely affected by new paved surfaces and decreased shading along disturbed areas. The temperature changes primarily depend on the stream size, the existing temperature regime, the amount and temperature of stream base flow, and the degree of shading. Although the road surfaces from the SHA-Selected Alternative occasionally will generate intensively heated runoff, stormwater management incorporating infiltration can mitigate any temperature effects on the receiving waters. Since the area affected by the SHA-Selected Alternative is relatively small compared to the drainage areas, peak flows at the crossings are only minimally affected. Mitigation of these effects with stormwater management design will reduce adverse effects.

All potentially affected streams are designated Use Classification I (Refer to Table IV-4). Instream work within the Henson Creek mainstem will be restricted from March 1 through June 15 of any year. If instream work is to involve construction of cofferdams, installation and

dismantling of cofferdams within the stream will be restricted from the closure period appropriate to the stream impacted by the work. Should cofferdams be utilized, the diversion channel established by the cofferdam will be sized according to hydraulic requirements.

Wherever possible, SHA will maintain at least 50% of the width of the stream open to allow for the passage of migratory fish. Width of the stream will be determined from the location of ordinary high water lines occurring under base flow conditions during the spawning season. During the design phase of the project, studies will be undertaken to assess potential secondary impacts to the lower portion of the watershed resulting from proposed stream relocation included in the project. SHA will make every attempt to replicate the sinuosity and stream channel length in order to ensure that stream bank erosion and channel incising will not be exacerbated in downstream areas. If replication is not feasible, other measures such as instream structures (e.g., J-Hooks, cross vanes) will be considered.

In order to minimize adverse changes to in stream hydrology and avoid excessive export of nutrients and sediments to downstream areas, mitigative measures will be employed. Tree and shrub removal in the work zone will be minimized and the cutting of the canopy provided by larger trees will be avoided wherever possible. In addition, protective fencing will be installed around individual trees or groups of trees that are to be conserved so that tree root systems and woodland soils are not compacted or otherwise disturbed by heavy equipment.

Best Management Practices will be used during all actions affecting instream waters.

No impacts within the Chesapeake Bay Critical Area (CBCA) would occur under Alternative 5A Modified.

Table IV-4 lists the stream impacts associated with the MD 210 Alternative 5A Modified.

Riparian Zone Impacts

Through coordination with the U.S. Fish & Wildlife Service, the National Marine Fisheries Service and the U.S. Army Corps of Engineers, stream reaches that will require relocation or substantial bridging or culverting with the SHA-Selected Alternative have been evaluated in terms of riparian zone impacts. Three riparian zones were identified in the project area, as follows:

1. Carey Branch – west of and parallel to MD 210 from approximately 500 feet north of Kerby Hill Road to the entrance of the existing box culvert under MD 210, approximately 1,500 feet south of Kerby Hill Road (See Figure IV-2).

2. Henson Creek – just north of Palmer Road/Livingston Road from approximately 350 feet east of MD 210 to 250 feet west of MD 210 (See Figure IV-3).

3. Broad Creek – from the west side of MD 210, near the entrance to the concrete arch culvert under MD 210, approximately 3,000 feet north of Fort Washington Road, to a point approximately 700 feet north of Fort Washington Road (See Figure IV-4).

The analysis first consisted of the delineation of a riparian zone analysis area for each of the three impacted riparian zones in the project area. The riparian zones analysis area was defined as a band, approximately 300 feet wide, centered on the main stream channel. The length of the analysis area extended such that the 300-foot wide band covered any proposed MD 210 improvements associated with the SHA-Selected Alternative, other than resurfacing.

MURRAY HILL

BRANCH PL

MURRAY HILL DR

CAREY BRANCH

RIVER POINT AP

ALCOA DR

MD 210

R/W LINE OF THROUGH HIGHWAY

R/W LINE

WOODS WAY

FOUNDERS

WILSON TOWERS APARTMENTS

BLDG.

BEGIN CONC. BARR.

CONC. BARR.

GAS STATION

SHALOM MINISTRIES WORSHIP CENTER

KERBY HILL

KERBY HILL RD.

RIPARIAN ZONE

C.H. KERBY P.1

POTENTIAL SWM AREA

RELOCATE EX. STREAM

EXISTING CAREY BRANCH

REMOVE EX. BOX CULVERT

POTENTIAL SWM AREA

ION 3

CAREY BRANCH MAINLINE STA. 157+00 TO 176+50 (KERBY HILL ROAD AREA)	
TOTAL RIPARIAN ZONE ANALYSIS AREA	14.01 AC.
EXISTING PAVEMENT AREA	3.05 AC.
PROPOSED ADDITIONAL PAVEMENT AREA	1.56 AC.
FOREST AREA	3.06 AC.
FOREST IMPACT AREA	1.25 AC
EXISTING LENGTH OF CHANNEL	1,955 LF
PROPOSED LENGTH OF CHANNEL*	1,920 LF

NOTE: ALL AREAS ARE WITHIN THE RIPARIAN ZONE

*NOTE:
THE PROPOSED CHANNEL LENGTHS INDICATED IN THE ABOVE TABLE REPRESENT A WORST CASE, STRAIGHT-LINE CHANNEL RELOCATION ASSUMPTION. DURING FINAL DESIGN, DETAILED HYDROLOGIC, HYDRAULIC AND STREAM GEOMORPHOLOGY STUDIES WILL BE COMPLETED AND THE APPROPRIATE SINUOSITY, GRADE CONTROL AND CHANNEL ARMORING WILL BE INCORPORATED IN THE DESIGN TO LIMIT VELOCITIES AND ENSURE STREAM CHANNEL STABILIZATION.

SHA State Highway Administration

MD 210 – I-95 /I-495 TO MD 228

RIPARIAN ZONE ANALYSIS
CAREY BRANCH

DATE	SCALE	FIGURE
MAY, 2004	1" = 200'	IV-2

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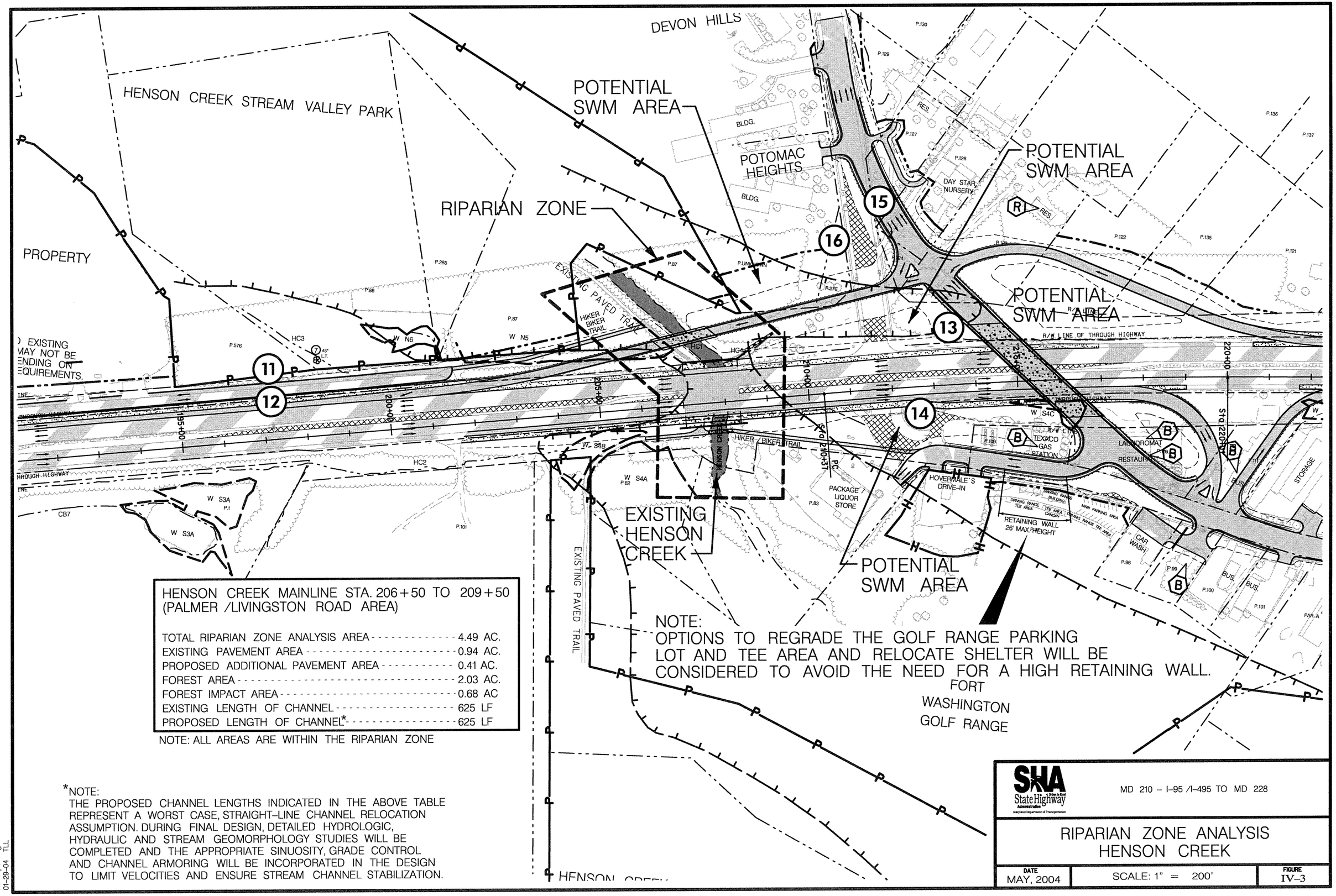

HENSON CREEK MAINLINE STA. 206+50 TO 209+50
(PALMER /LIVINGSTON ROAD AREA)

TOTAL RIPARIAN ZONE ANALYSIS AREA	4.49 AC.
EXISTING PAVEMENT AREA	0.94 AC.
PROPOSED ADDITIONAL PAVEMENT AREA	0.41 AC.
FOREST AREA	2.03 AC.
FOREST IMPACT AREA	0.68 AC
EXISTING LENGTH OF CHANNEL	625 LF
PROPOSED LENGTH OF CHANNEL*	625 LF

NOTE: ALL AREAS ARE WITHIN THE RIPARIAN ZONE

*NOTE:
THE PROPOSED CHANNEL LENGTHS INDICATED IN THE ABOVE TABLE REPRESENT A WORST CASE, STRAIGHT-LINE CHANNEL RELOCATION ASSUMPTION. DURING FINAL DESIGN, DETAILED HYDROLOGIC, HYDRAULIC AND STREAM GEOMORPHOLOGY STUDIES WILL BE COMPLETED AND THE APPROPRIATE SINUOSITY, GRADE CONTROL AND CHANNEL ARMORING WILL BE INCORPORATED IN THE DESIGN TO LIMIT VELOCITIES AND ENSURE STREAM CHANNEL STABILIZATION.

SHA State Highway Administration
Maryland Department of Transportation

MD 210 – I-95 /I-495 TO MD 228

RIPARIAN ZONE ANALYSIS
HENSON CREEK

DATE	SCALE	FIGURE
MAY, 2004	SCALE: 1" = 200'	IV-3

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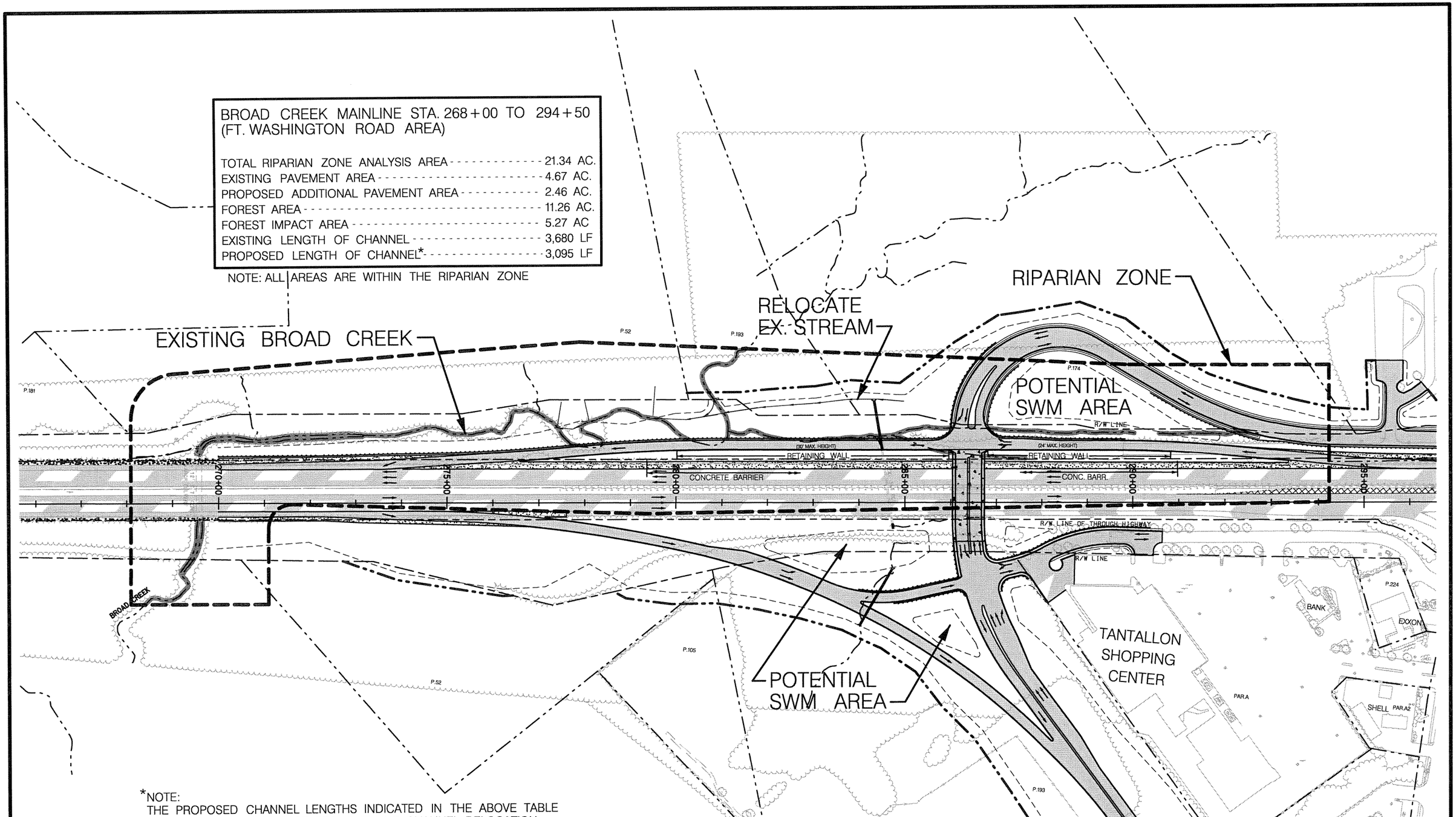
BROAD CREEK MAINLINE STA. 268+00 TO 294+50
(FT. WASHINGTON ROAD AREA)

TOTAL RIPARIAN ZONE ANALYSIS AREA	21.34 AC.
EXISTING PAVEMENT AREA	4.67 AC.
PROPOSED ADDITIONAL PAVEMENT AREA	2.46 AC.
FOREST AREA	11.26 AC.
FOREST IMPACT AREA	5.27 AC
EXISTING LENGTH OF CHANNEL	3,680 LF
PROPOSED LENGTH OF CHANNEL*	3,095 LF

NOTE: ALL AREAS ARE WITHIN THE RIPARIAN ZONE



*NOTE:
THE PROPOSED CHANNEL LENGTHS INDICATED IN THE ABOVE TABLE REPRESENT A WORST CASE, STRAIGHT-LINE CHANNEL RELOCATION ASSUMPTION. DURING FINAL DESIGN, DETAILED HYDROLOGIC, HYDRAULIC AND STREAM GEOMORPHOLOGY STUDIES WILL BE COMPLETED AND THE APPROPRIATE SINUOSITY, GRADE CONTROL AND CHANNEL ARMORING WILL BE INCORPORATED IN THE DESIGN TO LIMIT VELOCITIES AND ENSURE STREAM CHANNEL STABILIZATION.

LIVINGSTON ROAD COMMUNITY PAR

SHA State Highway Administration — Maryland Department of Transportation

MD 210 – I-95 /I-495 TO MD 228

RIPARIAN ZONE ANALYSIS
BROAD CREEK

DATE	SCALE	FIGURE
MAY, 2004	SCALE: 1" = 200'	IV-4

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TABLE IV-4
SUMMARY OF STREAM IMPACTS (LF)

Location	Waters of the U.S. Designation	Total Stream Impacts (LF)	Length of Impacted Ephemeral Streams (LF)	Impact Requiring Mitigation (LF)
Alt 5A Mainline	BC-4	40	---	40
	BC-5	30	---	30
	HM-1	40	---	40
	CB-7	350	---	350
	CB-2	245	145	100
Mainline Subtotal		**705**	**145**	**560**
Kerby Hill Road	CB-1	830	---	830
	CB-3	50	---	50
	CB-5	325	---	325
Kerby Hill Road Subtotal		**1,205**	**0**	**1,205**
Palmer/Livingston Road	HC-1	75	---	75
	HC-4	75	---	75
	HC-5	510	---	510
Palmer/Livingston Road Subtotal		**660**	**0**	**660**
Old Fort Road North	BC-1	230	---	230
	BC-2	810	810	---
	HM-2	420	---	420
	HM-2	140	140	---
Old Fort Road North		**1,600**	**950**	**650**
Fort Washington Road	BC-2	1,840	440	1,400
	BC-3	310	210	100
Fort Washington Road Subtotal		**2,150**	**650**	**1,500**
Swan Creek Rd – Option G	BC-6	935	200	735
Swan Creek Rd – Opt. G Subtotal		**935**	**200**	**735**
Old Fort Road South	BC-10	90	---	90
	PC-4	1,465	1,090	375
Old Fort Road South Subtotal		**1,555**	**1,090**	**465**
Farmington Road	PC-8	110	---	110
Farmington Road Subtotal		**110**	**0**	**110**
MD 373	PC-12	220	220	---
MD 373 Subtotal		**220**	**220**	**0**
TOTAL ALTERNATIVE 5A MODIFIED (LF)		**9,140**	**3,255**	**5,885**

BC = Broad Creek CB = Carey Branch PC = Piscataway Creek
HM = Hunters Mill Creek HC=HensonCreek

Various characteristics and impact parameters were evaluated within the analysis area are summarized as follows:

TABLE IV-5
RIPARIAN ZONE IMPACTS

	Carey Branch	Henson Creek	Broad Creek
Riparian Zone Analysis Area	14.01 acre	4.49 acre	21.34 acre
Existing Pavement Area	3.05 acre	0.94 acre	4.670 acre
Proposed Additional Pavement Area	1.56 acre	0.41 acre	2.46 acre
Forest Area	3.06 acre	2.03 acre	11.26 acre
Forest Impact Area	1.25 acre	0.68 acre	5.27 acre
Existing Length of Channel	1,955 LF	625 LF	3,680 LF
Proposed Length of Channel	1,920 LF	625 LF	3,095 LF

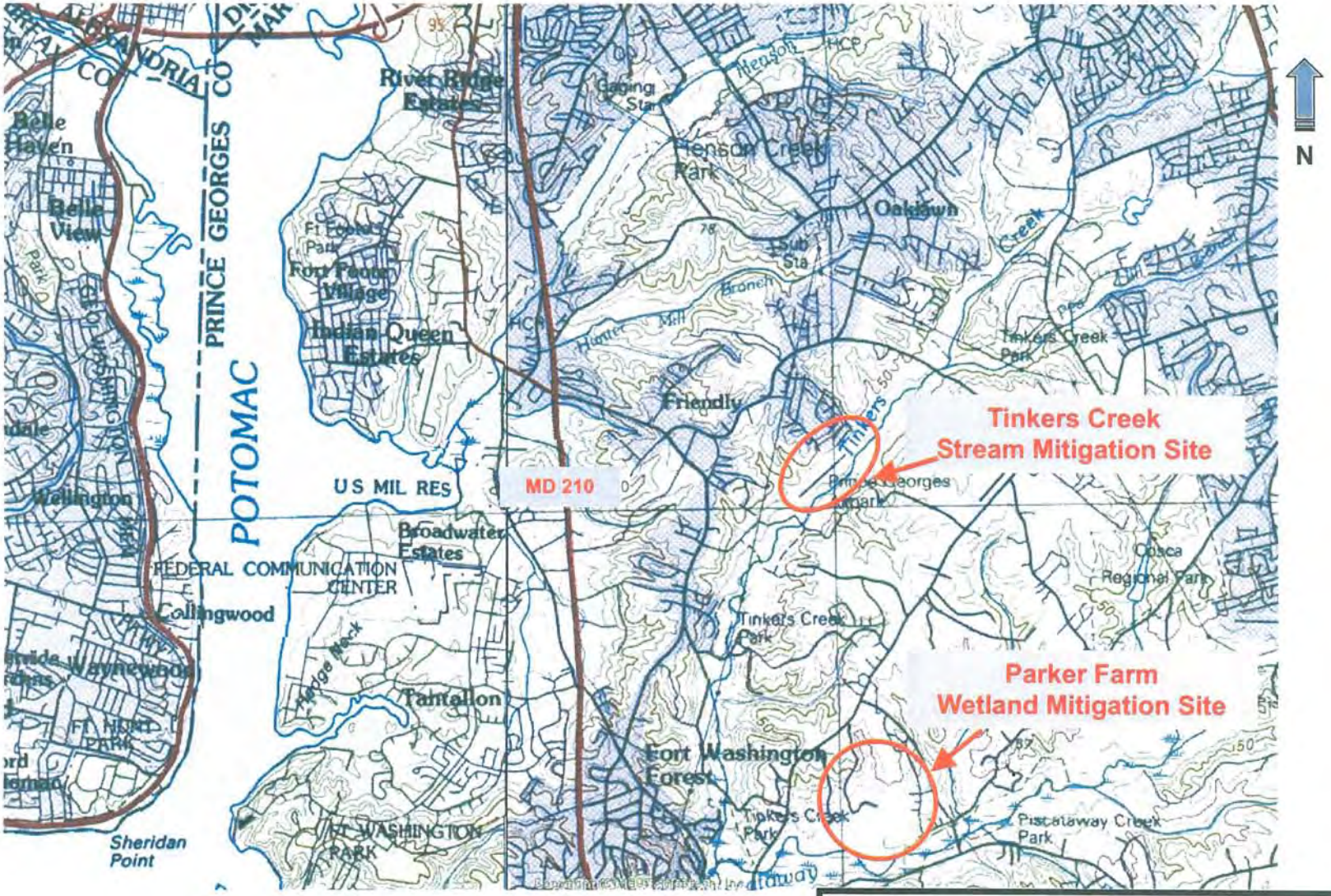
The proposed channel lengths indicated in the above table represent a worst case, straight-line channel relocation assumption. During final design, detailed hydrologic, hydraulic and stream geomorphology studies will be completed and the appropriate sinuosity, grade control and channel armoring will be incorporated in the design to limit velocities and ensure stream channel stabilization.

Mitigation (refer to Section VI. D for Agency Correspondence)

Stream Mitigation Project – Site SR-1, Tinkers Creek at Potomac Airfield

SHA-Selected Alternative 5A Modified would impact 9,140 lf of stream, 3,255 lf of which are ephemeral. A stream mitigation site search was undertaken for this project. Several sites were presented during an interagency field meeting in April 2003. The field meeting attendees approved the Potomac Airfield property, located east of MD 210 in the Piscataway Creek watershed. The SHA proposed and subsequently selected the restoration of approximately 2,200 linear feet of Tinkers Creek along the Potomac Airfield (See Figure IV-5 and IV-6) as mitigation for the proposed stream impacts associated with Alternative 5A Modified.

The proposed mitigation reach approximately spans more than half the length of the Potomac Airfield property. This site was recommended by the Maryland-National Capital Park and Planning Commission (M-NCPPC) as a good candidate. M-NCPPC advised that restoration and subsequent protection of Tinkers Creek along the Potomac Airfield property would serve as



SHA State Highway Administration

MD 210 MULTI-MODAL STUDY
1-95/1-495 TO MD 210

MITIGATION SITE LOCATION MAP

DATE		FIGURE
MAY, 2004	NOT TO SCALE	IV-5

Geomorphic Analysis Cross Sections
Proposed Tinkers Creek Restoration Alignment
Existing Tinkers Creek Alignment
Potential Staging Area
Potential Stream Restoration Area
Proposed Access Route

Existing Storm Sewer Alignment
Proposed Storm Sewer Alignment
Exposed Sanitary Sewer Line Fish Blockage

SHA State Highway Administration

MD 210 MULTI-MODAL STUDY
1-95/1-495 TO MD 210

TINKERS CREEK STREAM MITIGATION CONCEPT PLAN

DATE		FIGURE
MAY, 2004	NOT TO SCALE	IV-6

a valuable linkage between already protected stream corridors located upstream and downstream of the property. The combination of protection offered by the previous M-NCPPC and SHA efforts and the proposed restoration along Potomac Airfield provides Tinkers Creek with a "targeted watershed" status. This type of comprehensive approach is generally favored for overall environmental restoration as opposed to implementation of many small individual projects.

As Tinkers Creek flows into the area along the boundary between the Potomac Airfield and the Edenlen properties, its banks are devoid of woody vegetation, particularly on the right (west) bank where the airfield is located. Because there is no woody bank vegetation, the stream was able to incise and is now quickly widening and eroding the banks that consist of sand on top of a silt/clay layer and an underlying gravel layer. The pink to red clay layer that occurs low in the vertical bank profile throughout this reach is the Marlboro Clay. This formation is well documented in Maryland geological studies and its exposure in the bed of Tinkers Creek has slowed the relatively rapid erosion that appears to have taken place in recent years. As a result of the lack of woody vegetation, Tinkers Creek is experiencing severe lateral erosion for approximately 2,200 linear feet. Numerous exposed vertical banks eight to ten feet tall exist throughout the reach. The bank erosion is not an immediate threat to any buildings or airport runways. However, the severe erosion does appear to be serving as a significant source of sediment to the downstream system. The exposed gravel layer is likely the abandoned streambed and the source for the large gravel bars throughout the downstream reach. Past incision and current widening has created a planform that is out-of-phase; alternating gravel bars, pools, and riffles do not follow the pattern of a natural channel. Streams that are out-of-phase are in a transition state until a more stable pattern is established. The severe erosion also has destabilized a storm drain outfall channel that drains runoff from the nearby Rose Valley Estates residential area. Downstream of the study area, Tinkers Creek flows through the Aquia Greensand sediments that underlie the Marlboro Clay. In this area, the stream returns to a more stable state as evidenced by the information of stable floodplain terraces and an extensive riparian forest.A geomorphic assessment of the study area was performed, and data at six cross-sections were collected. In order to develop conceptual restoration measures, the reference reaches were used to estimate stable planform, discharge and geometry characteristics.

A review of historic aerial photographs of the study area from 1948 through 2002 was also performed to review past causes of the current channel instabilities. These photographs were also used to determine the historic belt width of Tinkers Creek, which is often a good indicator of the required conservation easement needed for protection of the mitigation project. These photographs also provided valuable observations of changing land use over the past fifty years. In particular, the removal of riparian forest cover within the past ten years appears to have

been a major destabilizing factor along Tinkers Creek near Potomac Airfield. Additionally, the extensive degree of surface disturbance from gravel mining and the increase in impervious area through urbanization of the watershed were evident from the aerial photographs.

During final design of the stream mitigation project, the designer will develop a more detailed understanding of the causes of instability than is possible or needed at the conceptual level. At this stage, it appears that the causes of the instability include urbanization, riparian buffer disturbance and large sources of gravel from upstream mining. Final design studies will determine if the channel incision has reached its final elevation or if grade control measures are required. More importantly, at final design the severe bank erosion and sediment transport discontinuity will also be taken into account. SHA's project goals are to establish a stream channel that is connected to a forested floodplain with an adequate riparian buffer and to examine a range of potential planform changes to the stream channel including relocation. However, final design commitments on any of these project elements would not be appropriate until further detailed assessment and property ownership issues are investigated.

Due to the unique geology in this area and the presence of groundwater seeps in the stream banks, detailed restoration concepts required a more comprehensive field assessment than is usually required at this early phase. The airfield property would likely be used as the primary construction access and staging area for any restoration efforts. Proposed restoration goals and measures include:

- Reconnecting the stream with historic floodplain by grading the stream banks above the bank full elevation and increasing the flood prone width;
- Creating a natural channel plan form by realigning portions of the stream to a more stable pattern;
- Enhancing the riparian buffer and strengthening and stabilizing the stream banks by installing riparian and stream bank plantings;
- Stabilizing the storm drain outfall channel by realigning the outfall to direct the flow downstream and grading and stabilizing the banks around the channel; and
- Providing fish passage (i.e., double wing deflector to narrow the channel, grade control to create backwater) over the exposed sanitary sewer line located at the downstream end of the project.

Coordination with the FWS and the DNR indicates that no state rare or federal listed threatened or endangered species are known to exist in the Tinkers Creek stream mitigation study

area. However, the forested area on the site contains Forest Interior Dwelling Bird species. DNR has documented the spawning activities of anadromous fish species in Tinkers Creek. These fish species should be adequately protected by the Use I instream work prohibition period, sediment and erosion control methods, and other Best Management Practices typically used for protection of stream resources. An effect determination has been obtained from the SHPO for inclusion in this Final Environmental Impact Statement. An initial field assessment and regulatory review indicates that there are no hazardous material issues with this mitigation project.

Carey Branch, located south of the Kerby Hill Road and MD 210 intersection, will be impacted by Alternative 5A Modified. The stream impact at this location is estimated to be 1,205 linear feet. The segment of Carey Branch is characterized by poor channel definition and substantial erosion. The stream has migrated close to the existing edge of MD 210, exposing an underground utility pipe culvert. In addition, an abandoned box culvert remains in the middle of the channel that once accommodated a driveway access to a property on the west side of the stream. The environmental agencies stated at a field meeting on April 22, 2003 that SHA could improve this reach of stream by providing better channel stability and removal of the abandoned box culvert. This mitigation would be considered in-kind 1:1 mitigation for this reach of Carey Branch.

None of the stream relocation proposed in the vicinity of the Fort Washington Road interchange is assumed to count as mitigation.

In response to agency comments received on the MD 210 Draft Selected Alternative & Conceptual Mitigation package, SHA is proposing out-of-kind mitigation for the remaining unmitigated stream impacts. SHA is proceeding with advance acquisition of the 6.5-acre forested wetland and forested upland parcel located at the southwest quadrant of MD 210 and Swan Creek Road. Preservation of the parcel will be assured through covenants and restrictions.

A list of the proposed stream impacts and associated mitigation is shown below.

Proposed Stream Impacts and Proposed Mitigation

Proposed Impacts (LF)	**Proposed Mitigation**
1,205 (Carey Branch)	1205 LF (on-site, in-kind mitigation)
3,255 (Ephemeral)	No mitigation proposed for ephemeral impacts
2,200	2,200 LF mitigation at Tinkers Creek
2,480	Swan Creek Wetland purchase & protection (out-of-kind mitigation)

Total: 9,140 LF

Stormwater Management (SWM)

A preliminary study has been completed to identify potential stormwater management areas that will be required for the SHA-Selected Alternative. The study followed the methodology set forth in the *Maryland Stormwater Management Guidelines for State and Federal Projects, July* 2001, which states the procedures for determining sizes and types of measures to mitigate the environmental impacts of roadway construction with respect to both water pollution (quality treatment) and increased runoff (quantity treatment). The analysis results were used to determine the treatment requirements and approximate areas to set aside for stormwater management. The stormwater management requirements associated with SHA-Selected Alternative 5A Modified consist of treating 61.7 acres of new impervious area and 13.3 acres of reconstructed impervious area. The preliminary study has concluded that treatment requirements can be met using 24 proposed stormwater management facilities. The exact type(s) of facilities will be selected during the final design stage following an analysis of Best Management Practices, which could include extended detention ponds, dry swales, bioretention areas, filtration methods and proprietary filtration systems. Approximately, 1.51 acres of additional right-of-way outside of existing R/W has been proposed.

2. Groundwater Resources

Alternative 5A Modified has the potential to contribute to groundwater contamination. Cuts can remove the natural soils needed to attenuate contaminants. Infiltration without effective pretreatment or without filtration through natural soil materials would constitute a threat to groundwater quality. Existing water supplies, from groundwater sources, may be affected by water-borne chemicals in runoff. Impacts may occur from contaminants in watersheds up gradient from sources, including recharge areas for groundwater supplies. There are domestic supply wells in use that could be affected. Effective sediment and erosion and stormwater management, previously discussed, will reduce potential changes to these supplies.

The primary impact is the potential reduction in groundwater recharge. Mitigation measures include the stormwater management planned for Alternative 5A Modified.

Groundwater base flow in the study area is critical to maintaining aquatic habitats and for water supply. The quantity of groundwater available for maintenance of base flow may be affected by reduced groundwater recharge from new pavement and from soil compaction by construction activities. Stormwater management involves techniques that capture and temporarily store runoff before allowing it to infiltrate into the soil over a period of time. Infiltration practices are an excellent technique for meeting recharge requirements and may also provide stormwater detention and channel protection. These techniques usually involve the use

of grass channels, grass filter strips, sand layers, filter fabric, and gravel. Properly constructed and maintained stormwater management facilities can reduce or eliminate base flow impacts. Best Management Practices (BMP) for stormwater management will be tailored to meet localized site conditions, depending upon the sensitivity of local resources. Because of existing regulations and BMP's, it is anticipated that the potential for groundwater contamination is low.

3. Fish Fauna

The SHA-Selected Alternative may have an impact on the fish fauna, as impacts to the fish fauna are dependent on the effectiveness of the stormwater management for this project.

Short-term impacts associated with temporary turbidity increases, reduced water flow, and low-level pollutant loads are likely to be minor due to the elasticity (the ability of a system to recover after a stress is applied) of the study area streams. This stems largely from the general occurrence throughout the area by fish assemblage. The widespread nature of most species' distribution and the extent of available habitat throughout the study area suggest that the major stream systems operate as met populations (population sources for re-colonization). Should fishes become displaced or destroyed, there is a large colonizing pool and sufficient avenues of dispersal to repopulate the region.

Fishes that may be affected in the longer term include those species that are intolerant of reduced water quality and/or habitat degradation. These species require clean water of ample flow velocity. High sedimentation loads may pose the greatest danger by limiting foraging and spawning substrates, effectively displacing the fishes that feed mainly on bottom-dwelling macro invertebrates and the fishes that require clean sediment for spawning. Following MDE sediment and erosion control regulations can reduce impacts. Silt fence, stabilized construction entrances, diversion swales and berms, and sediment traps are a few of the techniques that will be utilized to reduce impact to water quality and the associated aquatic fauna. In-stream construction restrictions from March 1 to June 15 inclusive, reduce impact to fisheries by protecting the spawning season.

G. Wetlands Including Waters of the U.S.

A jurisdictional wetland field delineation, conducted jointly with the COE et.al. in April 2000, and a supplemental jurisdictional review in August 2000, identified twenty-seven (27) wetlands within the project area, namely WS-1B, WS-2, WS-3A, WS-4A, WS-4B, WS-4C, WS-4D, WS-5, WS-5A, WS-6, WS-7, WS-8, WS-9/9A, WS-10, WN-4, WN-5, WN-6, WN-BC, WN-BC2, WS-11, WS-12, WS-13, WN-1A, WN-1, WN-2, WN-A and WN-3A/B.

The SHA-Selected Alternative, Alternative 5A Modified, has been designed with the intention of avoiding or minimizing harm to these wetlands, in accordance with Executive Order 11990. The SHA-Selected Alternative will impact 12 non-tidal wetlands with a total impact of approximately 1.3 acres. The impacted wetlands and avoidance and minimization measures are described below. Federal, state, and local regulations require the mitigation and/or compensation for the unavoidable loss of wetland habitats. A joint federal and state Section 404 Corps of Engineers permit is required for any disturbance to wetlands associated with the alternatives.

Conceptual wetland mitigation has been coordinated with the U.S. Army Corps of Engineers, Maryland Department of Environment, Natural Resources Conservation Service, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and the U.S. Environmental Protection Agency. (Refer to Section VI Comments and Coordination) This coordination will continue through the design phase.

Resource WS-2 (PEM Wetland) - Figure II-6

This resource is a small roadside wetland associated with Carey Branch. It is located west of MD 210 and south of Kerby Hill Road. Because this resource is less than one acre in size, functions and values were not assessed. The dominant vegetation includes *Juncus effusus* and *Carex lurida* these plants are either OBL or FACW for Maryland. The soil consists of an A layer from 0-4 inches with a matrix color of 10 YR 3 chroma 1 with a silt clay texture over a B layer of sandy gravel.

Alternative 5A Modified would impact 0.01 acre of WS-2, resulting from proposed roadway ramp grading.

Avoidance

Avoidance of wetland WS-2, other than a no-build option, would require a cantilevered structure having a length of 130 linear feet at a total cost of $800,000.

Minimization

A 0.005 acre reduction in impacts to WS-2 could be accomplished by eliminating the Kerby Hill Road to MD 210 SB ramp's proposed eight-foot closed section shoulder on the MD 210 mainline and constructing a retaining wall having a length of 130 linear feet, with an average height of four feet, at a cost of $85,000.

The avoidance option is not considered practicable because of cost. The minimization option is not considered practicable from an engineering and safety perspective since it would eliminate a shoulder in a high-speed merge area.

Resource WS-4B (PEM Wetland) - Figure II-7

This resource is part of a large wetland system within the floodplain of Henson Creek. It is located west of MD 210 and north of Livingston Road. Functions and values were assessed and functional capacity indices follow: sediment stabilization 0.98, water quality 0.86, wildlife habitat 0.87, uniqueness and heritage 1.0. The dominant vegetation includes *Impatiens capensis, Typha latifolia, Juncus effusus* and *Carex lurida* these plants range from OBL to FACW for Maryland. The soil consists of an A_1 layer from 0-10 inches with a matrix color of 10 YR 3 chroma 4 with a silt clay texture over an A_2 layer from 10 inches down with a matrix color of 10 YR 3 chroma 3 and a silt clay texture.

Alternative 5A Modified would impact 0.06 acre of WS-4B, resulting from the proposed roadway widening and grading.

Avoidance

Avoidance of Wetland WS-4B, other than a no-build option, would require shifting the MD 210 mainline to the east resulting in possible impacts to W-N5, W-N6, 100-year floodplain and Henson Creek Stream Valley Park on the east side of MD 210.

Minimization

A 0.05 acre reduction in impacts to WS-4B could be accomplished by constructing a retaining wall having a length of 200 linear feet, with an average height of eleven feet, at a cost of $326,000.

The avoidance option is not considered practicable because of the potential for additional environmental impacts. The minimization option is not considered practicable because of cost.

Resource WS-4C (PEM/PFO Wetland) - Figures II-7

This resource is a small wetland associated with an unnamed tributary to Henson Creek. It is located west of MD 210 and south of Livingston Road. Because this resource is less than one acre in size, functions and values were not assessed. The dominant vegetation includes *Fraxinus pennsylvanica, Rosa multiflora, Ambrosia artemisifolia,* and *Graminae spp.* These plants range from OBL to FACU for Maryland. The soil consists of an O layer from 0-6 inches with a matrix color of 10 YR 3 chroma 2 with an organic texture over an A_1 layer from 6 inches down with a matrix color of 10 YR 4 chroma 2 and a gravely clay loam texture.

Alternative 5A Modified would impact 0.10 acre of WS-4C, resulting from the proposed Relocated Palmer/Livingston Road over MD 210 and a proposed two-lane exit ramp with grading.

Avoidance

Avoidance of wetland WS-4C for Alternative 5A Modified, other than a no-build option, would require shifting the MD 210 mainline to the east resulting in possible impacts to the 100 year floodplain, Henson Creek Stream Valley Park and would require additional widening to the proposed structure over Henson Creek. Additionally, the proposed Palmer/Livingston Road structure over MD 210 would have to be lengthened to span the wetland.

Minimization

A 0.07 acre reduction in impacts to WS-4C for Alternative 5A Modified could be accomplished by constructing a retaining wall having a length of 190 linear feet, with an average height of six feet, at a cost of $266,000 and lengthening the proposed Palmer/Livingston Road structure over MD 210, at an additional cost of $718,000.

The avoidance option is not considered practicable because of potential additional environmental impacts and from an engineering perspective due to the difficulties associated with shifting the MD 210 mainline. The minimization option is not considered practicable because of cost.

Resource WS-4D (PFO Wetland) – Figure II-7

This resource is a small wetland associated with an unnamed tributary to Henson Creek. It is located west of MD 210 and south of Livingston Road. Because this resource is less than one acre in size, functions and values were not assessed. The dominant vegetation includes *Liquidambar styraciflua, Acer rubrum, Toxicodendron radicans, Juncus effusus,* and *Impatiens capensis.* These plants range from FACE+ to FAC for Maryland. The soil consists of an A_1 layer from 0-4 inches with a matrix color of 10 YR 3 chroma 2 with an organic clay texture over an A_2 layer from 4 inches down with a matrix color of 10 YR 4 chroma 2 with a clay texture.

Alternative 5A Modified would impact 0.04 acre of WS-4D, resulting from a one-lane ramp to MD 210 with grading.

Avoidance

Avoidance of Wetland WS-4D, other than a no-build option, would require construction of a retaining wall having a length of 160 linear feet, with an average height of 10.75 feet, at a

cost of $279,000. There would be a temporary construction impact (<0.01 acre construction easement) to construct the retaining wall.

Minimization

A 0.02 acre reduction in impacts to WS-4D could be accomplished by steepening the grading slopes from 2:1 to a 1:1 ratio. This may require the use of geotextiles to mechanically stabilize the slopes.

The avoidance option is not considered practicable because of cost. The minimization option is not considered practicable because of the difficulties from an engineering perspective associated with constructing geotextile installations and maintaining slopes steeper than a 2:1 ratio.

Resource WS-5 (PFO Wetland) - Figures II-7

This resource is a small wetland associated with an unnamed tributary to Broad Creek. It is located west of MD 210 and south of Old Fort Road North. Because this resource is less than one acre in size, functions and values were not assessed. The dominant vegetation includes *Smilax rotundifolia* and *Acer rubrum.* These plants are FAC for Maryland. The soil consists of an A_1 layer from 0-4 inches with a matrix color of 10 YR 3 chroma 2 with an organic clay texture over an A_2 layer from 4 inches down with a matrix color of 10 YR 4 chroma 2 with a clay texture.

Alternative 5A Modified would impact 0.02 acre of WS-5, resulting from a proposed one-lane entrance ramp with grading.

Avoidance

Avoidance of WS-5, other than a no-build option, would require a retaining wall having a length of 180 linear feet, with an average height of six feet, at a cost of $235,000. There would be a temporary construction impact (<0.01 acre) to construct the retaining wall.

Minimization

A 0.005 acre reduction in impacts to WS-5 could be accomplished by steepening the grading slopes from 2:1 to a 1:1 ratio for Alternative 5A Modified. This may require the use of geotextiles to mechanically stabilize the slopes.

The avoidance option is not considered practicable because of cost. The minimization option is not considered practicable because of the difficulties from an engineering perspective

associated with constructing geotextile installations and maintaining slopes steeper than a 2:1 ratio.

Resource WS-5A (PEM/PFO Wetland) - Figures II-8

This resource is a small wetland associated with an unnamed tributary to Broad Creek. It is located west of MD 210 and north of Old Fort Road North. Because this resource is less than one acre in size, functions and values were not assessed. The dominant vegetation includes *Acer negundo, Fraxinus pennsylvanica, Leersia oryzoides, Impatiens capensis,* and *Polygonum sagittatum.* These plants range from OBL to FACW for Maryland. The soil consists of an organic muck layer over a layer of confining silt clay.

Alternative 5A Modified would impact 0.08 acre of wetland WS-5A, resulting from proposed ramp grading. The wetland limits extend beyond the limits of the available mapping, consequently only the delineated portion of WS-5A was totaled.

Avoidance

Avoidance of WS-5A, other than a no-build option, would require construction of a retaining wall having a length of 200 linear feet, with an average height of 24.5 feet, at a cost of $700,000 for Alternative 5A Modified.

Minimization

A 0.05 acre reduction in impacts to WS-5A could be accomplished by steepening the grading slopes from 2:1 to a 1:1 ratio for Alternative 5A Modified. This may require the use of geotextiles to mechanically stabilize the slopes.

The avoidance option is not considered practicable because of cost. The minimization option is not considered practicable because of the difficulties from an engineering perspective associated with constructing geotextile installations and maintaining slopes steeper than a 2:1 ratio.

Resource WS-6 (PFO Wetland) - Figures II-8

This resource is a small wetland associated with an unnamed tributary to Broad Creek. It is located west of MD 210 and south of Old Fort Road North. Because this resource is less than one acre in size, functions and values were not assessed. The dominant vegetation includes *Liquidambar styraciflua, Acer rubrum,* and *Smilax rotundifolia.* These plants are FAC for Maryland. The soil consists of an organic muck layer over a confining layer of gravel.

Alternative 5A Modified would impact 0.04 acre, resulting from proposed MD 210 grading.

Avoidance

Avoidance of WS-6, other than a no-build option, would require construction of a retaining wall having a length of 160 linear feet, with an average height of nine feet, at a cost of $244,000 for Alternative 5A Modified. There would be a temporary construction impact (<0.01 acre construction easement) to construct the retaining wall.

Minimization

A 0.01 acre reduction in impacts could be accomplish by steepening the grading slopes from 2:1 to a 1:1 ratio, possibly requiring geotextile to mechanically stabilize the slopes for Alternative 5A Modified.

The avoidance option is not considered practicable because of cost. The minimization option is not considered practicable because of the difficulties from an engineering perspective associated with constructing geotextile installations and maintaining slopes steeper than a 2:1 ratio.

Resource WS-7 (PFO Wetland) - Figures II-9

This resource is a small wetland associated with an unnamed tributary to Broad Creek. It is located west of MD 210 and south of Old Fort Road North. Because this resource is less than one acre in size, functions and values were not assessed. The dominant vegetation includes *Arisaema triphyllum, Toxicodendron radicans,* and *Ulmus rubra.* These plants range from FACW to FAC for Maryland. The soil consists of an A layer from 0-8+ inches with a matrix color of 10 YR 3 chroma 3 and a silt loam texture.

Alternative 5A Modified would impact 0.11 acre of Wetland WS-7, resulting from proposed MD 210 grading.

Avoidance

Avoidance of Wetland WS-7, other than a no-build option, would require construction of a retaining wall having a length of 220 linear feet, with an average height of ten feet, at a cost of $363,000 for Alternative 5A Modified.

Minimization

A 0.07 acre reduction in impacts to WS-7 could be accomplished by steepening the grading slopes from 2:1 to a 1:1 ratio. This may require the use of geotextiles to mechanically stabilize the slopes for Alternative 5A Modified.

The avoidance option is not considered practicable because of cost. The minimization option is not considered practicable because of the difficulties from an engineering perspective associated with constructing geotextile installations and maintaining slopes steeper than a 2:1 ratio.

Resource WS-9/9A (PFO and PEM Wetland) - Figures II-11

This resource is a large wetland system associated with an unnamed tributary to Broad Creek. WS-9 is located west of MD 210 south of Swan Creek Road. Functions and values were assessed and functional capacity indices follow: sediment stabilization 0.75, water quality 0.95, wildlife habitat 0.36, uniqueness and heritage 0.9. The dominant vegetation includes *Acer rubrum, Quercus palustris, Ulmus rubra, Lindera benzoin, Viburnum dentatum, Alnus serrulata, Lonicera japonica, Liquidambar styraciflua, Impatians capensis, Sambucus canadensis,* and *Cinna arundinacea*. These plants range from OBL to FAC for Maryland. The soil consists of an A_1 layer from 0 - 4 inches with a matrix color of 10 YR 3 chroma 3 with a loam texture over an A_2 layer from 4 - 6 inches with a matrix color of 10 YR 5 chroma 4 with a clay loam texture over a B layer from 6 inches down with a matrix color of 2.5 Y 5 chroma 2 with a clay texture.

Alternative 5A Modified would impact 0.04 acre of wetland WS-9, resulting from MD 210 mainline widening.

Avoidance

Avoidance of Wetland WS-9, for Alternative 5A Modified, other than a no-build option, would require construction of a retaining wall having a length of 300 linear feet, with an average height of eight feet, at a cost of $419,000.

Minimization

A 0.02 acre reduction in impacts to WS-9 could be accomplished by steepening the grading slopes from a 2:1 to a 1:1 ratio for Alternative 5A Modified. This may require geotextiles to mechanically stabilize the slopes.

The avoidance option is not considered practicable because of cost. The minimization option is not considered practicable because of the difficulties from an engineering perspective

associated with constructing geotextile installations and maintaining slopes steeper than a 2:1 ratio.

WS-9A is located west of MD 210, north of Swan Creek Road. Functions and values were assessed and functional capacity indices follow: sediment stabilization 0.48, water quality 0.86, wildlife habitat 0.56, and uniqueness and heritage 0.9. The dominant vegetation includes *Acer rubrum, Liquidambar styraciflua, Vaccinium corymbosum, Lindera benzoin, Viburnum dentatum, Smilax rotundifolia, Lonicera japonica, Toxicodendron radicans, Symplocarpus foetidus, Claytonia virginiana, Typha latifolia, Glyceria striata, Juncus effuses,* and *Carex luridas.* These plants range from OBL to FAC for Maryland. The soil consists of an A_1 layer from 0 - 4 inches with a matrix color of 2.5 Y 6 chroma 3 with a silt clay texture over an A_2 layer from 4 - 10+ inches with a matrix color of 2.5 Y 6 chroma 2 with large distinct mottles of 7.5 YR 4 chroma 6 of a clay texture.

Alternative 5A Modified would impact 0.15 acre of wetland WS-9A, resulting from proposed access road construction and grading.

Avoidance

Avoidance of WS-9A would require relocation of the proposed access road to the east resulting in greater impact to the parking and delivery truck access for the Olde Forte Village Shopping Center.

Minimization

A 0.02 acre reduction in impacts to WS-9A could be accomplished by steepening the grading slopes from a 2:1 to a 1:1 ratio for Alternative 5A Modified. This may require geotextiles to mechanically stabilize the slopes.

The avoidance option is not considered practicable due to the extent of parking and accessibility impacts to the Old Forte Village Shopping Center. The minimization option is not considered practicable because of the difficulties from an engineering perspective associated with constructing geotextile installations and maintaining slopes steeper than a 2:1 ratio.

Resource WN-3A/B (PEM/PFO Wetland) - Figures II-10, 11

This resource is a large wetland system within the Broad Creek watershed. It is located east of MD 210 and north of Livingston Road. Functions and values were assessed and functional capacity indices follow: sediment stabilization 1.0, water quality 0.8, wildlife habitat 0.865, uniqueness and heritage 0.9. The dominant vegetation includes *Liquidambar styraciflua,*

Acer rubrum, Viburnum dentatum, Toxicodendron radicans, Leersia oryzoides, Cephalanthus occidentalis, and *Carex lurida*. These plants range from OBL to FAC for Maryland. The soil consists of an A_1 layer from 0 - 6 inches with a matrix color of 2.5 Y 5 chroma 2 with a silty clay texture over an A_2 layer from 6 inches down with a matrix color of 2.5 Y 6 chroma 2 with a clay texture. A second sampling point revealed soils consisting of an A layer from 0 - 12+ inches with a matrix color of 10 YR 6 chroma 2 with a silt clay loam texture.

Alternative 5A Modified would impact 0.15 acre of wetland WN-3A/B.

Avoidance

Avoidance of wetland WN-3B for Alternative 5A Modified would include eliminating the MD 210 NB to Swan Creek/Livingston Road ramp and relocating the proposed access road to the south avoiding WN-3B.

Minimization

A 0.03 acre reduction in impacts to WN-3B could be accomplished by constructing a retaining wall having a length of 230 linear feet, with an average height of five feet, at a cost of $234,000. There would be a temporary construction impact (<0.01 acre construction easement) to construct the retaining wall.

The avoidance option is not considered practicable because it would disregard business, community and focus group requests to provide an exit ramp north of the existing Swan Creek/Livingston Road and MD 210 intersection. The proposed exit ramp would allow northbound MD 210 motorists to see the Old Forte Village Shopping Center before exiting MD 210 maintaining viability of the existing businesses. The minimization option is not considered practicable because of cost.

Resource WN-BC2 (PFO Wetland) - Figures II-8

This resource is a small wetland system within the floodplain of Broad Creek. It is located east of MD 210 and south of Old Fort Road North. Because this resource is less than one acre in size, functions and values were not assessed. The dominant vegetation is *Platanus occidentalis, Liquidambar styraciflua, Lindera benzoin, Lonicera japonica,* and *Acer rubrum.* These plants range from FACW- to FAC- for Maryland. The soil consists of an A_1 layer from 0 - 3 inches with a matrix color of 2.5 Y 3 chroma 1 with a loam texture over an A_2 layer from 3 inches down with a matrix color of 2.5 Y 4 chroma 3 with a sandy clay texture.

Alternative 5A Modified would impact 0.15 acre of Wetland WN-BC2, resulting from proposed interchange ramp grading.

Avoidance

Avoidance of WN-BC2 for Alternative 5A Modified would involve shifting the proposed southeast quadrant ramp 50 feet± towards the MD 210 mainline and constructing retaining walls on the left and right sides of the ramp. The retaining walls on the left hand side of the proposed ramp would have a length of 300 linear feet with an average height of 16 feet, at a cost of $470,000. The retaining wall on the right side of the proposed ramp would have a length of 200 linear feet, with an average height of 25 feet, at a cost of $636,000. With this proposed ramp shift, to avoid having an offset intersection, the proposed northeast quadrant ramp would also need to be shifted towards MD 210 and retaining walls constructed between the ramp and MD 210 and to the outside of the ramp to avoid a possible residential displacement.

Minimization

A 0.09 acre reduction in impacts to WN-BC2 could be achieved for Alternative 5A Modified with construction of a retaining wall having a length of 250 linear feet, with an average height of 28 feet, at a cost of $869,000.

The avoidance and minimization options are not considered practicable because of cost and because of the difficulties from an engineering perspective and aesthetic concerns associated with constructing high retaining walls adjacent to the MD 210 mainline.

Resource WN-5 (PFO Wetland) - Figures II-7

This resource is a large wetland within the floodplain of Henson Creek. It is located east of MD 210 and north of Henson Creek. Functions and values were assessed and functional capacity indices follow: sediment stabilization 0.83, water quality 0.80, wildlife habitat 0.72, uniqueness and heritage 1.0. The dominant vegetation includes *Fraxinus pennsylvanica, Acer negundo, Asimina triloba, Luzula sp.,* and *Polygonum japonica.* These plants range from FACW to FACU+ for Maryland. The soil consists of a silty clay from 0 - 12+ inches with a matrix color of 2.5 Y 5 chroma 2.

Alternatives 5A Modified would impact 0.35 acre of Wetland WN-5, resulting from proposed ramp grading.

Avoidance

Avoidance of WN-5, for Alternate 5A Modified, would require eliminating the Palmer/Livingston Road to MD 210 NB ramp and replacing with a loop ramp in the southeast quadrant (similar to dropped option C or D) resulting in one additional business displacement.

Minimization

A 0.08 acre reduction in impacts to wetland WN-5 could be achieved, for Alternative 5A Modified, by constructing a retaining wall having a length of 300 linear feet, with an average height of twelve feet, at a cost of $562,000. There would be a temporary construction impact (0.01 acres) to construct the retaining wall.

The avoidance option is not considered practicable because of the potential additional business displacement. The minimization option is not considered practicable because of cost.

Based on the previous wetlands impact descriptions, Table IV-6 has been comprised to indicate the maximum impact to each wetland that would result from the Alternative 5A Modified, assuming an impact area extending ten-feet beyond the grading limits.

TABLE IV-6
MAXIMUM WETLAND IMPACT TABLE

	Wetland	Impact (Acres)			
Wetland Symbol/Watershed	**Size (Acres)**	**PEM**	**PSS**	**PFO**	**Total**
WS-1B/HC	0.09	0	0	0	0
WS-2/HC	0.01	0.01	0	0	0.01
WS-3A/HC	0.82	0	0	0	0
WS-4A/HC	0.59+	0	0	0	0
WS-4B/HC	0.24	0.06	0	0	0.06
WS-4C/HC	0.11	0	0	0.10	0.10
WS-4D/HC	0.08	0	0	0.04	0.04
WS-5/HC	0.05	0	0	0.02	0.02
WS-5A/HC	0.21+	0	0	0.08	0.08
WS-6/HC	0.08	0	0	0.04	0.04
WS-7/HC	0.11	0	0	0.11	0.11
WS-8/HC	0.62+	0	0	0	0
WS-9/9A/HC	6.48	0	0	0.19	0.19
WS-10	0.19	0	0	0	0
WN-4/HC	0.75+	0	0	0	0
WN-5/HC	0.81+	0	0	0.35	0.35
WN-6/HC	0.15	0	0	0	0
WN-BC/HC	0.60	0	0	0	0
WN-BC2/HC	0.58	0	0	0.15	0.15
HC Watershed - Total	NA	0.07	0	1.08	1.15
WS-11/PC	0.03	0	0	0	0
WS-12/PC	3.31+	0	0	0	0
WS-13/PC	0.65	0	0	0	0
WN-1A/PC	0.27	0	0	0	0
WN-1/PC	0.33	0	0	0	0
WN-2/PC	5.25+	0	0	0	0
WN-A/PC	0.03	0	0	0	0
WN-3A/B/PC	3.82+	0	0	0.15	0.15
PC Watershed – Total	NA	0.00	0.00	0.15	0.15
Total Watershed Impact	**NA**	**0.07**	**0.00**	**1.23**	**1.30**

Mitigation (refer to Section VI. D for Agency Correspondence)

For those impacts, which cannot be avoided or minimized, compensatory mitigation will provide for the replacement of resources lost to permanent impacts. Every effort will be made to mitigate impacts in-kind and in-watershed. For example, forested wetland impacts in the Piscataway Creek watershed will be replaced by forested wetland mitigation in the same watershed if possible.

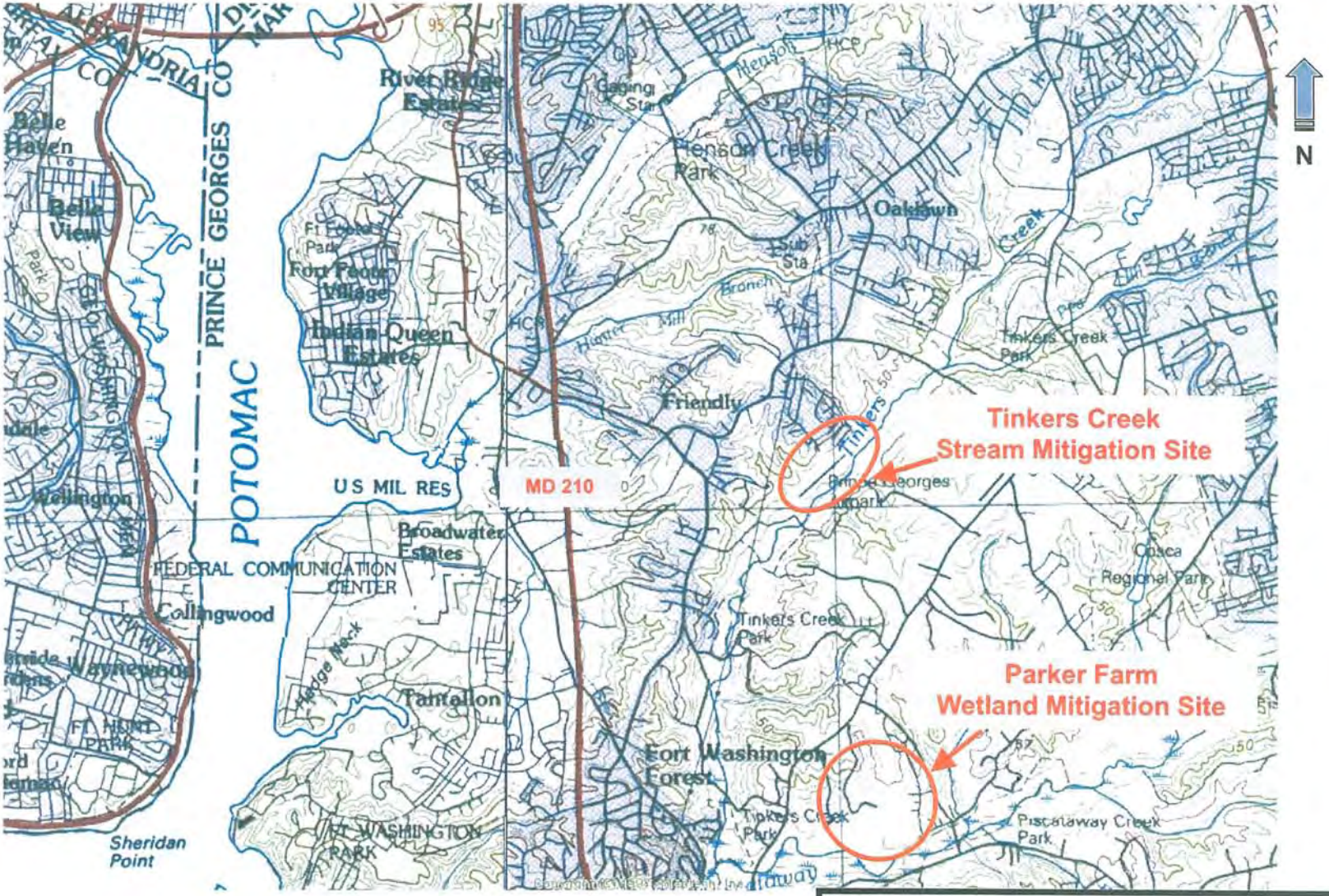
Replacement ratios for unavoidable wetland impacts are based on the Maryland Compensatory Guidance (1994) and agency coordination on a project-by-project basis, but impacts are generally mitigated according to the following ratios:

- Forested Wetlands 2:1
- Scrub/Shrub 2:1
- Emergent 1:1

Wetland Mitigation Project – Site P-15, Parker Farm Property

SHA-Selected Alternative 5A Modified would impact 1.3 acres of non-tidal wetlands, consisting of 1.23 acres of PFO and 0.07 acre of PEM acres, within the Henson Creek watershed. A mitigation site search was conducted and six sites were presented during an interagency field meeting in August 2001. The Parker Farm, located east of MD 210 in the Piscataway Creek watershed (See Figure IV-7), was chosen as the most favorable wetland mitigation site. A majority of the site lies within the floodplain of Piscataway Creek and is used for production of row crops. The Parker Farm mitigation site could be used for approximately seven acres of wetland creation, one acre of wetland restoration, and sixteen acres of wetland preservation (Figure IV-8); 2.6 acres of wetland mitigation would be accomplished on the site for impacts to wetlands resulting from Alternative 5A Modified. The SHA is investigating potential future projects with mitigation needs that fall within the Middle Potomac watershed for the remaining mitigation credit. If future projects are identified, SHA will request environmental agency concurrence to use the site as mitigation for the specified future projects.

Soils on the site are mapped as Woodstown sandy loam and Fallsington sandy loam, which are moderately well-drained and poorly drained, respectively. The Fallsington soils are classified as hydric, and are located within a broad swale that contains subsurface tile drains. The proposed mitigation plan would eliminate the tile drains to restore wetland hydrology.

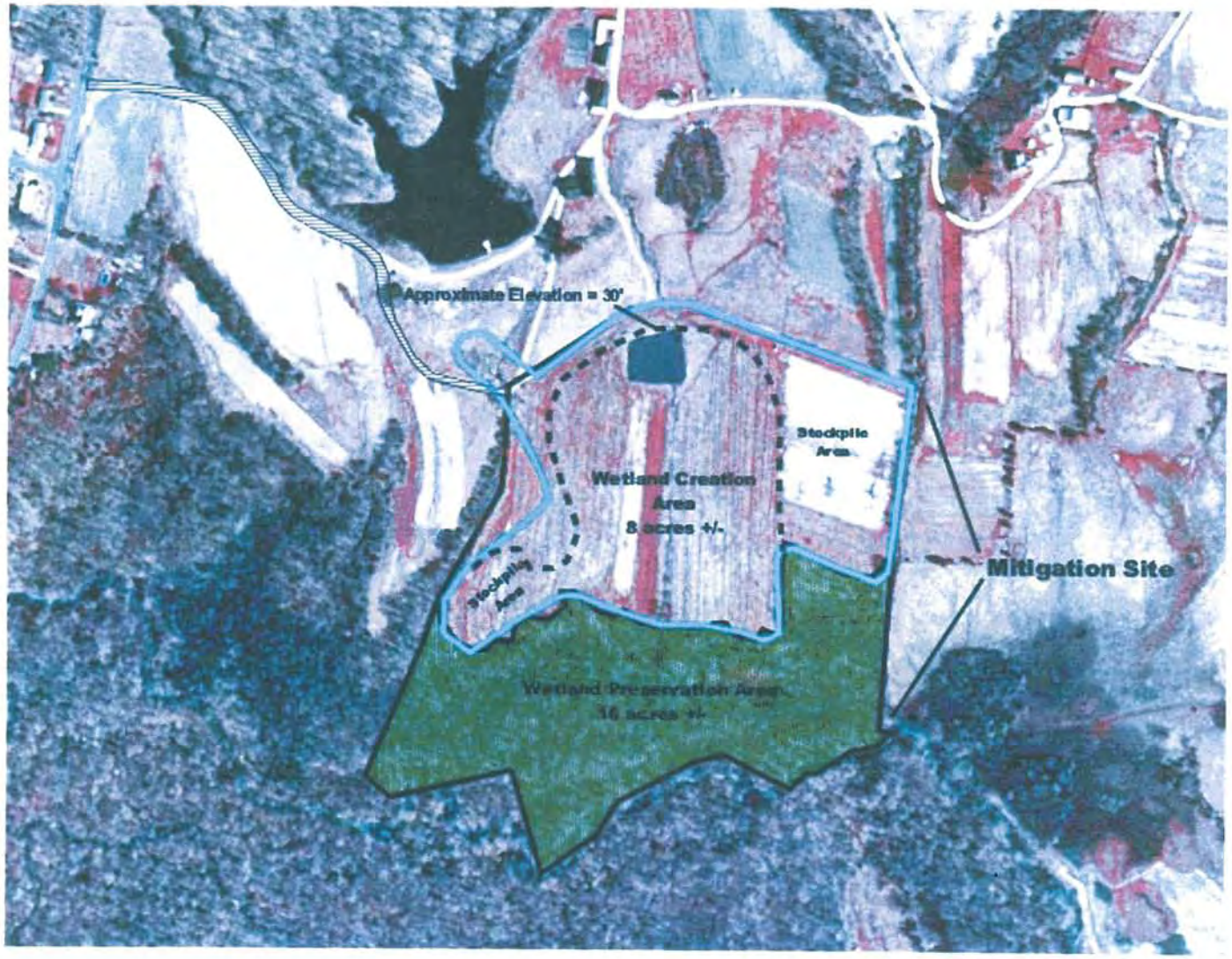


SHA State Highway Administration

MD 210 MULTI-MODAL STUDY
1-95/1-495 TO MD 210

MITIGATION SITE LOCATION MAP

DATE		FIGURE
MAY, 2004	NOT TO SCALE	IV-7



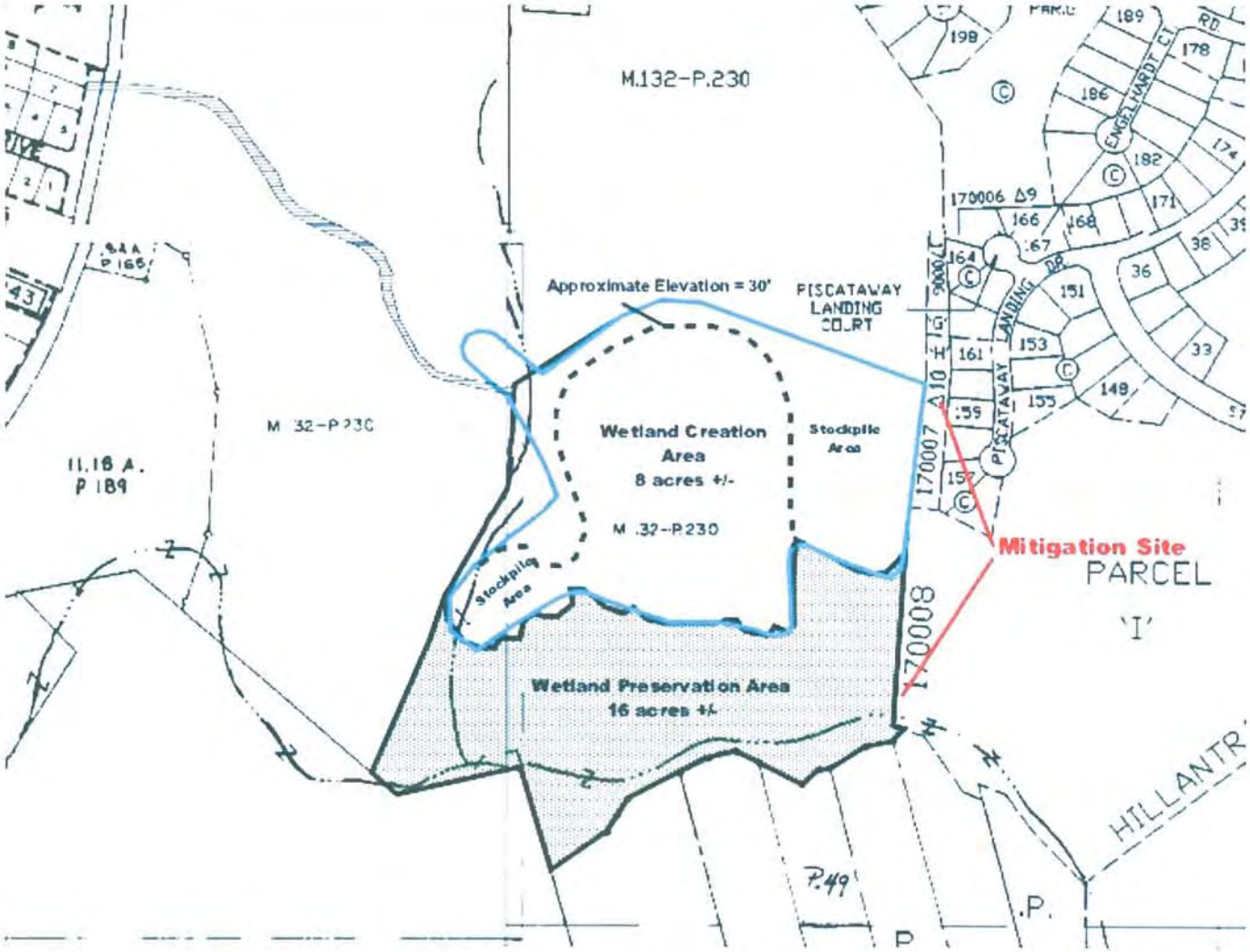
Proposed Access
Proposed LOD

SHA State Highway Administration

MD 210 MULTI-MODAL STUDY
1-95/1-495 TO MD 210

PARKER FARM WETLAND MITIGATION CONCEPT PLAN

DATE		FIGURE
MAY, 2004	NOT TO SCALE	IV-8



Proposed Access
Proposed LOD

SHA State Highway Administration

MD 210 MULTI-MODAL STUDY
1-95/1-495 TO MD 210

PARKER FARM WETLAND MITIGATION SITE - CONCEPT PLAN ON PRINCE GEORGE'S COUNTY TAX MAPS 132, 133, 142 & 143

DATE		FIGURE
MAY, 2004	NOT TO SCALE	IV-9

The mitigation site is located in a landscape position that is capable of replacing the wetland functions associated with the impacted wetlands and is large enough to meet the entire mitigation requirement for this project, with an average cut of three feet to achieve a design elevation of 25 to 30 feet. Groundwater monitoring wells will be installed to determine appropriate design parameters, and existing wetlands in the area will be surveyed and shown on final design plans.

Wetland hydrology in the mitigation area would be provided by groundwater and surface water runoff from a 100-acre watershed. Several groundwater seeps emerge along the toe-of-slope, at the upper limit of the mitigation site. A small farm pond has been constructed in one of the primary seepage areas. In addition, storm flow could be diverted from an intermittent stream to provide additional water during the summer months. A large farm pond has impounded the intermittent stream, and storm flow could be diverted near the outlet of the pond into the mitigation site.

The goal of the mitigation project will be to replace the functions of the impacted wetlands, which include wildlife habitat, groundwater discharge, sediment trapping and stabilization, and nutrient retention and removal. Expanding on the existing riparian forest and implementing grading and planting plans that maximize species diversity will replace habitat functions identified in the FEIS. Furthermore, the site is under development pressure as shown on the tax map provided in Figure IV-9 and would expand on the existing stream valley protection corridor that is owned by the Maryland-National Capital Park and Planning Commission.

H. Effects on Hazardous Materials/Waste Sites

Eleven sites have been identified that, according to SHA's Project Impact Ranking Criteria, have a high or medium/high project impact rating and would be impacted with Alternative 5A Modified. The sites are listed in Table IV-7 along with the degree of impact for Alternative 5A Modified. The impacts are broken down as either a business relocation (i.e., total take) or a right of way acquisition (i.e. fee simple impact).

During the final design phase of the project, the site plans for the potential hazardous waste sites impacted by Alternative 5A Modified will be investigated thoroughly to determine the presence and location of the hazardous waste within the parcel and determine the best course of action for each impacted hazardous materials/waste site.

TABLE IV-7
AFFECTED HAZARDOUS MATERIALS/WASTE SITES

I.D. No.	Hazardous Materials/Waste Site With High or Medium/High Impact Ratings	Alternative 5A Modified
2, 35	Shell Service Station – 8005 Indian Head Highway	R
11, 40	Texaco Service Station - 9100 Livingston Road	R
38	Fort Laundromat/Eddies Food – 9116 Livingston Road.	R
39	Oxon Hill Rentals – 9120 Livingston Road	R
37	Day Star Nursery – 915 Palmer Road	T
67	Pride of America Fuel - 11800 Indian Head Highway	R
70	National Tire & Battery (Changed Name) - 11700 block Livingston Rd.	R
17, 51	Exxon Co. USA #25687 (Vacant) – 12800 Old Fort Road	R
31	Oxon Hill Staff Dev. Center - 7711 Livingston Rd.	T
64	Clagett Realty – 16001 Indian Head Highway	T
33, 34	Wilson Towers Apartments – 7907, 7911 Indian Head Highway	T
	R=Relocation of Business (Total Take) - Total	**7**
	T=Right of Way Take (Fee Simple) - Total	**4**
	Total	**11**

I. Floodplains

Construction of the SHA-Selected Alternative would impact 3.4 acres of the 100-year floodplain associated with Piscataway and Henson Creeks. The estimated impact was based on preliminary structure lengths. Final determination of structure length will be made during the design phase of the project.

Pursuant to the Flood Hazard Management Act of 1976 and in accordance with the Executive Order 11988, Floodplain Management, federal funds may not be used to support incompatible floodplain development unless no practical alternate exists.

The estimated impact to the 100-year floodplain, results from constructing new ramps for the Palmer Road/Livingston Road interchange and widening MD 210 structures over Piscataway

Creek and Henson Creek. Because of the need to provide an interchange at Palmer Road/Livingston Road and widen MD 210 in the vicinity of Piscataway Creek and Henson Creek, impacts to 100-year floodplains cannot be avoided.

The State Highway Administration will prepare a detailed hydrologic and hydraulic study for the Selected Alternative during final design to identify the existing 100-year storm discharge and floodplain. Stormwater management will be provided and all hydraulic structures will be designed as per roadway classification.

The use of standard hydraulic design techniques for all waterway openings, which limit upstream flood level increases and approximate existing downstream flow rates will be utilized where feasible.

Use of state-of-the-art sediment and erosion control techniques and Stormwater management controls will ensure that none of the encroachments would result in risks or impacts to the beneficial floodplain values or provide direct or indirect support to further development within the floodplain.

In accordance with the requirements of FHPM 6-7-3-2, which is a FHWA guideline for ensuring compliance with Executive Order No. 11988, the impacts of each encroachment have been evaluated to determine if it is a significant encroachment. A significant encroachment would involve one of the following:

- A significant potential for interruption or termination of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route,
- A significant risk, or
- A significant adverse impact on natural and beneficial floodplain values.

Preliminary analyses indicate that no significant floodplain impacts are expected to occur as a result of Alternative 5A Modified.

J. Terrestrial Ecosystem

1. Flora

Alternative 5A Modified would impact flora. The SHA-Selected Alternative would impact 58.2 acres in direct losses of woodlands. Impacts to flora include direct losses associated

with clearing within the footprint of the Alternative 5A Modified and changes in plant community structure and composition.

Changes in plant community structure and composition result from creating edge habitats or ecotones. Edge habitats admit greater incidence of light to forest floors causing changes in micro-climates. The result is replacement or partial replacement of moist, mesic forest conditions with brighter, drier micro-habitants. The greater incidence of light usually results in a greater profusion of herbaceous and woody under story species. Stem densities are higher and the probability of invasion by exotic species such as Japanese honeysuckle, tear thumb, multiform rose, etc. is increased.

Wildflower planting would be included in the construction of the SHA-Selected Alternative. The amount of wildflower planting would be 0.25 percent of the landscaping being provided.

It is anticipated that all reforestation requirements will be met within the proposed right-of-way for Alternative 5A Modified.

2. Specimen Trees

The SHA-Selected Alternative would require the removal of six specimen trees. Table IV-8 presents the impacts to specimen trees for Alternative 5A Modified.

TABLE IV-8
SUMMARY OF SPECIMEN TREES

I.D. No.	Diameter at Breast Height	Species	Alternative 5A Modified	Location
9	31.4"	Northern Red Oak	1	Old Fort Road North
11	80.2"	Yellow Poplar	1	Fort Washington Road
12	40.0"	Yellow Poplar	1	Fort Washington Road
13	39.0"	White Oak	1	Fort Washington Road
19	33.0"	Yellow Poplar	1	Old Fort Road South
21	30.5"	White Oak	1	Old Fort Road South
TOTAL			**6**	

3. Fauna

Alternative 5A Modified would impact fauna in the study area. Direct and indirect impacts of the SHA-Selected Alternative on fauna include:

- habitat loss and alteration;
- habitat fragmentation;
- changes in animal populations and communities;
- gene pool fragmentation;
- contamination from roadway pollutants;
- changes in wildlife usage due to noise and other disturbances;
- mortality from wildlife-vehicular collisions.

Habitat loss would be the most significant impact of construction on fauna. Alteration of existing habitats rendering them unsuited to their original faunal assemblages is also considered habitat loss (USFWS 1987). Construction activities associated with the SHA-Selected Alternative would result in actual acreage losses of habitats and habitat alterations.

Forest dwelling wildlife would lose 58.2 acres from construction of Alternative 5A Modified. Scrub/shrub and old field dwelling species would lose 0.11 acres from the SHA-Selected Alternative but wildlife species inhabiting agricultural lands would not be impacted.

The fragmentation of habitats is another impact that is expected of the SHA-Selected Alternative. Some species require large blocks of contiguous habitat. For example, some neotropical migrant birds are forest interior nesters. Forests that are fragmented by roads into small units may expose these species to nest predators. The smaller parcels may no longer be viable habitat for these birds. Impacts from the SHA-Selected Alternative on Forest Interior Dwelling Bird Species are expected to be limited because most impacts are within the existing edge habitat. However, forest clearing and construction along the existing roadway may, in some areas, cause the further extension of edge habitat into nearby existing forest interior areas.

Many wildlife species require suitable corridors connecting parts of their range to avoid predators and exposure to climatic extremes (Stearns 1973). Interconnecting travel corridors along streams are an important factor in maintaining the viability of small tracts of land as

wildlife habitat (USFWS 1987). Alternative 5A Modified would, in some cases, fragment these corridors, magnifying the effects of habitat loss for many species.

Overpopulation and consequent over-utilization of available food sources can occur in some wildlife species if a barrier, such as MD 210, prevents dispersal (Smith 1980). This results in habitat deterioration and can contribute to population declines.

Roadsides increase the probability of habitat fragmentation and disruption of travel corridors can negatively affect gene pool variability of less mobile wildlife species, such as amphibians, reptiles, and small mammals. Roads such as MD 210, can act as barriers separating populations of some wildlife species, especially in urbanized areas. A reduction in intermixing of genetic material can result in reduced population viability.

Heavy metals, deicing compounds, petrochemicals, and other pollutants common to road usage and maintenance often contaminate roadside vegetation and soils. (Oxley et al. 1974). Shaheen (1975) has noted heavy metal deposition in the roadside environment. The metals are derived from normal wear of automobile parts and from automotive emissions. Gish and Christiansen (1973) quantified the presence of lead and zinc in earthworms along two Maryland highways. These levels may be lethal to earthworm eating animals including amphibians, reptiles, birds and mammals.

Trainer and Karstad (1960) diagnosed salt poisoning in rabbits, pheasants, and quail populations in Wisconsin. This poisoning was caused by salt used to melt ice on highways. Sodium ferrocyanide is used as an anti-caking additive in some de-icing compounds. This substance is water soluble and can potentially generate cyanide in the presence of sunlight. Twenty parts per million is the minimum required level of sodium ferrocyanide to ensure the anti-caking function is maintained. Test results have indicated that up to 128 ppm may be present. No maximum safe level has been established, therefore impacts cannot be quantified.

Pesticides are widely used in the maintenance of roadside vegetation. These compounds can cause declines in insect numbers and diversity, resulting in diminished food supplies for many wildlife species (Geradi 1974). Pollutants from a contaminated environment can accumulate in wildlife tissues causing negative health effects.

A Memphis State University study (1971) showed that noise may have a negative effect on the breeding efficiency of birds that utilize vocal communications during the breeding season.

Roadside and median vegetative plantings can be attractive food sources and/or cover for some wildlife species. De-icing compounds that accumulate in roadside soils can serve as attractive "salt-licks". The attraction of wildlife to these salt-licks can lead to increased wildlife

mortality due to collisions with vehicles. Many studies have shown that increases in wildlife mortality result from the construction and operation of roads (Michael 1975, Oxley et al. 1974, Campbell 1973, and Hancock 1963).

Impacts on Herpetofauna (For a discussion of impacts to Herpetofauna, please refer to DEIS Section IV.J.3. page IV-75)

Mitigation of Adverse Impacts to Herpetofauna (For a discussion of mitigation to Herpetofauna, please refer to DEIS Section IV.J.3. page IV-76) Mitigation of adverse impacts to Herpetofauna can be achieved through standard environmental mitigation efforts such as wetland creation, stream and wetland buffer protection, and restoration.

Impacts on Birds (For a discussion of impacts to Birds, please refer to DEIS Section IV.J.3. page IV-77)

Mitigation of Adverse Impacts to Birds (For a discussion of mitigation to Birds, please refer to DEIS Section IV.J.3. page IV-79)

Impacts on Mammals (For a discussion of Impact to Mammals, please refer to DEIS Section IV.J.3. page IV-80)

Mitigation of Adverse Impacts to Mammals (For a discussion of Mitigation to Mammals, please refer to DEIS Section IV.J.3. page IV-81)

4. Rare, Threatened or Endangered Species

Coordination with the USFWS and MDNR indicates that there are recent records for species of concern known to occur within the vicinity of the project site. There are no federally listed threatened or endangered species known to occupy the project area. The species of concern could potentially occur on the project site itself, especially if the appropriate habitat exists. They are as follows:

Scientific Name	Common Name	State Status
Juncus torreyi	Torrey's Rush	Endangered
Nemophila aphylla	Small-flowered Baby-blue-eyes	Highly Rare

Subsequent to completion of the DEIS, at the request of MDNR, SHA conducted a field survey in search of Torrey's rush and Small-flower-baby-blue-eyes. Torrey's rush was not

identified in the project area. Small-flower-baby-blue-eyes was identified near the project area but not within the project grading limits.

K. Noise Quality

1. Introduction

Seventy-two (72) receptor sites are located within the Study Area as indicated in Table III- 12 and shown on Figures III-7A through III-7H. The sites were grouped into fourteen (14) Noise Sensitive Areas (NSA). Receptors were selected to represent the overall noise environment and to determine locations where residences may be impacted by traffic noise. A summary of impacts and mitigation measures is presented in this section.

The complete Noise Analysis Technical Report is available at the Maryland State Highway Administration, 707 North Calvert Street, Baltimore, Maryland 21202.

2. Predicted Noise Levels

The method used to model and predict noise levels in this study was developed by the Federal Highway Administration (FHWA). The computer model, called the FHWA Traffic Noise Model ® (TNM), computes highway traffic noise levels at user-defined receivers, and aids in the design of highway noise barriers. TNM® includes a database of speed-related noise emission levels for five (5) vehicle types (automobiles, medium trucks, heavy trucks, buses, and motorcycles) under cruise (constant speed) conditions. An adjustment is first applied to account for the numbers of each vehicle type and their speed as defined by the user. In addition, TNM contains a database of noise levels that accounts for the effects of accelerating vehicles for use when traffic is affected by stop signs, signals, toll booths, on-ramps, and roadway upgrades. Sound propagation is computed taking into account the effects of atmospheric absorption, divergence (i.e. geometric spreading of sound energy over distance), intervening ground types and their acoustical characteristics, topography, man-made barriers, vegetation, and rows of buildings. To improve accuracy, all TNM databases and calculations are based on 1/3 octave band (i.e. data is broken down into individual frequency bands), then the results are recombined to give noise levels in the standard units used in highway noise analysis.

In this study, noise levels are presented in terms of the A-weighted equivalent sound level, abbreviated here as L_{eq}. L_{eq} is a single number representation of the actual fluctuating sound level that accounts for all the sound energy during a given period of time. The units of L_{eq} are A-weighted decibels, or dBA. The A-weighting means that the sound is measured by a method that approximates the response of the human ear, with de-emphasis of the low and very

high frequencies, and emphasis on the mid-frequency noise level range. In order to give a sense of perspective to the noise levels discussed; a quiet rural night would register about 40-dBA, a quiet suburban night about 60-dBA, a noisy day about 80-dBA, a gas lawn mower at 100 feet about 70-dBA and a diesel truck at 50 feet about 85-dBA. Under typical field conditions, noise level changes of 2 to 3-dBA are barely perceptible, while a change of 5-dBA is readily noticeable. A 10-dBA increase in noise levels is judged by most people as a doubling of sound loudness. Predicted noise levels for this project are summarized in Table IV-10. For the design year 2020, predicted noise levels range from 52 to 80-dBA for the Build Alternative.

The existing traffic volumes and speed along MD 210 used for model calibration were developed from volumes obtained during ambient measurement sessions. SHA developed the 2020 traffic volumes used for impact assessment and mitigation, while the 2020 traffic speeds were calculated through the use of HCS computer software. A summary of the traffic volumes used is included in Section II. Intersections provided capacity constraint, which is alleviated by the interchange options, resulting in increase traffic volume between interchanges.

The noise levels given in this section are for the noisiest hour of the day. For the No-Build alternative there are nine signalized major intersections in this Study Area, causing vehicles to queue at the traffic lights. Groups of vehicles advance from one intersection to another creating less noise than a lower volume, steadier flow of traffic. In this study area, the noisiest hour usually preceded peak traffic hour. The associated travel speed along with the traffic volumes were included in this analysis.

The worst-case noise scenario was found to be in the PM hours. Predicted Build noise levels along with projected No-Build levels and measured ambient noise levels are shown in Table IV-10. All ambient and predicted noise levels are A-weighted exterior L_{eq} Noise levels. Noise criteria is approached or exceeded at 13 NSAs.

In general, the Build traffic noise levels are slightly (not perceptibly) greater than the No-Build noise levels. However, because many of the residences were constructed prior to the existing 6-lane divided roadway configuration, with the roadway being either 2-lane undivided or 4-lane divided, there are increases in the Build noise levels over the baseline noise levels. The baseline noise level is defined as the maximum noise level for the roadway configuration in place at the time a residence was constructed.

3. Impact Assessment and Abatement Consideration

a. Impact Assessment and Feasibility of Noise Control

The determination of traffic noise impacts is based on the relationship between the ambient noise levels, the predicted peak hour traffic noise levels and the established noise abatement criteria in the project area. The effects of noise from the SHA-Selected Alternative are judged in accordance with the Federal Highway Administration's guidelines as established by 23 Code of Federal Regulations (CFR) Part 772 and current SHA Sound Barrier Policy. The FHWA criteria shown in Table IV-9 are based on specific land uses and are used in determining the need for studying noise attenuation measures. All locations within this study area are of land use Category B with a design noise level of 67-dBA (L_{eq}). Mitigation measures were investigated where the peak hour noise levels approached or exceeded the 67-dBA Federal Noise Abatement Criterion for residential areas. Based on current SHA Sound Barrier Policy, 66-dBA is considered as approaching the criteria. Additionally, the criteria requires that mitigation measures be considered where build levels are equal to or greater than 57-dBA and exceed the ambient levels by 10-dBA or more. The results of this study are shown in Table IV-10, and are described in detail in this section. Where mitigation was modeled, additional criteria were examined to determine if mitigation is feasible and reasonable.

This evaluation was also completed in accordance with the SHA's Sound Barrier Policy, dated May 1998. The MD 210 project is a Type I noise project as defined in 23 CFR, Part 772. A Type I project provides evaluation of noise mitigation for new highways or significant modification of existing roadways that increase highway capacity, or brings traffic closer to existing residences. For the SHA-Selected Alternative, although the existing roadway configuration is unchanged for much of its length, the replacement of signalized intersections with interchanges brings traffic closer to some residences, and removes capacity restraints which permits the existing MD 210 roadway configuration to operate close to design capacity. When mitigation is investigated, feasibility and reasonableness criteria established by SHA's Sound Barrier Policy must be met in order for a barrier to be considered eligible for construction. These criteria are summarized below:

Feasibility Criteria

- Noise levels can be reduced by 7 to 10-dBA at receptors with the highest noise levels.
- Placement of barrier does not restrict vehicular or pedestrian access.
- Barrier does not cause any safety or maintenance problems.

- Barrier can be constructed given topography, drainage, utilities, etc.
- There are no non-highway noise sources that would reduce or limit barrier effectiveness.

Reasonableness Criteria

- The majority of impacted receptors receive a 7 to 10-dBA noise reduction.
- At least 75% of the impacted residents approve of the proposed noise abatement.
- A 3-dBA or greater change in design year noise levels over design year no-build. Noise levels are expected to result from the proposed action.
- The cumulative effect of highway improvements on the design year noise levels at receptors that existed when prior improvements were made is equal to or greater than 3-dBA.
- Build levels are equal to or greater than 72-dBA and there is any increase in noise levels between no-build and build alternatives.
- The barrier should not have significant negative visual impact, such as a high barrier close to residences.
- The cost of noise abatement must be equal to or less than $50,000 per residence benefited
- The average cost per residence for the entire project will also be considered. Project cost averaging would be considered for any NSA with a cost exceeding $50,000 per residence, but less than $100,000 per residence.
- There are special Section 4(f) circumstances (e.g., areas with historical, recreational, or cultural significance).

b. Noise Abatement Criteria

The study of noise abatement measures considers the size of the impacted areas, the number and distribution of noise sensitive sites within that area, the predominant activities being performed and their vulnerability to noise disturbances, and the visual impact and economic feasibility of the noise attenuation methods.

An assessment of reasonable cost for sound barriers is based on the following assumptions: an effective barrier should, in general, extend in both directions for four times the distance between receiver and roadway (source) and provide a 7 to 10-dBA reduction in the noise level at the most severely affected residences. The effective barrier height was considered to be the height at which this reduction was achieved. A second consideration was that the barriers block the line of sight to all vehicles from every location. The cost per residence is determined by dividing the total barrier cost by the number of benefited residences. A unit cost of $16.54 per square foot is used to determine the cost of the barrier when evaluating economic feasibility. An impacted residence is considered benefited when it experiences a minimum 3-dBA reduction in noise with mitigation. Also a residence that is not impacted is considered benefited if it receives a 5-dBA reduction from the mitigation. When determining the cost per residence, the SHA policy has assumed that a church or school or historic area has the value of ten equivalent residences. An historic site is considered as 2 residences and an historic district is considered as 10 residences.

The effects of noise from each alternative are judged in accordance with the FHWA's activity/criteria relationship published in 23 CFR, Part 772 and subsequent memorandum. The FHWA criteria are based on specific land uses and are used in determining the need for studying noise attenuation measures. All locations within this Study Area are of land use Category B, which has a design noise level of 67-dBA (Leq).

This evaluation was also completed in accordance with the SHA's Sound Barrier Policy. This is a Type I noise project as defined in 23 CFR, Part 772. A Type I project provides evaluation of noise mitigation for projects that propose construction of a highway on a new location or the expansion or reconstruction of an existing highway that substantially changes the highway's horizontal or vertical alignment or increases the number of through traffic lanes.

TABLE IV-9
FEDERAL NOISE ABATEMENT CRITERIA

LAND USE CATEGORY	DESIGN NOISE LEVEL – Leq	DESCRIPTION OF LAND USE CATEGORY
A	57-dBA (exterior)	Tracts of land in which serenity and quiet are of extraordinary significance and preservation of those qualities is essential if the area is to continue its intended purpose. Such areas could include amphitheaters, particular parks, or open spaces which are dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B	67-dBA (exterior)	Residences, motels, hotels, public meeting (exterior) rooms, schools, churches, libraries, hospitals or picnic areas, playgrounds, active sports areas and parks.
C	72-dBA (exterior)	Developed lands, properties or activities not included in category A or B above.
D	None Prescribed	Land which is undeveloped on the date of public knowledge of the project, and on which no known future development is planned.
E	52-dBA (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

c. Cumulative Noise Effects

In the assessment of the No-Build to Build noise level change, consideration is given to the cumulative effects of interim highway improvements made after the original highway construction. If the cumulative increase in design-year build noise level is equal to or greater than 3-dBA, noise abatement could be considered reasonable.

MD 210 was constructed in 1945 as a 2-lane undivided highway. Since then, the SHA has undertaken a series of widening projects, several of which occurred prior to NEPA and the requirements for traffic noise investigations. The noise levels resulting from these previous roadway configurations are referred to as the 'Baseline' noise levels. Each of these improvements resulted in a small increase in noise levels for receptors in existence at the time of the roadway improvements. Individually these increases would not have warranted noise mitigation during the planning and design phase of this project. The purpose of this analysis is to determine whether these small increases, when combined, would meet SHA's Policy Reasonableness Criterion 3, which states:

"In the assessment of the No-Build to Build noise level change, consideration will be given to the cumulative effects of highway improvements made after the original highway construction. If the cumulative increase in design year build noise levels...is equal to or greater than 3 decibels, noise abatement could be considered reasonable."

The residences (i.e., receptors) in the study area were constructed over many years. A comparison of dates of roadway improvements against construction dates revealed that construction of many of the study area residences preceded certain MD 210 improvements. Previous configurations of the roadway can be separated into 5 separate cases:

- **Case 1 (1949-1966):** Two-lane undivided roadway

- **Case 2 (1966-1986):** Two-lane undivided highway from MD 373 to Fort Washington Road. Four-lane divided roadway north of Fort Washington Road

- **Case 3 (1986-1992):** Four-lane divided roadway

- **Case 4 (1992 to 1996)**: Four-lane divided roadway MD 373 to Fort Washington Road. Six-lane divided roadway north of Fort Washington Road

- **Case 5 (1996 to Present)**: Six-lane divided highway for the entire length of roadway in the study area.

Receptors that were constructed after 1996 (Case 5) or after 1992 north of Fort Washington Road (Case 4) have not experienced any MD 210 interim improvements since their construction. Thus, a comparison of the No-Build to the Build noise levels will provide an accurate assessment of the reasonableness of noise abatement at these locations; no cumulative effects analysis is required.

d. Mitigation Measures

In acoustical analysis, various methods of noise abatement are possible: noise attenuation through a barrier or berm placed between the source and the receptor; traffic flow restrictions or controls; and attenuation of noise generated by the vehicles.

Several types of sound barriers including reflective walls and earth berms can be used to reduce noise levels at sensitive receptors. Because berms would require a significant amount of additional right-of-way, only concrete walls were analyzed in this study.

While NSA's were selected wherever noise sensitive land use occurs, 2020 noise levels from the SHA-Selected Alternative at some NSA's do not equal or exceed FHWA and SHA criteria noise levels, and mitigation was not investigated at those NSA's. Mitigation was also not investigated in those residential neighborhoods where access required for driveways and sidewalks would make construction of effective barriers impossible. At all impacted locations where mitigation is not feasible or reasonable, investigations will be made during final design to determine whether landscaping buffer schemes, or other options that would soften the effects of the proposed improvements and minimize noise impacts, could be utilized in a cost effective way. At locations where barriers are determined to be feasible or reasonable, these options could also be considered as a way to improve the effectiveness of the mitigation design.

The following is a description of the mitigation measures analyzed to protect impacted residences. The barrier locations were separated into three different classifications:

- **Classification 1** locations include any part of a barrier designed to protect residences nearest to proposed roadway construction which consists of capacity improvements or brings traffic closer to residences.

- **Classification 2** locations include any part of a barrier that extend in front of residences within the same 'community' as the residences blocked by an adjacent Classification 1 segment;

- **Classification 3** locations include areas where there is no construction, or construction which does not consists of capacity improvements or does not bring traffic closer to residences. Pavement overlays are an example of this type of locations. Mitigation was not analyzed at Classification 3 locations

Barriers are proposed for the six NSA's in which noise mitigation was necessary. Of these, five barriers are those in which the cost of noise abatement meets the reasonableness criteria of costing no more than $50,000 per benefited residence. In addition, one barrier is proposed where its individual cost was greater than $50,000 per residence, but when averaged for the entire project, the cost was less than $50,000. Below is a summary of each NSA:

Noise Sensitive Area A

NSA A consists of single family residences on the east side of MD 210, at the northern limit of the study, and is a Classification 3 location. The residences are located from Catone Court, north to Southlawn Park and are represented by receptors R-57 through R-65. The projected 2020 build and no-build noise levels for the SHA-Selected Alternative equal or exceed 66-dBA; however, a barrier was not analyzed because there are no adjacent roadway capacity improvements, nor does traffic come closer to residences.

Noise Sensitive Area B

NSA B consists of single family residences on the west side of MD 210; represented by receptor R-55 and receptors R-67 through R-73. The residences are located near Wilson Bridge Drive and are on both the east and west sides of Carey Branch. The projected 2020 noise levels for the SHA-Selected Alternative equal or exceed 66-dBA. This is a Classification 1 & 2 location because there are adjacent improvements, which bring traffic closer to the residences in a portion of the community. There is also at least a 3-dBA increase between Build and No-Build noise levels, considering cumulative effects.

To protect the impacted residences of NSA B, two barriers were investigated. The barriers run from the I-295/I-495 Ramp south to Kerby Hill Road. The first barrier is to the north of Wilson Bridge Drive and the second is to the south. All impacted residences receive at least a 3-dBA insertion lost and the most severely affected residences receive more than 10-dBA

insertion loss. Therefore, all impacted residences are considered to be benefited. Because the barrier would cost less than $50,000 per benefited residence and because there is also at least a 3-dBA increase between Build and No-Build noise levels considering cumulative effects, both barriers meet current criteria for further consideration.

Barrier	NSA B: Classification 1 & 2		
Length (ft)	4,770	**Total**	
Area (sq ft)	90,630	**Residences**	
Avg. Ht. (ft)	19	**Benefited**	250
Insertion Loss	4-14 dBA	**Cost Per**	
Total		**Benefited**	
Cost	$1,468,000	**Residence**	$5,872

Noise Sensitive Area C

NSA C consists of single family residences adjacent to MD 210; represented by receptors R-49 through R-52. The residences are located between Henson Creek Stream Valley Park and Livingston Road on the east side of the roadway, and include the Indian Hill Manor and Murray Hill developments. The projected 2020 noise levels for the SHA-Selected Alternative equal or exceed 66-dBA. This is a Classification 1 & 2 location because there are adjacent improvements, which bring traffic closer to the residences in a portion of the community. There is also at least a 3-dBA increase between Build and No-Build noise levels, considering cumulative effects.

To protect the impacted residences of NSA C, a barrier was investigated. The barrier is located from Livingston Road southward (in the direction of Palmer Road) to approximately the end of the River View community. All impacted residences receive at least a 3-dBA insertion lost and the most severely affected residences receive more than 10-dBA insertion loss. Therefore, all impacted residences are considered to be benefited. Because the barrier would cost less than $50,000 per benefited residence and because there is also at least a 3-dBA increase between Build and No-Build noise levels considering cumulative effects, this barrier meets current criteria for further consideration.

Barrier	**NSA C: Classification 1 & 2**		
Length (ft)	1,810	**Total**	
Area (sq ft)	30,770	**Residences**	
Avg. Ht. (ft)	17	**Benefited**	37
Insertion Loss	6 to 12-dBA	**Cost Per**	
Total		**Benefited**	
Cost	$510,000	**Residence**	$13,784

Noise Sensitive Area D

NSA D consists of single family residences on the west side of MD 210; represented by receptors R-53, R-54 and R-56. The residences are located between Henson Creek Stream Valley Park and Kerby Hill Road. The residence at R-56 is abandoned and not considered in the analysis. At the remaining residences, the projected 2020 noise levels for the SHA-Selected Alternative equal or exceed 66-dBA. This is a Classification 1 location because there are adjacent improvements, which bring traffic closer to all residences in the community. However a barrier was not analyzed because there is not at least a 3-dBA increase between Build and No-Build noise levels, considering cumulative effects.

Noise Sensitive Area E

NSA E consists of single family residences and an apartment complex on the east side of MD 210. The residences are located between Broad Creek and Henson Creek. The NSA is represented by receptors R-42 through R-46; however, it has been determined that the residence represented by R-42 will be removed by construction. The projected 2020 noise levels for the SHA-Selected Alternative equal or exceed 66-dBA. This is a Classification 1 location because there are adjacent improvements, which bring traffic closer to the residences in the community. There is also at least a 3-dBA increase between Build and No-Build noise levels, considering cumulative effects.

In order to protect impacted receptors of NSA E, three barriers were investigated. The first barrier runs from Palmer Road north to Henson Creek to provide noise reduction for the Potomac Heights apartment complex. The second barrier is located between Old Palmer Road and Palmer Road. The third barrier is located between Old Fort Road North and Hunters Mill Creek. Although the barrier would cost more than $50,000 per benefited residence, the combined barriers do meet current criteria for further consideration when their cost is averaged with the entire project.

Barrier	**NSA E: Classification 1 & 2**		
Length (ft)	2,718	**Total**	
Area (sq ft)	71,275	**Residences**	
Avg. Ht. (ft)	20.4	**Benefited**	22
Insertion Loss	4 to 11-dBA	**Cost Per**	
Total Cost	$1,178,900	**Benefited Residence**	$53,586

Noise Sensitive Area F

NSA F consists of two parks and single family residences on the west side of MD 210. The NSA covers the area between Broad Creek and Henson Creek Stream Valley Park. The NSA is represented by residences on Old Fort Road North (R-47, R-48), R-H1 (Henson Creek Park) and R-BC1 (Broad Creek Park). At Henson Creek Stream Valley Park and Broad Creek Stream Valley Park the projected 2020 noise levels for the SHA-Selected Alternative equal or exceed 66-dBA; however, because there are no recreational uses for which quiet is required to maintain the recreational function, mitigation was not investigated. Mitigation at residences adjacent to Old Fort North (R-47 & R-48) is not warranted because the only impacted residence is being relocated under the SHA-Selected Alternative.

Noise Sensitive Area G

NSA G consists of single family residences and two churches east of MD 210; represented by receptors R-38 through R-41. The residences are located between Livingston Road and Fort Washington Road. The two impacted churches are Grace Lutheran Church and Fort Washington Memorial Church. The projected 2020 noise levels for the SHA-Selected Alternative equal or exceed 66-dBA. The northern portion of this NSA is a Classification 1 & 2 location because there are adjacent improvements, which bring traffic closer to the residences in a portion of the community. There is also at least a 3-dBA increase between Build and No-Build noise levels, considering cumulative effects. South of the Grace Lutheran Church is a Classification 3 location because there are no roadway improvements which increase capacity or bring traffic closer to the residences in this area.

To protect residences of NSA G, a barrier was investigated. The barrier runs from Fort Washington Memorial Church southward to Aragona Boulevard. Because the barrier would cost less than $50,000 per benefited residence and because there is also at least a 3-dBA increase between Build and No-Build noise levels considering cumulative effects, this barrier meets current criteria for further consideration.

Barrier	**NSA G: Classification 1 &2**		
Length (ft)	1,680	**Total Residences Benefited**	23
Area (sq ft)	34,400		
Avg. Ht. (ft)	20.5		
Insertion Loss	8 to 10-dBA	**Cost Per Benefited Residence**	$24,957
Total Cost	$574,000		

Noise Sensitive Area H

NSA H consists of single family residences and one church west of MD 210; represented by receptors R-23 through R-29. The residences are located between Old Fort Road South and Swan Creek Road, adjacent to Lampton Lane. The church, Fort Washington United Methodist Church, is located immediately north of Old Fort Road South. Investigation of a sound barrier in this location is warranted in front of Fort Washington United Methodist Church (R-29) and between Tantallon Drive and Swan Creek Road (R-23 to R-26), because the projected 2020 noise levels for the SHA-Selected Alternative equal or exceed 66-dBA in these two areas. These areas of the NSA are Classification 1 & 2 locations because there are adjacent roadway improvements, which bring traffic closer to portions of the community. There is also at least a 3-dBA increase between Build and No-Build noise levels, considering cumulative effects. The portion of the community south of Tantallon Drive (R-27 & R-28) is protected by an existing berm and the 66-dBA noise criterion is not exceeded.

Within NSA H behind residences and the church, two barriers were investigated. Because these barriers would cost less than $50,000 per benefited residence and because there is also at least a 3-dBA increase between Build and No-Build noise levels considering cumulative effects, these barriers meet current criteria for further consideration.

Barrier	**NSA H: Classification 1 & 2**		
Length (ft)	2,130	**Total**	
Area (sq ft)	51,120	**Residences**	
Avg. Ht. (ft)	24	**Benefited**	34
Insertion Loss	1 to 10-dBA	**Cost Per**	
Total Cost	$809,000	**Benefited Residence**	$23794

Noise Sensitive Area I

NSA I consists of single family residences, a Health Center, and a park adjacent to the east side of MD 210; represented by receptors R-33 through R-37 and receptor R-FW1 for the Fort Washington Local Forest Park. The residences are located in two sections: the first between Piscataway Creek Stream Valley Park and Fort Washington Forest Local Park, and the second between Old Fort Road South and Livingston Road. The projected 2020 noise levels for the SHA-Selected Alternative equal or exceed 66-dBA at the Lexington Health Center (R-37) and the park (R-33, R-FW1). Because there are no active uses in the park, or outside activities at the Health Center, investigation of sound barriers at these locations is not warranted. Also because the projected 2020 noise levels for the SHA-Selected Alternative do not equal or exceed 66-dBA

at the residences (R-34 to R-36), investigation of sound barriers at these locations is also not warranted.

Noise Sensitive Area J

NSA J consists of single family residences west of MD 210; represented by receptors R-30, R-31 and R-32. The residences are located along Coldwater Drive. Because the existing terrain acts to shield the residences, the projected 2020 noise levels for the SHA-Selected Alternative do not exceed or equal 66-dBA and are not equal to or more than 10-dBA above ambient noise levels. Therefore, investigation of a sound barrier is not warranted for the SHA-Selected Alternative.

Noise Sensitive Area K

NSA K consists of single family residences on the east side of MD 210; represented by receptors R-14, R-15, R-16, R-18, R-19 and R-20. The residences are located between White Hall Forest and Piscataway Park Creek. The projected 2020 noise levels for the SHA-Selected Alternative equal or exceed 66-dBA; however, this is a Classification 3 location because there is no roadway construction which consists of capacity improvements or brings traffic closer to residences. Therefore, mitigation was not analyzed at this location.

Noise Sensitive Area L

NSA L consists of single family residences and Piscataway Creek Park (R-PC1) west of MD 210; represented by receptors R-21, R-22 and R-PC1. The residences are located between Farmington Road and Piscataway Creek Park. The projected 2020 noise levels for the SHA-Selected Alternative equal or exceed 66-dBA; however, this is a Classification 3 location because there is no roadway construction of capacity improvements nor is traffic brought closer to residences. Therefore, mitigation was not analyzed at this location.

Noise Sensitive Area M

NSA M consists of single family residences east of MD 210; represented by receptors R-10, R-11 and R-13. The residences are located between MD 373 and Tree View Estates. The projected 2020 noise levels for the SHA-Selected Alternative equal or exceed 66-dBA; however, this is a Classification 3 location because there is no roadway construction which consists of capacity improvements or brings traffic closer to residences. Therefore, mitigation was not analyzed at this location.

Noise Sensitive Area N

NSA N consists of single family residences adjacent to MD 210; represented by receptors R-2 through R-9. The residences are located west of MD 210 between MD 228 and Farmington Road. The projected 2020 noise levels for SHA-Selected Alternative equal or exceed 66-dBA only in the Biddle Road area (R3, R-4, R-5), which is a Classification 1 area. Therefore, investigation of a sound barrier in this location is only warranted in the area between MD 228 and MD 373.

To protect the impacted residences of NSA N, one barrier of category Classification 1 was investigated. The barrier is located between MD 373 and MD 228. Because this barrier would cost less than $50,000 per benefited residence and because there is also at least a 3-dBA increase between Build and No-Build noise levels considering cumulative effects, this barrier meets current criteria for further consideration.

Barrier	NSA N: Classification 1		
Length (ft)	1,450	**Total Residences Benefited**	13
Area (sq ft)	21,025		
Avg. Ht. (ft)	14.5		
Insertion Loss	1 to 10-dBA	**Cost Per Benefited Residence**	$26,923
Total Cost	$350,000		

e. Summary of Results

Below is a summary of the proposed barriers. All barriers examined meet current criteria for reasonableness and feasibility, when considered on a project average basis.

NSA	Cost	Benefited Res.	Cost/Res.
B	$1,468,000	250	$5,872
C	$510,000	37	$13,784
E	$1,178,900	22	$53,586
G	$574,000	23	$24,957
H	$809,000	34	$23,794
N	$350,000	13	$26,923
Total	$4,889,900	379	$12,902

4. Construction Impacts

As with any major construction project, areas around the construction site are likely to experience varied periods and degrees of noise impact. This type of project would probably employ the following pieces of equipment that would likely be sources of construction noise:

- Bulldozer and Earth Movers
- Graders
- Front End Loaders
- Dump and other Diesel Trucks
- Compressors
- Pile Drivers

Construction noise level specifications, especially relating to nighttime periods in more sensitive areas, will be coordinated with Prince George's County.

Temporary fencing will be considered, where feasible, to screen construction activities from view.

Maintenance of construction equipment will be regular and through to minimize noise emissions because of inefficiently tuned engines, poorly lubricated moving parts, inefficiently tuned engines, poorly lubricated moving parts, ineffective muffling systems, etc.

L. Air Quality

1. Objectives and Type of Analysis

This analysis will serve as support documentation for the project and has been prepared in accordance with the U.S. Environmental Protection Agency (US EPA), Federal Highway Administration (FHWA), and Maryland State Highway Administration (MD SHA) guidelines.

Carbon monoxide (CO) impacts are analyzed as the accepted indicator of vehicle-generated air pollution.

The EPA CAL3QHC dispersion model is used to predict carbon monoxide (CO) concentrations for air quality sensitive receptors for both the build year (2010) and design year (2020). The detailed analyses predict air quality impacts from CO vehicular emissions for both the No-Build Alternative and the Build Alternative at each receptor location. Modeled 1-hour and 8-hour average CO concentrations are added to background CO concentrations for comparison to the State and National Ambient Air Quality Standards (S/NAAQS).

2. Construction Impacts

The construction phase of the proposed project has the potential to impact the local ambient air quality by generating fugitive dust through activities such as demolition and materials handling. The State Highway Administration has addressed this possibility by establishing "Standard Specifications for Construction and Materials" which specifies procedures to be followed by contractors involved in site work.

The Maryland Air and Radiation Management Administration was consulted to determine the adequacy of the "Specifications" in terms of satisfying the requirements of the "Regulations Governing the Control of Air Pollution in the State of Maryland". The Maryland Air and Radiation Management Administration found the specifications to be consistent with the requirements of these regulations. Therefore, during the construction period, all appropriate measures (Code of Maryland Regulations 10.18.06.03 D) would be incorporated to minimize the impact of the proposed transportation improvements on the air quality of the area.

Table IV-10

MD 210/ Alternative 5A

NOISE ANALYSIS SUMMARY

NSA	RECEPTOR	DATE BUILT CASE/DATE/LANES*	PEAK AMBIENT	2020 BUILD LEVEL	BASELINE ** NOISE LEVEL	CHANGE OVER BASELINE	2020 NO-BUILD	CHANGE OVER 2020 NO-BUILD	BUILD WITH BARRIER	INSERTION LOSS***		BARRIER ANALYSIS: IMPACTED @ 66 dBA	
	R-57	5/after 1996/6L	69	72	N/A	N/A	71	1	61	11			
	R-58	"	58	59	N/A	N/A	58	1	54	5		Classification 3	
	R-59	"	70	73	N/A	N/A	71	2	60	13			
	R-60	2/1966-1986/4L	74	77	76	1	76	1	64	13		There are no capacity	
A	R-61	"	63	65	64	1	64	1	57	8		improvements or	
	R-62	1/before 1966/2L	72	74	63	11	73	1	64	10		construction that brings	
	R-63	"	65	66	60	6	65	1	55	11		traffic closer to receptor	
	R-64	"	64	66	56	10	65	1	56	10			
	R-65	N/A	64	65	N/A	N/A	64	1	58	7			
												L= 4,770'	
												Average HT= 19'	
	R-55	1/before 1966/2L	65	67	59	8	66	1	63	4		COST= $ 1,468,000	
	R-67	"	61	64	58	6	63	1	54	10			
	R-68	"	63	64	58	6	62	2	59	5		Impacted @ 66dBA = 223	
B	R-69	"	73	77	71	6	76	1	63	14		Imp. & Ben. @ 3dBA = 223	
	R-70	2/1966-19864L	72	73	72	1	72	1	62	11		Not Imp. & Ben. @ 5dBA= 27	
	R-71	"	73	74	72	2	73	1	64	10		Total Benefited = 250	
	R-72	"	73	78	76	2	77	1	65	13			
	R-73	1/before 1966/2L	73	75	68	7	74	1	63	12		Cost per Benefited	
												Residence = $ 5,872 /RES.	
												L= 1,810'	
												Average HT= 17'	
												COST= $ 510,000	
	R-49	1/before 1966/2L	73	73	64	9	73	0	N/A	N/A		Impacted @ 66dBA = 34	
C	R-50	2/1966-1986/4L	73	74	69	5	75	-1	64	10		Imp. & Ben. @ 3dBA = 34	
	R-51	1/before 1966/2L	74	77	65	12	76	1	65	12		Not Imp. & Ben. @ 5dBA= 3	
	R-52	"	64	66	58	8	65	1	60	6		Total Benefited = 37	
												Cost per Benefited	
												Residence = $ 13,784 /RES.	
												Classification 1	
	R-53	5/after 1996/6L	70	70	N/A	N/A	70	0	63	7		Less than 3 dBA increase	
D	R-54	"	60	63	N/A	N/A	62	1	60	3		in No-build/ Build noise levels	
	R-56	1/before 1966/2L	70	75	68	7	74	1	N/A	N/A			
	R-56 is abandoned												

* Date Built is when the residence was constructed. No. Lanes is the number of roadway lanes in use at the time of residence construction
** Baseline is the maximum noise using roadway configuration when receptor was built. N/A indicates no-build and baseline are the same
*** N/A mitigation not warranted or not feasible at specified receptor

Table IV-10 (Cont)

MD 210/ Alternative 5A

NOISE ANALYSIS SUMMARY

NSA	RECEPTOR	DATE BUILT CASE/DATE/LANES*	PEAK AMBIENT	2020 BUILD LEVEL	BASELINE** NOISE LEVEL	CHANGE OVER BASELINE	2020 NO-BUILD	CHANGE OVER 2020 NO-BUILD	BUILD WITH BARRIER	INSERTION LOSS***	BARRIER ANALYSIS: IMPACTED @ 66 dBA
	R-42	1/before 1966/2L	72	76	67	9	75	1	N/A	N/A	L= 2,718' Average HT= 20.4' Impacted @ 66dBA = 23 COST= $ 1,178,900
	R-43	2/1966-1986/4L	66	71	68	3	70	1	N/A	N/A	
	R-44	1/before 1966/2L	63	69	59	10	68	1	N/A	N/A	
E	R-45	"	63	66	58	8	65	1	N/A	N/A	
	R-46	2/1966-1986/4L	68	66	65	1	65	1	N/A	N/A	Imp. & Ben. @ 3dBA = 22 Not Imp. & Ben. @ 5dBA= 0 Total Benefited = 22 Cost per Benefited Residence = $ 53,586 /RES.
	R-47	1/before 1966/2L	57	59	50	9	58	1	N/A	N/A	
F	R-48	"	59	66	59	7	64	2	N/A	N/A	No active park use
	R-H1	N/A	69	74	N/A	N/A	73	1	N/A	N/A	Impacted residence being
	R-BC1	N/A	68	70	N/A	N/A	68	2	N/A	N/A	relocated
											L= 1680' Average HT= 20.5' Cost= $ 574,000
	R-38	2/1966-1986/2L	70	72	64	8	71	1	58	14	Impacted @ 66-dBA = 23
G	R-39	3/1992-1996/4L	68	71	68	3	71	0	60	11	Imp. & Ben. @ 3-dBA = 23
	R-40	"	64	65	62	3	64	1	59	6	Not Imp. & Ben. @ 5-dBA= 0
	R-41	2/1966-1986/2L	71	74	67	7	74	0	64	10	Total Benefited = 23 Cost per Benefited Residence = $ 24,957 /RES.
	R-23	2/1966-1986/2L	60	61	55	6	60	1	59	2	L= 2,130' Average HT= 24' COST= $ 809,000
	R-24	"	65	66	61	5	65	1	56	10	
	R-25	"	62	64	58	6	62	2	56	8	Impacted @ 66-dBA = 20
H	R-26	"	61	66	61	6	65	1	56	10	Imp. & Ben. @ 3-dBA = 20
	R-27	"	55	56	51	5	55	1	56	0	Not Imp. & Ben. @ 5-dBA= 14
	R-28	"	54	52	47	5	51	1	51	1	Total Benefited = 34
	R-29	"	61	66	61	5	64	2	66	0	Cost per Benefited Residence = $ 23,794 /RES.
	R-33	4/1992-1996/4L	61	66	60	6	66	0	N/A	N/A	
	R-34	2/1966-1986/2L	56	53	48	5	53	0	N/A	N/A	
I	R-35	"	69	64	56	8	63	1	N/A	N/A	No active outside uses at park and health center
	R-36	"	63	64	58	6	64	0	N/A	N/A	Residences not impacted
	R-37	"	67	71	64	7	70	1	N/A	N/A	
	R-FW1	N/A	69	73	N/A	N/A	73	0	N/A	N/A	

* Date Built is when the residence was constructed. No. Lanes is the number of roadway lanes in use at the time of residence construction
** Baseline is the maximum noise using roadway configuration when receptor was built. N/A indicates no-build and baseline are the same
*** N/A mitigation not warranted or not feasible at specified receptor

Table IV-10 (Cont)

MD 210/ Alternative 5A

NOISE ANALYSIS SUMMARY

NSA	RECEPTOR	DATE BUILT CASE/DATE/LANES* DATE BUILT	PEAK AMBIENT	2020 BUILD LEVEL	BASELINE** NOISE LEVEL	CHANGE OVER BASELINE	2020 NO-BUILD	CHANGE OVER 2020 NO-BUILD	BUILD WITH BARRIER	INSERTION LOSS***	BARRIERS SCENARIO 1	BARRIER ANALYSIS: IMPACTED @ 66 -dBA BARRIERS SCENARIO 2	BARRIERS SCENARIO 3
	R-30	2/1966-1986/2L	61	61	55	6	61	0	N/A	N/A		Not Impacted	
J	R-31	"	56	56	51	5	56	0	N/A	N/A		No barrier was required in NSA J.	
	R-32	"	61	62	54	8	61	1	N/A	N/A			
	R-14	4/1992-1996/4L	66	66	66	0	65	1	58	8		Classification 3	
	R-15	"	58	63	61	2	63	0	58	5			
K	R-16	5/after 1996/6L	62	65	N/A	N/A	65	0	N/A	N/A		There are no capacity improvements or construction that brings traffic closer to receptor	
	R-18	4/1992-1996/4L	70	74	67	7	73	1	62	12			
	R-19	"	71	72	66	6	72	0	68	4			
	R-20	2/1966-1986/2L	66	67	59	8	66	1	59	8			
	R-21	2/1966-1986/2L	66	68	61	7	67	1	N/A	N/A		Classification 3	
L	R-22	"	66	68	62	6	68	0	N/A	N/A			
	R-PC1	N/A	66	69	N/A	N/A	68	1	N/A	N/A		There are no capacity improvements or construction that brings traffic closer to receptor	
	R-10	2/1966-1986/2L	66	67	62	5	66	1	57	10		Classification 3	
M	R-11	4/1992-1996/4L	70	70	68	2	70	0	59	11		There are no capacity improvements or construction that brings traffic closer to receptor	
	R-13	"	57	58	57	1	58	0	53	5			
	R-2	2/1966-1986/2L	61	61	57	4	61	0	60	1		L= 1,450' Average HT= 14.5' COST= $ 350,000	
	R-3	"	70	72	66	6	72	0	62	10			
	R-4	5/after 1996/6L	67	70	N/A	N/A	70	0	60	10		Impacted @ 66-dBA = 6	
N	R-5	2/1966-1986/2L	59	59	56	3	59	0	53	6		Imp. & Ben. @ 3-dBA = 6	
	R-6	5/after 1996/6L	64	64	N/A	N/A	64	0	N/A	N/A		Not Imp. & Ben. @ 5-dBA= 7	
	R-8	"	61	61	N/A	N/A	61	0	N/A	N/A		Total Benefited = 13	
	R-9	"	59	61	N/A	N/A	60	1	N/A	N/A		Cost per Benefited Residence = $ 26,9230 /RES.	

* Date Built is when the residence was constructed. No. Lanes is the number of roadway lanes in use at the time of residence construction

** Baseline is the maximum noise using roadway configuration when receptor was built. N/A indicates no-build and baseline are the same

*** N/A mitigation not warranted or not feasible at specified receptor; numeric value only applies when nearest barrier is present (i.e. most inclusive Scenario)

3. Receptor Site Locations

Seventy (70) air quality receptors were selected to represent air quality sensitive locations within the study area. All of the receptor sites chosen for these receptors are residences, places of worship, or medical centers. In addition, 254 air quality receptors were used to analyze nine (9)-signalized intersections in the study area. At these intersections, receptors were placed at the edge of right-of-way along roadways where queue lengths form. The CO concentration listed for the intersection is the maximum concentration from the receptors used to analyze the intersection.

The locations of the receptors are described in Section III.L. and are presented on Tables III-11 and 12 and Figures III-7A through III-7H.

4. Results of Microscale Analysis

A summary of the CO concentrations is shown in Tables IV-11 and 12. The CO concentrations at all air quality receptors and all signalized intersections for the No-Build and the Build Alternative are below the State and National Ambient Air Quality Standards in the one-hour and eight-hour analyses.

A comparison between the No-Build and the Build Alternative show that CO concentrations generally decrease at the northern end of the project due to the elimination of the signalized intersections on MD 210. CO concentrations at receptors from Old Fort Road North to Old Fort Road South generally increase for the Build Alternative. The increases in CO concentrations can be attributed to moving roadways closer to the receptor sites and longer queue lengths at the signalized intersections due to the elimination of the signals at the northern end. CO concentrations south of Old Fort Road South generally increase slightly due to moving roadways closer to the receptor sites.

5. Conformity with Regional Air Quality Planning

The MD 210 project is located in Prince George's County, Maryland. This county is not designated as non-attainment for carbon monoxide (CO) or particulate matter (PM_{10}), but is designated as a serious non-attainment area for ozone (O_3). Since the project is located in an ozone non-attainment area, conformity to the State Implementation Plans (SIP's) is determined through a regional air quality analysis performed on the Transportation Improvement Plan (TIP) and transportation plan. This project (STIP No. 163440) conforms to the SIP as it originates from a conforming TIP and transportation plan. Ozone conformity is determined through a regional air quality analysis performed on the TIP by the Metropolitan Washington Council of

Governments (MWCOG). The project conforms to the SIP O_3 levels since it is included in a conforming TIP. Ozone cannot be modeled on a project specific basis, since it is formed by chemical reactions in the atmosphere. CO can be done on a project specific (microscale) basis and will determine if there are any "hot spot" violations.

6. Analysis Input

a. Traffic Data

The traffic data used for this air quality analysis included average daily traffic volumes (ADTs), design hour volume (DHV), percent daily distributions (diurnal traffic curves), for both the Build and No-Build Alternatives. Traffic speeds were determined by using *LOS Criteria for Basic Freeway Sections* in Chapter 3 of the 1997 Highway Capacity Manual. The maximum speed for roadway segment was limited to the posted speed limit. LOS F speed was assumed to be 30 mph. Traffic in the vicinity of signalized intersections was assumed to be 30 mph on MD 210. Traffic volumes and diurnal curves provided by the MD SHA and Rummel, Klepper, and Kaul Inc. (RK&K) for the MD 210 project. This data was compiled for each alternative and each year of study.

b. Vehicular Emissions

Mobile source emission factors were obtained for use in the CO prediction models using the latest version of the (EPA) Mobile Source Emission Factors Model, MOBILE5b, released September 14, 1996. The emission rates of individual vehicles are influenced by factors such as ambient air temperature, engine temperature, operating mode, average speed, and maintenance. The average emission rate for a fleet of vehicles operating on a highway is further influenced by the composition of the fleet, vehicle type, and vehicle age. The Metropolitan Washington Council of Governments (MWCOG) provided assumptions for these factors used in the MD 210 Mobile5b models.

Vehicle CO emissions rates increase with decreasing ambient temperature. An ambient temperature of 46.5°F was used to determine both one-hour and eight-hour impacts. Engine operating temperature is included in the emission rate calculation as the fraction of vehicles operating in the cold or hot modes. MWCOG models four different operating modes: Federal Test Procedure (FTP), 100% stabilized mode, 100% cold start mode, and 100% hot start mode. The FTP operating mode (20.6% non-catalytic cold start vehicles, 27.3% catalytic hot start vehicles, and 20.6% catalytic cold start vehicles) was used to represent emissions from vehicles for MD 210. Vehicle maintenance is factored into the emissions rate calculation as the rate of compliance with the Maryland Vehicle Emissions Inspection Program (VEIP). The default

Mobile5b vehicle miles traveled was assumed. Since Maryland has opted into the National Low Emission Vehicle (NLEV) program starting in 1999, the phase-in of Low Emitting Vehicles (LEV) was modeled using Mobile5 Information Sheet #6 (*Effect of New National Low Emission Vehicles Standard for Light-Duty Gasoline Fueled Vehicles).* One set of trip length distributions and registration distributions by age was supplied by MWCOG and was used.

Assumptions for the fuel parameters used in Mobile5b were provided by MWCOG. The fuel volatility is class B and volatility limits of 7.8-psi were assumed for both phases 1 and 2. The first calendar year for period 2 is 2020. Wintertime reformulated gasoline rules were assumed. MWCOG assumes no additional correction factors for humidity, air conditioner usage, and trailer towing. Refueling emission rates were calculated reflecting the mandatory onboard vapor recovery system.

c. Meteorological Factors

For direct comparison to the S/NAAQS, CO concentrations were estimated for worst-case one-hour and eight-hour periods. The meteorological conditions that would result in the maximum one-hour concentrations are (1) conditions of very light wind speeds (1.0 m/sec) and (2) very stable atmospheric conditions (Stability F). The wind direction that results in the maximum receptor concentration is dependent upon roadway/receptor geometry. In general, for receptors near free flow links, wind angles nearly parallel to the roadway yield the highest CO concentrations.

The worst case 1-hour average analyses conducted for this study were performed using the highest one-hour traffic volumes, Stability Class F, and a 1.0 m/sec. wind speed. Both a.m. and p.m. peaks were analyzed. The maximum one-hour CO impact was obtained for each air quality sensitive receptor by adding the background concentration to the one-hour CO receptor-specific concentration.

To estimate the maximum eight-hour average CO concentration, daily traffic distributions (diurnal curves) were used to breakdown the ADT's into hourly traffic volumes. Hourly time segments were analyzed to determine the receptor-specific CO concentrations. The worst consecutive eight hours were averaged and added to the background CO concentration to obtain the 8-hour average CO concentration.

d. CAL3QHC Analysis

The mathematical model used to estimate future air quality concentrations was the current version of the EPA's CAL3QHC dispersion model, released in June 1993. The CAL3QHC dispersion model is a microcomputer-based modeling methodology developed to

predict the level of CO or other inert pollutant concentrations from motor vehicles traveling near roadway intersections. The CAL3QHC model is a consolidation of the CALINE3 line source dispersion model and an algorithm that internally estimates the length of the queues formed by idling vehicles at signalized intersections. Based on the assumption that vehicles at an intersection are either in motion or in an idling state, the program is designed to predict air pollution concentrations by combining the emissions from both moving and idling vehicles. By including emissions from idling vehicles, CAL3QHC represents a more reliable tool then CALINE3 alone for predicting CO concentrations near signalized intersections where idling vehicles interact with moving vehicles in complex configurations. Predictions of free flow traffic volumes using either CALINE3 or CAL3QHC would yield equivalent results.

The CAL3QHC program requires the roadways to be broken down into segments known as links. Links can be either free flow links (for vehicles moving at a constant velocity) or queue links (for idling vehicles). The required inputs for each link are the endpoints, traffic volume (vehicles/hour), and the emission factor (g/veh*mile for free flow links and g/hr for queue links). Additional inputs only for queue links are the average cycle length (seconds), saturation flow rate (vehicles/hour), signal type (pre-timed, actuated, or semi-actuated), and arrival rate (worst, below average, above average, or best progression). 1,600 vehicles/hour was assumed for the saturation flow rate. All signals were assumed pre-timed, with an average arrival rate, and a clearance time of 2.0 seconds.

A free flow link is defined as a straight segment of roadway having a constant width, height, traffic volume, traffic speed, and vehicle emission factor. A change in any of these factors requires a new link to be coded. The width of a free flow link is equal to the roadway width plus 10 feet on each side of the roadway to account for the dispersion of the plume generated by the wake of moving vehicles. For roadways where the median is less than 20 feet wide, free-flow link widths are the shoulder to shoulder width plus 20 feet. The traffic volumes used were the combined traffic volume in both directions traveling along the free-flow links. The roadways where the median width is greater than 20 feet, free-flow links were used to model separate roadways.

CAL3QHC also requires the input of meteorological factors. These factors are averaging time (minutes), surface roughness coefficient (cm), settling velocity (cm/s), deposition velocity (cm/s), wind speed (m/s), and mixing height (m). The values used for these factors were held constant throughout the analysis and are presented as follows:

VARIABLE	**VALUE**
Averaging Time	60 minutes
Surface Roughness Coefficient	108 cm (Suburban Area)

Settling Velocity	0.0 cm/second
Deposition Velocity	0.0 cm/second
Mixing Height	1,000 meters
Scale Factor	0.3048 meters/foot
Source Height	0.0 feet

CAL3QHC calculates the CO concentration at each receptor for a given wind direction. The wind direction was varied through a full 360 degrees in five-degree increments in this study. The results for all wind directions for each receptor are placed in a matrix, and CAL3QHC determines the wind direction that caused the worst CO concentration at each receptor.

e. Background Levels

In order to calculate the total concentration of CO that occurs at a particular receptor site during worst cast meteorological conditions; the background levels are considered in addition to the levels directly attributable to the facility under consideration.

The background levels were derived from the application of rollback methodology to on-site monitoring conducted by the Maryland Air and Radiation Management Administration at their Bladensburg site in Prince George's County during the period of 1999.

Background CO, PPM*

Year	1 Hour	8 hour
2010	7.5	4.3
2020	7.5	4.3

* Parts Per Million

Data obtained from Maryland Air Quality Data Report 1999
Maryland Department of the Environment
Air and Radiation Management Administration
2500 Broening Highway
Baltimore, Maryland 21224

7. Conclusion

Based on the predicted CO concentrations obtained using the EPA CAL3QHC dispersion model for the No-Build and the Build Alternatives, there would be no violation of the 1-hour

standard (35 ppm) and 8-hour standard (9 ppm) set forth in the State and National Ambient Air Quality Standards.

M. Secondary and Cumulative Effects Analysis

In compliance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulations (40 CFR 1508.25(c)), the following analysis examines the secondary and cumulative effects on the environment which may result from this project. The CEQ regulations and guidelines entitled "Considering Cumulative Effects Under the National Environmental Policy Act" define secondary and cumulative effects as follows:

Secondary (Indirect) Effects: "Effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems." (40CFR 1508.8(b))

Cumulative Impacts: "Impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal/non-federal) or person undertakes such other actions." (40 CFR 1508.7)

The SHA Selected Alternative 5A Modified is addressed by this secondary and cumulative effects analysis (SCEA).

TABLE IV-11
CO CONCENTRATION (ppm) in 2005
MD 210: From I-95/I-495 to MD 228

Receptor	Alternative 5A																			
	No Build		Opt. 1A		Opt. 1B		Opt. 1C		Opt. 1D		Opt. 2A		Opt. 2B		Opt. 2C		Opt. 2D		Opt. 2E	
	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR
INT-A	10.9	5.9	9.8	5.5	-	-	-	-	-	-	9.8	5.5	-	-	-	-	-	-	-	-
INT-B	13.6	7.7	10.4	5.7	-	-	-	-	-	-	10.4	5.7	-	-	-	-	-	-	-	-
INT-C	10.6	6.4	9.4	5.1	9.1	5.1	10.0	5.5	10.0	5.5	9.4	5.1	9.1	5.1	10.0	5.5	9.5	5.4	-	-
INT-D	11.3	6.5	13.3	7.1	-	-	-	-	-	-	-	-	-	-	8.6	4.9	8.6	4.9	-	-
INT-E	11.5	6.6	10.8	6.3	10.7	6.2	-	-	-	-	-	-	-	--	-	-	9.5	5.2	8.9	5.0
INT-F	12.8	6.3	12.0	6.2	-	-	-	-	-	-	8.9	5.0	-	-	-	-	-	-	-	-
INT-G	10.1	5.7	10.7	5.7	-	-	-	-	-	-	-	-	-	-	9.1	5.1	9.2	5.1	-	-
INT-H	9.3	5.2	9.2	5.2	-	-	-	-	-	-	9.2	5.2	-	-	-	-	-	-	-	-
INT-I	12.1	8.3	12.3	7.6	-	-	-	-	-	-	12.3	7.6	-	-	-	-	-	-	-	-
R-2	8.9	5.3	8.9	4.9	-	-	-	-	-	-	8.9	4.9	-	-	-	-	-	-	-	-
R-3	9.4	5.8	9.4	5.3	-	-	-	-	-	-	9.4	5.3	-	-	-	-	-	-	-	-
R-4	8.6	5.2	8.5	4.8	-	-	-	-	-	-	8.5	4.8	-	-	-	-	-	-	-	-
R-5	8.0	4.5	8.1	4.4	-	-	-	-	-	-	8.1	4.4	-	-	-	-	-	-	-	-
R-6	8.3	4.8	8.2	4.6	-	-	-	-	-	-	8.2	4.6	-	-	-	-	-	-	-	-
R-8	8.3	4.9	8.3	4.7	-	-	-	-	-	-	8.3	4.7	-	-	-	-	-	-	-	-
R-9	7.8	4.5	7.8	4.4	-	-	-	-	-	-	7.8	4.4	-	-	-	-	-	-	-	-
R-10	8.3	4.8	8.3	4.7	-	-	-	-	-	-	8.3	4.7	-	-	-	-	-	-	-	-
R-11	8.3	4.9	8.3	4.7	-	-	-	-	-	-	8.3	4.7	-	-	-	-	-	-	-	-
R-13	7.8	4.5	7.8	4.4	-	-	-	-	-	-	7.8	4.4	-	-	-	-	-	-	-	-
R-14	8.7	4.8	8.7	4.7	-	-	-	-	-	-	8.7	4.7	-	-	-	-	-	-	-	-

NOTES: 1-hour average CO concentrations include a 7.5-ppm background concentration. Worst case (a.m. or p.m.) shown.
8-hour average concentration include a 4.3-ppm background concentration.
The S/NAAQS for the 1-hour average is 35.0 ppm.
The S/NAAQS for the 8-hour average is 9.0 ppm.

TABLE IV-11 (cont)
CO CONCENTRATION (ppm) in 2005
MD 210: From I-95/I-495 to MD 228

Receptor	Alternative 5A																			
	No Build		Opt. 1A		Opt. 1B		Opt. 1C		Opt. 1D		Opt. 2A		Opt. 2B		Opt. 2C		Opt. 2D		Opt. 2E	
	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR
R-15	8.1	4.5	8.0	4.5	-	-	-	-	-	-	8.0	4.5	-	-	-	-	-	-	-	-
R-17	8.1	4.5	8.1	4.5	-	-	-	-	-	-	8.1	4.5	-	-	-	-	-	-	-	-
R-18	8.8	4.9	8.8	4.9	-	-	-	-	-	-	8.8	4.9	-	-	-	-	-	-	-	-
R-19	8.6	4.8	8.6	4.7	-	-	-	-	-	-	8.6	4.7	-	-	-	-	-	-	-	-
R-20	8.3	4.7	8.3	4.6	-	-	-	-	-	-	8.3	4.6	-	--	-	-	-	-	-	-
R-21	9.1	5.2	9.0	5.2	-	-	-	-	-	-	9.0	5.2	-	-	-	-	-	-	-	-
R-22	8.0	4.6	8.0	4.6	-	-	-	-	-	-	8.0	4.6	-	-	-	-	-	-	-	-
R-24	8.6	4.9	8.7	4.9	-	-	-	-	-	-	8.1	4.6	-	-	-	-	-	-	-	-
R-25	8.1	4.5	8.1	4.6	-	-	-	-	-	-	7.8	4.5	-	-	-	-	-	-	-	-
R-26	8.3	4.7	8.3	4.7	-	-	-	-	-	-	8.2	4.7	-	-	-	-	-	-	-	-
R-28	8.2	4.6	8.2	4.6	-	-	-	-	-	-	-	-	-	-	8.2	4.7	8.1	4.7	-	-
R-29	9.1	5.1	9.3	5.2	-	-	-	-	-	-	-	-	-	-	8.6	4.9	8.6	4.9	-	-
R-30	8.7	4.7	8.7	4.8	-	-	-	-	-	-	-	-	-	-	8.4	4.8	8.4	4.8	-	-
R-31	8.2	4.5	8.3	4.6	-	-	-	-	-	-	-	-	-	-	8.1	4.6	8.0	4.6	-	-
R-32	8.5	4.7	8.5	4.7	-	-	-	-	-	-	-	-	-	-	8.5	4.8	8.5	4.8	-	-
R-33	8.5	4.8	8.6	4.8	-	-	-	-	-	-	-	-	-	-	8.3	4.7	8.3	4.7	-	-
R-34	8.3	4.6	8.1	4.6	-	-	-	-	-	-	-	-	-	-	7.9	4.5	7.9	4.5	-	-
R-35	7.9	4.5	8.0	4.5	-	-	-	-	-	-	-	-	-	-	8.0	4.6	8.0	4.6	-	-
R-36	8.8	4.8	8.6	4.8	-	-	-	-	-	-	-	-	-	-	9.0	5.2	9.0	5.2	-	-
R-37a	9.2	5.2	9.2	5.1	-	-	-	-	-	-	8.4	4.7	-	-	-	-	-	-	-	-

NOTES: 1-hour average CO concentrations include a 7.5-ppm background concentration. Worst case (a.m. or p.m.) shown.
8-hour average concentration include a 4.3-ppm background concentration.
The S/NAAQS for the 1-hour average is 35.0 ppm.
The S/NAAQS for the 8-hour average is 9.0 ppm.

TABLE IV-11 (cont)
CO CONCENTRATION (ppm) in 2005
MD 210: From I-95/I-495 to MD 228

Receptor	Alternative 5A																			
	No Build		Opt. 1A		Opt. 1B		Opt. 1C		Opt. 1D		Opt. 2A		Opt. 2B		Opt. 2C		Opt. 2D		Opt. 2E	
	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR
R-37b	8.2	4.7	8.2	4.6	-	-	-	-	-	-	8.1	4.6	-	-	-	-	-	-	-	-
R-38	8.7	4.8	8.5	4.7	-	-	-	-	-	-	8.4	4.8	-	-	-	-	-	-	-	-
R-39	8.7	4.8	8.7	4.8	-	-	-	-	-	-	8.6	4.8	-	-	-	-	-	-	-	-
R-40	8.2	4.7	8.2	4.6	8.3	4.6	-	-	-	-	-	-	-	-	-	-	8.0	4.6	8.0	4.6
R-41	9.7	5.4	9.5	5.3	9.5	5.2	-	-	-	-	-	-	-	--	-	-	8.5	4.9	8.6	4.9
R-42	9.3	5.3	9.9	5.4	-	-	-	-	-	-	-	-	-	-	8.7	5.1	8.7	5.1	-	-
R-43	9.0	5.2	10.2	5.5	-	-	-	-	-	-	-	-	-	-	8.5	4.9	8.4	4.8	-	-
R-44	9.1	5.3	10.4	5.4	-	-	-	-	-	-	-	-	-	-	8.7	5.0	8.7	5.0	-	-
R-46	9.5	5.4	8.3	4.7	8.3	4.7	9.3	5.1	9.3	5.1	8.3	4.7	8.3	4.7	9.3	5.1	9.1	5.2	-	-
R-47	8.5	4.7	8.8	4.9	-	-	-	-	-	-	-	-	-	-	7.9	4.5	7.9	4.5	-	-
R-48	10.6	6.2	12.3	6.9	-	-	-	-	-	-	-	-	-	-	8.4	4.8	8.4	4.7	-	-
R-49	8.8	5.1	8.9	4.9	-	-	-	-	-	-	8.9	4.9	-	-	-	-	-	-	-	-
R-50	9.3	5.2	8.9	5.0	-	-	-	-	-	-	8.9	5.0	-	-	-	-	-	-	-	-
R-51	10.3	6.0	8.9	5.0	-	-	-	-	-	-	8,9	5.0	-	-	-	-	-	-	-	-
R-52	8.9	5.1	8.3	4.7	-	-	-	-	-	-	8.3	4.7	-	-	-	-	-	-	-	-
R-53	8.9	5.1	8.8	4.9	-	-	-	-	-	-	8.8	4.9	-	-	-	-	-	-	-	-
R-54	8.2	4.7	8.7	4.8	-	-	-	-	-	-	8.7	4.8	-	-	-	-	-	-	-	-
R-55	9.1	5.3	8.6	4.8	-	-	-	-	-	-	8.6	4.8	-	-	-	-	-	-	-	-
R-56	8.8	5.0	9.6	5.3	-	-	-	-	-	-	8.4	5.3	-	-	-	-	-	-	-	-

NOTES: 1-hour average CO concentrations include a 7.5-ppm background concentration. Worst case (a.m. or p.m.) shown.
8-hour average concentration include a 4.3-ppm background concentration.
The S/NAAQS for the 1-hour average is 35.0 ppm.
The S/NAAQS for the 8-hour average is 9.0 ppm.

TABLE IV-11 (cont)
CO CONCENTRATION (ppm) in 2005
MD 210: From I-95/I-495 to MD 228

Receptor	Alternative 5A																			
	No Build		Opt. 1A		Opt. 1B		Opt. 1C		Opt. 1D		Opt. 2A		Opt. 2B		Opt. 2C		Opt. 2D		Opt. 2E	
	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR
R-57	9.4	5.3	9.2	5.0	-	-	-	-	-	-	9.2	5.0	-	-	-	-	-	-	-	-
R-58	8.7	4.9	8.7	5.0	-	-	-	-	-	-	8.7	5.0	-	-	-	-	-	-	-	-
R-59	9.4	5.4	9.8	5.4	-	-	-	-	-	-	9.8	5.4	-	-	-	-	-	-	-	-
R-60	9.2	5.3	9.0	5.0	-	-	-	-	-	-	9.0	5.0	-	-	-	-	-	-	-	-
R-61	8.5	4.8	8.2	4.7	-	-	-	-	-	-	8.2	4.7	-	--	-	-	-	-	-	-
R-62	9.0	5.1	8.8	5.1	-	-	-	-	-	-	8.8	5.1	-	-	-	-	-	-	-	-
R-63	9.6	5.5	9.7	5.4	-	-	-	-	-	-	9.7	5.4	-	-	-	-	-	-	-	-
R-64	8.1	4.5	8.0	4.6	-	-	-	-	-	-	8.0	4.6	-	-	-	-	-	-	-	-
R-65	8.1	4.7	8.1	4.6	-	-	-	-	-	-	8.1	4.6	-	-	-	-	-	-	-	-
R-67	8.3	4.7	8.6	4.8	-	-	-	-	-	-	8.6	4.8	-	-	-	-	-	-	-	-
R-68	8.5	4.9	8.2	4.7	-	-	-	-	-	-	8.2	4.7	-	-	-	-	-	-	-	-
R-69	9.7	5.5	9.3	5.2	-	-	-	-	-	-	9.3	5.2	-	-	-	-	-	-	-	-
R-70	9.9	5.4	9.1	5.2	-	-	-	-	-	-	9.1	5.2	-	-	-	-	-	-	-	-
R-71	9.9	5.2	9.5	5.2	-	-	-	-	-	-	9.5	5.2	-	-	-	-	-	-	-	-
R-72	10.4	5.8	9.6	5.3	-	-	-	-	-	-	9.6	5.3	-	-	-	-	-	-	-	-
R-73	10.6	6.1	9.2	5.1	-	-	-	-	-	-	9.2	5.1	-	-	-	-	-	-	-	-
PC-1	8.2	4.7	8.2	4.7	-	-	-	-	-	-	8.2	4.7	-	-	-	-	-	-	-	-
FW-1	9.2	5.0	8/8	4.9	-	-	-	-	-	-	-	-	-	-	8.4	4.8	8.4	4.8	-	-
BC-1	8.4	4.8	8.7	4.8	8.6	4.8	-	-	-	-	-	-	-	-	-	-	8.5	4.8	8.7	4.9
H-1	9.3	5.4	8.9	5.0	8.9	5.0	9.1	5.0	9.2	5.1	8.9	5.0	8.9	5.0	9.1	5.0	8.9	5.1	-	-

NOTES: 1-hour average CO concentrations include a 7.5-ppm background concentration. Worst case (a.m. or p.m.) shown.
8-hour average concentration include a 4.3-ppm background concentration.
The S/NAAQS for the 1-hour average is 35.0 ppm.
The S/NAAQS for the 8-hour average is 9.0 ppm.

TABLE IV-12
CO CONCENTRATION (ppm) in 2020
MD 210: From I-95/I-495 to MD 228

Receptor	Alternative 5A																			
	No Build		Opt. 1A		Opt. 1B		Opt. 1C		Opt. 1D		Opt. 2A		Opt. 2B		Opt. 2C		Opt. 2D		Opt. 2E	
	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR
INT-A	11.6	6.0	10.3	5.7	-	-	-	-	-	-	10.3	5.7	-	-	-	-	-	-	-	-
INT-B	13.3	8.1	10.8	6.0	-	-	-	-	-	-	10.8	6.0	-	-	-	-	-	-	-	-
INT-C	10.8	6.3	9.4	5.3	9.3	5.2	10.2	5.7	10.2	5.7	9.5	5.3	9.3	5.2	10.2	5.7	10.2	5.7	-	-
INT-D	11.0	6.5	14.2	7.0	-	-	-	-	-	-	-	-	-	-	8.7	4.9	8.8	4.9	-	-
INT-E	11.4	7.0	10.9	6.6	10.8	6.5	-	-	-	-	-	-	-	--	-	-	9.6	5.2	9.1	5.2
INT-F	12.5	6.6	12.7	6.4	-	-	-	-	-	-	9.1	4.8	-	-	-	-	-	-	-	-
INT-G	10.7	5.9	11.8	6.0	-	-	-	-	-	-	-	-	-	-	9.7	5.5	9.7	5.3	-	-
INT-H	9.6	5.7	9.7	5.4	-	-	-	-	-	-	9.7	5.4	-	-	-	-	-	-	-	-
INT-I	11.8	7.3	12.2	7.7	-	-	-	-	-	-	12.2	7.7	-	-	-	-	-	-	-	-
R-2	8.9	5.1	9.0	5.1	-	-	-	-	-	-	9.0	5.1	-	-	-	-	-	-	-	-
R-3	9.4	5.4	9.5	5.4	-	-	-	-	-	-	9.5	5.4	-	-	-	-	-	-	-	-
R-4	8.4	4.9	8.4	5.0	-	-	-	-	-	-	8.4	5.0	-	-	-	-	-	-	-	-
R-5	8.0	4.5	8.0	4.5	-	-	-	-	-	-	8.0	4.5	-	-	-	-	-	-	-	-
R-6	8.1	4.7	8.1	4.8	-	-	-	-	-	-	8.1	4.8	-	-	-	-	-	-	-	-
R-8	8.3	4.8	8.3	4.8	-	-	-	-	-	-	8.3	4.8	-	-	-	-	-	-	-	-
R-9	7.8	4.5	7.8	4.5	-	-	-	-	-	-	7.8	4.5	-	-	-	-	-	-	-	-
R-10	8.2	4.7	8.2	4.7	-	-	-	-	-	-	8.2	4.7	-	-	-	-	-	-	-	-
R-11	8.3	4.8	8.3	4.8	-	-	-	-	-	-	8.3	4.8	-	-	-	-	-	-	-	-
R-13	7.7	4.4	7.7	4.4	-	-	-	-	-	-	7.7	4.4	-	-	-	-	-	-	-	-
R-14	8.8	5.1	8.8	4.9	-	-	-	-	-	-	8.8	4.9	-	-	-	-	-	-	-	-

NOTES: 1-hour average CO concentrations include a 7.5-ppm background concentration. Worst case (a.m. or p.m.) shown.
8-hour average concentration include a 4.3-ppm background concentration.
The S/NAAQS for the 1-hour average is 35.0 ppm.
The S/NAAQS for the 8-hour average is 9.0 ppm.

TABLE IV-12 (cont)
CO CONCENTRATION (ppm) in 2020
MD 210: From I-95/I-495 to MD 228

Receptor	Alternative 5A																			
	No Build		Opt. 1A		Opt. 1B		Opt. 1C		Opt. 1D		Opt. 2A		Opt. 2B		Opt. 2C		Opt. 2D		Opt. 2E	
	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR
R-15	8.2	4.6	8.1	4.6	-	-	-	-	-	-	8.1	4.5	-	-	-	-	-	-	-	-
R-17	8.1	4.7	8.1	4.6	-	-	-	-	-	-	8.1	4.6	-	-	-	-	-	-	-	-
R-18	8.8	5.3	9.1	5.1	-	-	-	-	-	-	9.1	5.1	-	-	-	-	-	-	-	-
R-19	8.5	4.9	8.5	4.9	-	-	-	-	-	-	8.7	4.8	-	-	-	-	-	-	-	-
R-20	8.4	4.8	8.5	4.7	-	-	-	-	-	-	8.5	4.7	-	--	-	-	-	-	-	-
R-21	9.1	5.6	9.2	5.5	-	-	-	-	-	-	9.4	5.4	-	-	-	-	-	-	-	-
R-22	8.0	4.7	8.0	4.6	-	-	-	-	-	-	8.1	4.6	-	-	-	-	-	-	-	-
R-24	8.8	5.0	9.2	5.0	-	-	-	-	-	-	8.4	4.6	-	-	-	-	-	-	-	-
R-25	8.1	4.6	8.3	4.6	-	-	-	-	-	-	7.9	4.5	-	-	-	-	-	-	-	-
R-26	8.3	4.8	8.5	4.8	-	-	-	-	-	-	8.3	4.6	-	-	-	-	-	-	-	-
R-28	8.2	4.8	8.4	4.7	-	-	-	-	-	-	-	-	-	-	8.4	4.8	8.4	4.8	-	-
R-29	9.0	5.3	9.7	5.4	-	-	-	-	-	-	-	-	-	-	8.8	5.1	8.8	5.0	-	-
R-30	8.8	5.0	8.9	5.0	-	-	-	-	-	-	-	-	-	-	8.6	5.0	8.6	4.9	-	-
R-31	8.5	4.7	8.3	4.7	-	-	-	-	-	-	-	-	-	-	8.2	4.8	8.1	4.7	-	-
R-32	8.6	4.9	8.7	4.9	-	-	-	-	-	-	-	-	-	-	8.6	5.0	8.6	4.9	-	-
R-33	8.7	4.9	8.9	4.9	-	-	-	-	-	-	-	-	-	-	8.5	4.9	8.5	4.8	-	-
R-34	8.3	4.7	8.2	4.7	-	-	-	-	-	-	-	-	-	-	8.2	4.7	8.2	4.7	-	-
R-35	7.9	4.5	8.1	4.6	-	-	-	-	-	-	-	-	-	-	8.1	4.7	8.1	4.6	-	-
R-36	8.8	5.0	8.8	4.9	-	-	-	-	-	-	-	-	-	-	9.2	5.3	9.2	5.4	-	-
R-37a	9.4	5.4	9.6	5.3	-	-	-	-	-	-	8.8	4.6	-	-	-	-	-	-	-	-

NOTES: 1-hour average CO concentrations include a 7.5-ppm background concentration. Worst case (a.m. or p.m.) shown.
8-hour average concentration include a 4.3-ppm background concentration.
The S/NAAQS for the 1-hour average is 35.0 ppm.
The S/NAAQS for the 8-hour average is 9.0 ppm.

TABLE IV-12 (cont)
CO CONCENTRATION (ppm) in 2020
MD 210: From I-95/I-495 to MD 228

Receptor	Alternative 5A																			
	No Build		Opt. 1A		Opt. 1B		Opt. 1C		Opt. 1D		Opt. 2A		Opt. 2B		Opt. 2C		Opt. 2D		Opt. 2E	
	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR
R-37b	8.3	4.7	8.6	4.8	-	-	-	-	-	-	8.2	4.5	-	-	-	-	-	-	-	-
R-38	8.4	4.9	8.6	4.9	-	-	-	-	-	-	8.6	4.7	-	-	-	-	-	-	-	-
R-39	8.5	4.9	8.9	5.0	-	-	-	-	-	-	8.8	4.8	-	-	-	-	-	-	-	-
R-40	8.2	4.8	8.4	4.8	8.5	4.8	-	-	-	-	-	-	-	-	-	-	8.1	4.6	8.1	4.6
R-41	9.6	5.7	9.8	5.5	9.9	5.4	-	-	-	-	-	-	-	--	-	-	8.6	4.9	8.6	5.0
R-42	9.3	5.4	9.9	5.5	-	-	-	-	-	-	-	-	-	-	9.0	5.1	8.9	5.1	-	-
R-43	8.9	5.3	10.0	5.5	-	-	-	-	-	-	-	-	-	-	8.5	4.8	8.6	4.8	-	-
R-44	9.1	5.3	10.2	5.6	-	-	-	-	-	-	-	-	-	-	8.9	5.0	8.9	5.0	-	-
R-46	9.5	5.5	8.6	4.8	8.6	4.8	9.5	5.3	9.5	5.3	8.6	4.8	8.6	4.8	9.5	5.3	9.5	5.3	-	-
R-47	8.4	4.8	8.9	4.9	-	-	-	-	-	-	-	-	-	-	8.0	4.5	8.0	4.5	-	-
R-48	10.3	6.2	12.6	6.7	-	-	-	-	-	-	-	-	-	-	8.6	4.9	8.6	4.8	-	-
R-49	8.8	5.1	9.1	5.1	-	-	-	-	-	-	9.1	5.1	-	-	-	-	-	-	-	-
R-50	9.3	5.4	9.0	5.1	-	-	-	-	-	-	9.0	5.1	-	-	-	-	-	-	-	-
R-51	10.2	6.2	9.1	5.1	-	-	-	-	-	-	9.1	5.1	-	-	-	-	-	-	-	-
R-52	8.9	5.2	8.3	4.7	-	-	-	-	-	-	8.3	4.7	-	-	-	-	-	-	-	-
R-53	9.0	5.2	9.0	5.1	-	-	-	-	-	-	9.0	5.1	-	-	-	-	-	-	-	-
R-54	8.3	4.8	8.8	4.9	-	-	-	-	-	-	8.8	4.9	-	-	-	-	-	-	-	-
R-55	9.1	5.4	8.8	4.9	-	-	-	-	-	-	8.8	4.9	-	-	-	-	-	-	-	-
R-56	8.7	5.1	9.8	5.5	-	-	-	-	-	-	9.8	5.5	-	-	-	-	-	-	-	-

NOTES: 1-hour average CO concentrations include a 7.5-ppm background concentration. Worst case (a.m. or p.m.) shown.
8-hour average concentration include a 4.3-ppm background concentration.
The S/NAAQS for the 1-hour average is 35.0 ppm.
The S/NAAQS for the 8-hour average is 9.0 ppm.

TABLE IV-12 (cont)
CO CONCENTRATION (ppm) in 2020
MD 210: From I-95/I-495 to MD 228

Receptor	Alternative 5A																			
	No Build		Opt. 1A		Opt. 1B		Opt. 1C		Opt. 1D		Opt. 2A		Opt. 2B		Opt. 2C		Opt. 2D		Opt. 2E	
	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR	1-HR	8-HR
R-57	9.7	5.5	9.5	5.2	-	-	-	-	-	-	9.5	5.2	-	-	-	-	-	-	-	-
R-58	8.6	5.0	8.9	5.1	-	-	-	-	-	-	8.9	5.1	-	-	-	-	-	-	-	-
R-59	9.3	5.6	10.1	5.7	-	-	-	-	-	-	10.1	5.7	-	-	-	-	-	-	-	-
R-60	9.5	5.4	9.1	5.1	-	-	-	-	-	-	9.1	5.1	-	-	-	-	-	-	-	-
R-61	8.5	4.8	8.4	4.7	-	-	-	-	-	-	8.4	4.7	-	--	-	-	-	-	-	-
R-62	9.5	5.1	9.1	5.1	-	-	-	-	-	-	9.1	5.1	-	-	-	-	-	-	-	-
R-63	9.9	5.5	9.9	5.6	-	-	-	-	-	-	9.9	5.6	-	-	-	-	-	-	-	-
R-64	8.2	4.5	8.0	4.6	-	-	-	-	-	-	8.0	4.6	-	-	-	-	-	-	-	-
R-65	8.3	4.7	8.2	4.7	-	-	-	-	-	-	8.2	4.7	-	-	-	-	-	-	-	-
R-67	8.5	4.7	8.6	4.9	-	-	-	-	-	-	8.6	4.9	-	-	-	-	-	-	-	-
R-68	8.6	4.9	8.3	4.7	-	-	-	-	-	-	8.3	4.7	-	-	-	-	-	-	-	-
R-69	9.5	5.7	9.7	5.3	-	-	-	-	-	-	9.7	5.3	-	-	-	-	-	-	-	-
R-70	10.8	5.3	9.6	5.4	-	-	-	-	-	-	9.6	5.4	-	-	-	-	-	-	-	-
R-71	10.3	5.2	9.8	5.4	-	-	-	-	-	-	9.8	5.4	-	-	-	-	-	-	-	-
R-72	10.7	5.9	9.8	5.6	-	-	-	-	-	-	9.8	5.6	-	-	-	-	-	-	-	-
R-73	10.4	6.4	9.4	5.3	-	-	-	-	-	-	9.4	5.3	-	-	-	-	-	-	-	-
PC-1	8.2	4.9	8.2	4.8	-	-	-	-	-	-	8.3	4.8	-	-	-	-	-	-	-	-
FW-1	9.2	5.2	9.0	5.1	-	-	-	-	-	-	-	-	-	-	8.7	5.0	8.9	5.0	-	-
BC-1	8.2	4.8	8.7	4.9	8.7	4.9	-	-	-	-	-	-	-	-	-	-	8.9	4.9	8.8	5.0
H-1	9.2	5.5	9.2	5.1	9.0	5.1	9.1	5.1	9.4	5.2	9.2	5.1	9.0	5.1	9.2	5.1	9.4	5.2	-	-

NOTES: 1-hour average CO concentrations include a 7.5-ppm background concentration. Worst case (a.m. or p.m.) shown.
8-hour average concentration includes a 4.3-ppm background concentration.
The S/NAAQS for the 1-hour average is 35.0 ppm.
The S/NAAQS for the 8-hour average is 9.0 ppm

1. Scoping for the SCEA

a. Description of the Resources Addressed by the SCEA

An initial step in the SCEA process is to identify the resources for which secondary and cumulative effects are to be assessed. The list of resources considered in this SCEA is primarily based on those resources which would be directly impacted by the build alternatives under consideration and includes surface waters, 100-year floodplains, wetlands, woodlands, prime farmland and parklands.

b. Description of the SCEA Boundary

The geographic boundary for secondary and cumulative effects analyses, referred to as the SCEA boundary, is based on a number of sub-boundaries. The sub-boundaries that were considered in establishing the SCEA boundary for this project are shown on Figures IV-10 to IV-13 along with the SCEA boundary. The following sub-boundaries were considered: the project area (the extent of the SHA-Selected Alternative under consideration), the area of traffic influence, census tracts and block groups, planning areas and watersheds/sub-watersheds.

The concept behind "the area of traffic influence" can be explained as follows. The geographic extent to which a project would affect traffic levels on the nearby roadways defines the overall area in which the project would have an influence on the traffic. The Area of Traffic Influence for the MD 210 Multi-Modal Study encompasses an area approximately 60 square miles in size, bordered roughly by the Potomac River on the west, the Capital Beltway on the north, the Charles County line on the south and a line on the east side that is parallel to and approximately three miles west of MD 5. The area is defined using Traffic Analysis Zones (TAZ) included in the Metropolitan Washington Council of Governments (MWCOG) Regional Travel Demand Model. Six zones (1183, 1185, 1186, 1187, 1260 and 1261) were selected based on review of general model output generated as part of the MD 210 Multi-Modal study for the No-Build Alternative and Alternative 5B (since dropped from consideration). Model output for these two alternatives were analyzed, and any TAZ within which a coded roadway (i.e., arterial or collected) indicated a 10% and 1,000 vehicle per day traffic volume difference between the two alternatives was considered part of the Area of Traffic Influence.

The overall SCEA boundary is a synthesis of the aforementioned sub-boundaries. The project's SCEA boundary encompasses the project area, as well as the area of traffic influence. Portions of areas where sewer and/or water service is not planned are contained within the SCEA

boundary. The sewer and water service sub-boundary did not have a major influence when synthesizing all of the sub-boundaries considered in establishing the SCEA boundary.

The SCEA boundary lies within Subregions V and VII in Prince George's County and extends into the northern portion of Charles County. The following rationale was applied in determining the limits of the SCEA boundary. A detailed description of the boundary is provided afterwards (Refer to Figures IV-10 to IV-13). The northern portion of the SCEA boundary follows census tract boundaries which also coincide with the northern limit of the area of traffic influence. By selecting this as the northern limit, the SCEA boundary encompasses the northern project limits and synthesizes with the Potomac River Watershed boundary. The western portion of the SCEA boundary again follows census tract boundaries, coinciding with the western limit of the area of traffic influence. This western limit encompasses the portion of the Potomac River receiving runoff from the project area's watersheds. The southern portion of the SCEA boundary follows the Mattawoman Creek watershed boundary, a project area watershed. This portion also encompasses the northern portion of Charles County where MD 210 terminates. The eastern portion of the SCEA boundary is a synthesis of census tract and census block group boundaries, the eastern limit of the area of traffic influence and Prince George's County planning area boundaries. The area of traffic influence has a major influence in establishing the eastern limit of the SCEA boundary. The project's SCEA boundary is described in detail below (Refer to Figures IV-10 to IV-13).

- Beginning at the northeastern extremity of the SCEA boundary, at I-95/I-495, the SCEA boundary runs southwesterly, following the boundaries of 1990 Census Tracts 8017.02, 8014.05 and 8014.03 along the Capital Beltway.

- It then runs southerly then westerly, following the boundaries of Census Tracts 8014.03 and 8013.98 along the western shore of the Potomac River.

- Continuing southwesterly into Charles County, the SCEA boundary follows the boundaries of Census Tracts 8501.00 and 8502.02 and crosses the Potomac River to Indian Head following the boundaries of Census Tracts 8502.02 and 8502.01.

- It then continues southwesterly, following the Mattawoman Creek watershed boundary along the Potomac River shoreline.

- Leaving the Potomac River shoreline, the SCEA boundary runs northeasterly, in general, following the Mattawoman Creek watershed boundary to Census Tract boundary 8507.3 at Waldorf, outside the area of traffic influence.

- It then runs northeasterly along the boundaries of Census Tracts 8507.03 and 8507.02 to the boundary of Census Block Group 8507.02.1.

- The SCEA boundary then runs northwesterly and northerly, following the boundaries of Census Block Groups 8507.02.1 and 8507.02.3 to the Charles County line.

- Continuing northerly into Prince George's County, the SCEA boundary follows the boundary of Census Tract 8013.01, runs along the boundary of the area of traffic influence for a short distance, then follows the boundary of Census Tract 8013.01 to the boundary of Planning Area 81B.

- It then runs northerly, in general, following the boundary of Planning Area 81B to the boundary of Census Block Group 8012.04.2.

- The SCEA boundary continues northwesterly to the beginning point, following the boundaries of Census Block Group 8012.04.2 and Census Tracts 8014.01, 8017.01 and 8017.02.

c. Temporal Limits of the SCEA

As part of the scoping process, a time frame is defined for the analysis of secondary and cumulative effects. The following events were considered in establishing the time frame for the SCEA which begins in 1966 and is projected through the design year 2020.

- 1945 - MD 210 was constructed as a 2-lane roadway.

- 1966 - The northern portion of MD 210, from Fort Washington Road to the north, was dualized to 4-lanes.

- 1986 - The portion of MD 210, from Fort Washington Road to MD 373, was dualized to 4-lanes.

- 1989 - The interchanges were upgraded at I-95/I-495 and MD 210, and at I-95/I-495 and I-295.

- 1992 - The portion of MD 210, from Old Fort Road North to the north, was widened to 6-lanes.

- 1996 - The portion of MD 210, from Old Fort Road North to MD 228, was widened to 6-lanes.