# IV. ENVIRONMENTAL CONSEQUENCES

This section of the FEIS presents the results of the detailed environmental impact studies conducted for the No-Build Alternate (Alternate 1), the four Build Alternates (Alternate 5C, Alternate 7, Alternate 8A, and Alternate 8B) that were recommended to be carried forward in the DEIS and Alternate 7 Modified, which is SHA's Selected Alternate for the MD 97 Brookeville Project, as described in **Section II.** The five Build Alternates addressed in the FEIS are located on **Figure II-2**.

SHA's Selected Alternate, Alternate 7 Modified, is similar to Alternate 7 except that Alternate 7 Modified is shifted approximately 30-40 feet in a westerly direction through the Reddy Branch Stream Valley Park to minimize impacts to the Newlin/Downs Mill Complex archeological site. A retaining wall will be placed on the south side of Brookeville Road, east of the roundabout to further minimize impacts to the Newlin/Downs Mill Complex. Alternate 7 Modified has a design speed of 40 miles per hour and an open typical section, which consists of two 11-foot lanes and two 10-foot shoulders (five feet paved for bicycle compatibility and five feet graded). The SHA has selected the open section because existing MD 97 is an open section and this is consistent with both the northern and southern tie-ins with existing MD 97 **(Figure II-1)**. Access will be limited to two roundabouts (at Brookeville Road and the southern termini) **(Figure II-2)**. Cost of the SHA Selected Alternate 7 Modified is estimated at $12.5 million.

Potential impacts of the five Build Alternates including the SHA Selected Alternate 7 Modified to existing socio-economic, cultural, natural, and manmade features, as described in **Section III**, are discussed in the following sections. In addition, a comparison of the impacts between the two typical sections developed to minimize many of these impacts is included. A discussion of the No-Build Alternate is also included. Detailed impacts were assessed in accordance with applicable laws and regulations for each of the environmental resources evaluated. Where appropriate, avoidance, minimization, and mitigation strategies are described. The extent of potential project impacts as described in this section, as well as further opportunities to avoid and minimize impacts, will be refined during the project's design phase.

## A. SOCIAL, ECONOMIC, AND LAND USE

### 1. Social Impacts

#### a. Residential Property Impacts/Displacements

The No-Build Alternate would not result in any residential, commercial, or farm displacements, nor would it require any ROW. SHA's Selected Alternate 7 Modified would not require any residential, commercial, or farm displacements, but would require 14.57 acres of ROW acquisition.

Alternate 5C would require five residential displacements, all associated with the Sunnymeade Community, which is comprised of five residences located east of the corporate boundaries of Brookeville and south of Brighton Dam Road **(Figure II-3A)**. Three undeveloped lots planned for in the Brookeville Farms Subdivision off Lubar Drive south of Bordly Drive would also be impacted **(Figure II-3B)**. Compared to the 14.57 acres of ROW needed for the SHA Selected Alternate, the Open Section for Alternate 5C requires a total of 42.40 acres of ROW for property acquisition. Alternate 7, Alternate 8A, and Alternate 8B **(Figures II-4A to II-6B)** would not require any residential displacements, but would require 11.70 acres, 15.30 acres, and 16.82 acres of ROW, respectively, for the open typical section.

In comparison to Alternate 5C, no residences or businesses would be displaced by SHA's Selected Alternate 7 Modified. SHA's Selected Alternate would require ROW from 11 properties, which are primarily, wooded lots and open fields. Alternate 8A and Alternate 8B would affect 14 properties, but would not require any displacements. Alternate 5C would affect 21 properties in addition to the five residential relocations **(Figure II-3A)**.

***Title VI Statement***

It is the policy of the SHA 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 handicap, or sexual orientation in all SHA projects funded in whole or in part by the FHWA. SHA will not discriminate in highway planning, design, or construction; the acquisition of ROW; 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 SHA for investigation.

### b. Environmental Justice

Environmental Justice, as previously defined in **Section III** of this document, assesses the potential for a project to incur "disproportionately high and adverse impacts" on minority and low-income populations. It also affords the opportunity for these groups to become more involved in the public participation process. According to the 2000 US Census, two percent of the families in Census Tract 7013.04 were below the poverty level in 1999, and one percent was below the poverty level in Census Tract 7013.09 (US Census Bureau, 2001). Census Tract boundaries are shown on **Figure III-4** and **Figure III-5** in **Section III** of this FEIS.

In the Town of Brookeville there were two families and six individuals having poverty status in 1999. According to the 2000 US Census, 12 percent of the population in Census Tract 7013.04 are minorities and 20 percent of the population in Census Tract 7013.09 are minorities. In the Town of Brookeville, however, only 2.5 percent of the population are minorities. The SHA Selected Alternate would not require any residential or business displacements, therefore, no disproportionately high and adverse impacts would occur to minority and/or low-income populations as a result of the proposed project.

### c. Effects on Community Facilities and Services

None of the Build Alternates, including SHA's Selected Alternate, would require ROW or impact any educational or health care related facilities in the project area as described in **Section III.B** and located on **Figure III-6**. The four religious facilities within the project area would not be affected by any of the alternates, including SHA's Selected Alternate, particularly since the main services are held at an off-peak time as it relates to traffic (i.e., Sunday morning). None of the proposed alternates, including the SHA's Selected Alternate, would require property from the Brookeville Community Center.

The Build Alternates including SHA's Selected Alternate would allow for improved access for safe passage of emergency vehicles within and around the Town of Brookeville. This is mainly a result of the strategic placement of the proposed roundabouts at Brookeville Road and Georgia Avenue. Emergency response times outside of Town would also be reduced because the vehicles would have a more efficient and easier passage to reach their destination. All of the Build Alternates would have the potential to improve local school bus patterns and access to community facilities in the project area, by alleviating the traffic congestion and delays currently experienced by the residents of the Town of Brookeville.

Because the Build Alternates would require ROW from Reddy Branch Stream Valley Park and Hawlings River Stream Valley Park, which are publicly owned public parks, a separate Section 4(f) Evaluation has been prepared to evaluate prudent and feasible alternates to the use of such property **(Section V)**. All of the proposed Build Alternates, including the SHA's Selected Alternate, would require ROW from Reddy Branch Stream Valley Park, with Alternate 5C also requiring ROW from the Hawlings River Stream Valley Park.

### *Longwood Community Center*

The No-Build Alternate would not require ROW from the Longwood Community Center. SHA's Selected Alternate, as well as Alternate 7, Alternate 8A, and Alternate 8B, share a common alignment which includes a roundabout that has been shifted away from the Longwood Community Center property owned by M-NCPPC. As a result, the western Build Alternates including SHA's Selected Alternate would require approximately 3.64 acres of M-NCPPC owned lands previously reserved for transportation use and currently used as recreational fields. By tying into existing MD 97 from the east, Alternate 5C would impact approximately 0.65 acre of the M-NCPPC property previously reserved for transportation use.

### *Reddy Branch Stream Valley Park*

The No-Build Alternate would not require ROW acquisition from the Reddy Branch Stream Valley Park. All Build Alternates, including SHA's Selected Alternate, would require ROW from portions of this public park property, as discussed in **Section V** (Section 4(f) Evaluation) of this document. SHA's Selected Alternate would require the use of approximately 5.62 acres (open section) of public park property that is a multi-jurisdictional regional conservation park, which is part of a larger system of regional stream valley parks through Montgomery County. The impacted area would include primarily wooded areas, portions of which are located within the Brookeville Historic District. The four other Build Alternates would require the use of public park property ranging from approximately 2.67 to 6.29 acres (open section) and 2.54 to 5.64 acres (closed section) **(Table V-1** in **Section V)**. Impact minimization and mitigation opportunities for Reddy Branch Stream Valley Park are identified in **Section V.G** and **Section V.H** of the Section 4(f) Evaluation.

### *Hawlings River Stream Valley Park*

The No-Build Alternate, SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B would avoid the Hawlings River Stream Valley Park. Only Alternate 5C would impact this park (1.88 acres open section/1.26 acres closed section) (**Table V-2** in **Section V**) where it would connect back into MD 97 at the northern project limit approximately 2,000 feet north of Bordly Drive **(Figure II-2B** and **V-6B)**. The impacted acreage consists primarily of open fields and woodland fronting MD 97.

### d. Disruption of Neighborhoods and Communities

The Brookeville Comprehensive Plan considers the proposed improvements to MD 97 as "critical to retaining the town's quality of life and historic character" (Brookeville Planning Commission, 1994). Existing and proposed commuter and truck traffic along MD 97 and the horizontal geometry of the road through Brookeville currently have a negative impact on the community and reduce the efficiency and safety of traffic flow on MD 97. Therefore, the No-Build Alternate would not address these quality of life issues for the Town of Brookeville and the community.

The western alignments of SHA's Selected Alternate 7 Modified, Alternate 7, Alternate 8A, and Alternate 8B would not disrupt any neighborhoods or communities. **Figure II-2** depicts the location of each alternate in relation to the neighborhoods in the project area.

For the eastern alignment Alternate 5C, the entire small community of Sunnymeade located just south of Brighton Dam Road would be displaced including five residences **(Figure II-3A)**. North of Brighton Dam Road and east of the corporate boundary of Brookeville, Alternate 5C would traverse through three lots of Brookeville Farms on the east side of the alignment and come within 200 feet of the back property boundaries of homes on the west side of the Alternate 5C alignment **(Figure II-3B)**. Within the same subdivision, Alternate 5C would span Lubar Drive to allow the approximate eight residences bisected by the alignment to access the remainder of the subdivision. The proximity of Alternate 5C to Brookeville Farms would increase the ambient noise levels for these residents **(Section IV-L)** and would impact the visual environment of the subdivision.

### e. Effects on Access to Services and Facilities

The No-Build Alternate would not directly impact existing access to services and facilities within the study area, as described in **Section III** and located on **Figure III-6**. Indirectly, because of the increase in traffic, residents may have to restrict their travel within the Town of Brookeville to certain times of the day when traffic is less congested in order to avoid long delays.

All of the Build Alternates, including SHA's Selected Alternate, would require an alteration to traffic patterns in the study area. As discussed in **Section II**, these alterations are due to the bypass nature of the alignments that would be mitigated by the addition of roundabouts at both ends of the project **(Figure II-2)**. All of the Build Alternates would have the potential to improve local traffic patterns and access to services and facilities in the project area, by alleviating the traffic congestion and delays currently experienced by the residents of the Town of Brookeville.

## 2. Economic Impacts

### a. Effects on Regional Business Activities

Access to adequate transportation facilities for the movement of goods and services is a very important factor to businesses. The No-Build Alternate may ultimately have a negative impact to regional business activities as traffic projections reveal a more congested MD 97 in the future. Regional business activities would benefit from any of the five Build Alternates, including SHA's Selected Alternate, because they are designed to improve the efficiency of through-traffic flow by improving the overall operational characteristics of the roadway.

This project would serve a localized need for congestion relief, and would cause minimal effects from a regional employment standpoint. However, because there is considerable regional through-traffic on MD 97, commuters would experience an improved travel time with any of the Build Alternates, including SHA's Selected Alternate, as compared to the No-Build Alternate.

### b. Effects on Local Businesses

Neither the No-Build Alternate, SHA's Selected Alternate, Alternate 7, Alternate 8A, or Alternate 8B would adversely impact the existing businesses within the project area. Alternate 5C would require the acquisition of Billingsley Magnetics, which is located in the Sunnymeade Community east of the corporate boundaries of Brookeville and south of Brighton Dam Road **(Figure II-3A)**. Billingsley Magnetics currently has nine employees. This business is also a private residence.

Brookeville has eight businesses along MD 97, and the only business that depends on "drive-by" patrons is the Brookeville Farms Nursery, which typically has ten or less employees. **(Figure III-6)**. According to the supervisor of the nursery, this company receives 90 percent of their business from "drive-by" patrons (Interview with John Fritz, 1997). While separating local traffic from through-traffic would be beneficial to both local and regional drivers, businesses that depend on "drive-by" travelers for their patronage could be negatively affected by an off-line alignment. Of the Build Alternates, only Alternate 5C, would divert traffic away from the Brookeville Farms Nursery. The western Build Alternates including SHA's Selected Alternate tie back into existing MD 97 south of Brookeville Farms Nursery, and would not divert potential customers away from the business. It does not appear that the remaining businesses in Town would be adversely impacted by diverted through-traffic, given the nature of their business providing local services **(Figure III-6)**.

Two farm operations may be affected by the Build Alternates. Alternate 5C would impact croplands associated with the Camp Bennett property. The cropland, currently in hay production, is leased to a local farmer. Alternate 5C would impact the cropland, however, based on coordination with the land owner, operations would continue to be viable. All three western alternates, including SHA's Selected Alternate, would result in minimal impacts to farmland operations. These impacts would be limited to the edge of the Nash Farm corn production immediately adjacent to MD 97. Farmland operations would remain viable in this area.

From a local perspective, none of the Build Alternates, including SHA's Selected Alternate, would cause a change in the employment conditions. However, all of the Build Alternates, including SHA's Selected Alternate, would provide a safer roadway along existing MD 97 for commuters to travel to their places of employment within the immediate project area as compared to the No-Build Alternate.

### c. Effects on Tax Base

The No-Build Alternate would not have an adverse impact to the tax base of the project area. SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B would not be expected to adversely impact the tax base of the project area. Alternate 5C would have the most potential to impact the tax base of the project area due to the number of associated relocations (5 residential and 1 business).

## 3. Land Use

### a. Existing

The No-Build Alternate would not impact the existing land use in the project area **(Figure III-8)**. Each of the Build Alternates, including SHA's Selected Alternate, would convert acreage from the existing farmland (Nash Farm or Camp Bennett), open space, recreational, and forested lands to transportation use **(Figure III-7)**; however, no secondary changes to land use are planned or anticipated for the proposed project. **Section O** discusses the secondary and cumulative impacts that could be incurred to land use as a result of the MD 97 Brookeville Project. In addition, the MDP has commented that the SHA Selected Alternate 7 Modified best minimizes the potential of encouraging secondary sprawl development while meeting the Purpose and Need of the MD 97 Brookeville Project (**Section VI**, MDP July 3, 2003 letter).

### b. Future

The No-Build Alternate is not compatible with the 1994 Brookeville Comprehensive Plan or the 1980 Olney Master Plan. All of the Build Alternates, except Alternate 5C, are considered compatible with the local comprehensive plans. No unplanned changes to future land use are anticipated because of any of the Build Alternates **(Figure III-6)**, although Alternate 5C would impact the neighboring community of Sunnymeade.

SHA's Selected Alternate includes provisions to comply with the Maryland Planning Act of 1992 and Maryland's Smart Growth Areas Act. Under the Maryland Planning Act, local commissions are required to make recommendations for streamlining of development regulations in areas designated for growth. In addition, local commissions were required to enact a sensitive area element containing goals and standards to protect sensitive areas from the adverse impacts of development. Maryland's Smart Growth Areas Act requires the state to direct funding for growth-related projects to areas designated by local jurisdictions as PFAs. Since this project is located outside of a PFA, it may be subject to an exception, which must be approved by the Board of Public Works. This approval must occur before the project can be funded for subsequent phases of development such as design, ROW acquisition, or construction.

An agreement with local elected officials, MDOT, and the Governor's office, set four specific criteria, discussed in **Section A.3.b**, to be met for design and construction of the project. Following this agreement, the MD 97 Brookeville Project was included in the FY 2003-2008 Maryland Consolidated Transportation Program for Project Planning.

In response to these conditions, Montgomery County amended their Annual Growth Policy on April 6, 1999 to discourage sprawl development as well as additional capacity for new development beyond the boundary of the Town of Brookeville as it relates to proposed bypass. SHA's Selected Alternate would incorporate a permanent easement along the roadway corridor that would be held by a third party. Any third party easements would be within SHA's ROW, possibly between the hinge point and the ROW. Along Reddy Branch, an easement may not be required since it is already parkland. The MDP has commented that the SHA Selected Alternate 7 Modified best minimizes the potential of encouraging secondary sprawl development while meeting the Purpose and Need of the MD 97 Brookeville Project, and recommended that MDOT, SHA, and MDP discuss the steps necessary for submittal of this project to the State Board of Public Works (See **Section VI**, MDP July 3, 2003 letter). In response, a Letter of Commitment, dated July 29, 2003, was submitted by SHA to MET for signature **(Section VI)**.

### 4. Visual Quality

The No-Build Alternate would have no effect on the existing visual quality of the project area. The DEIS Build Alternates and SHA's Selected Alternate would alter the existing setting of Brookeville in varying degrees including adverse visual effects on the Brookeville Historic District. For this reason, the project's MOA in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, includes a stipulation that SHA will design a landscape plan to reduce the visual intrusion of Alternate 7 Modified on the historic district. The Longwood Community Center and Reddy Branch Stream Valley Park would also experience an altered visual setting with the Build Alternates. In the case of the Longwood Community Center, it is already located adjacent to existing MD 97 and thus, the corner of property required for the proposed alternates would be in closer proximity to the facility but would not be a notable change from the existing visual landscape **(Figure III-6).** Visual impacts are anticipated for a portion of Reddy Branch Stream Valley Park for each of the western alternates including SHA's Selected Alternate. The impacts associated with SHA's Selected Alternate will be minimal and are limited to the portion of the park to the west of Town. This is where the park includes a portion of the historic district and implementation of the Section 106 stipulated landscape plan would also benefit park users and residents in town. Impacts to the communities to the west of SHA's Selected Alternate will be minimized due to the existing steep topography associated with the stream valley including the extensive forest cover within this portion of Reddy Branch Stream Valley Park.

Construction activity and materials storage for the project could have a negative aesthetic effect in the area immediately surrounding the project; however, this would be temporary and should pose no notable long-term impact. Mitigation in the form of landscaping using vegetation that is compatible with existing forest conditions in the area would be used to reduce negative intrusions into the surrounding viewsheds.

## B. CULTURAL RESOURCES

The requirements of the National Historic Preservation Act of 1966, as amended, are implemented in 36 CFR 800. The National Historic Preservation Act regulates the ACHP and establishes the procedures for compliance with Section 106 of the National Historic Preservation Act. If historic properties listed in, or determined eligible for, the National Register are identified (36 CFR 800.4), the sponsoring agency must assess how its project will affect them. Throughout this assessment, the agency should work with the SHPO and consider the views of others, such as representatives of local governments, property owners, members of the public, and the ACHP. The agency's assessment should use the criteria found in the ACHP'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, any 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."

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

(i) Physical destruction of or damage to all or part of the property;
(ii) 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;
(iii) Removal of the property from its historic location;
(iv) Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;
(v) Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;
(vi) 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
(vii) 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.

In consultation with the SHPO, the FHWA has identified five cultural resources including two historic properties and three archeological sites within in the APE for the MD 97 Brookeville Project. FHWA consulted with the SHPO and others - Montgomery Preservation, Inc., Montgomery County Historic Preservation Commission - to determine the potential effects of the project on the historic properties. The SHPO determination of effects on cultural resources is documented in letters dated May 5, 1998, April 16, 2001, and May 24, 2001 (signed July 20, 2001). On November 6, 2002, the SHPO concurred with SHA's recommendation of adverse effect that would result from SHA's Selected Alternate **(Section VI)**.

### 1. Historic Sites

Two historic properties/districts are currently within the APE for the No-Build, SHA's Selected Alternate, Alternate 7, Alternate 5C, Alternate 8A, and Alternate 8B. These include Bordley's Choice and Brookeville Historic District **(Figure III-9)**.

#### a. Brookeville Historic District

The No-Build Alternate would have the potential for adverse impacts to the Brookeville Historic District due to commuter through traffic that would continue to deteriorate the quality of life in the historic Town of Brookeville. The continually increasing traffic volumes impair traffic operations and safety on existing MD 97 and degrades the historic character of the Town.

Coordination with the SHPO indicated that each of the Build Alternates would have an adverse effect on the Brookeville Historic District. Because the project would traverse a small portion of the District, it is the opinion of the SHPO that impacts could not be reduced through the development of landscaping. SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B, would adversely effect approximately 1.7, 2.2, 1.8, and 2 acres of ROW, respectively, within the District through the acquisition of property for construction of the project (**Table V-3** in Section 4(f) Evaluation). This includes the Oakley Cabin trail which paralleled an old millrace for the Newlin's Mill in Brookeville and was used by people who lived in the community and worked at Newlin's Mill, as described in Section III. A small portion of the trail within the project impact area in the vicinity of the four western alternate alignments (Alternate 7, Alternate 8A, Alternate 8B, and the SHA Selected Alternate 7 Modified) has recently been cleared by M-NCPPC and is considered to be man-made and not historic.

Although Alternate 5C would completely avoid ROW acquisition from the Brookeville Historic District **(Figure III-9),** it has an adverse impact to the viewshed of the District. An adverse effect determination was requested and concurred upon by the SHPO.

#### b. Bordley's Choice (M23:66)

This National Register eligible property is located north of Brookeville and just south of a new subdivision **(Figure III-9)**. SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B, would tie into existing MD 97 on the west side of Brookeville, opposite from Bordley's Choice **(Figures III-9)**. At this location, the structures are located to the rear of the extensive property and are well buffered from the roadway by heavy vegetation along the frontage with MD 97. The buildings would be isolated from the alignments by extensive vegetation and differing elevations and thus would be outside of the viewsheds of these alternates. Although SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B, would tie into MD 97 along the frontage of the property, Bordley's Choice would not be adversely impacted. The SHPO concurred that none of the Build Alternates, including SHA's Selected Alternate, would have an adverse effect on Bordley's Choice.

### 2. Archeological Sites

#### a. Site 18MO368 (Newlin/Downs Mill complex)

The core of Site 18MO368, which contains the remains of numerous features including a well, retaining wall, building foundations, mill wheel, and mill race, would be directly impacted by SHA's Selected Alternate, with or without a retaining wall, Alternate 7 and Alternate 8A. Alternate 8B would avoid the core of the mill complex, but would impact the site's mill race extending along Brookeville Road. No direct impacts to the site over 1,000 linear feet would occur under the No-Build or Alternate 5C **(Table IV-1)**.

The SHPO concurred that Phase II evaluation of 18MO368 was warranted to conclusively determine its eligibility to the National Register. Phase II evaluation of the site was conducted in March and April 2002. These investigations determined that Site 18MO368 is significant both individually and as a contributing resource to the Brookeville Historic District. Under the SHA Selected Alternate, 7 Modified with retaining wall, approximately five percent of Site 18MO368 would be impacted. The mill race system would be affected, but not the identified features and significant archeological deposits of the site associated with the mill and miller's house.

Approximately 700 linear feet of the mill race system would be impacted by SHA's Selected Alternate. Phase III data recovery is recommended in the appended draft MOA if the site cannot be avoided during design of SHA's Selected Alternate.

***Table IV-1 Impacts to Components of Newlin/Downs Mills Complex***

| **Components of Site 18MO368** | **Alternate 5C** | **Alternate 7** | **Alternate 7 Modified *without Retaining Wall*** | **SHA's Selected Alternate *with Retaining Wall*** | **Alternate 8A** | **Alternate 8B** |
|---|---|---|---|---|---|---|
| 18MO368 Newlin/Downs Mill Complex | Site is Avoided | 60% of Site's Core | 20% of Site's Core | 5% of Site's Core | 25% of Site's Core | Core of Site is Avoided |
| Mill Worker's House including Stone Retaining Wall and Well | No | Yes | No | No | Yes | No |
| Mill Structure Including Cobble Roadway, Wheel Race/Pit, and Tail Race | No | Yes | Yes | No | No | No |
| C-Shaped Mound (Refuse Disposal Area) | No | Yes | No | No | Yes | No |
| Large Race (Western Race along Reddy Branch) (*linear feet*) | 0 | 600 | 500 | 500 | 800 | 300 |
| Small Race (Southern Race along Reddy Branch) (*linear feet*) | 0 | 200 | 200 | 200 | 200 | 200 |
| Total Mill Race Impacts (*linear feet*) | 0 | 800 | 700 | 700 | 1,000 | 500 |
| Project Costs (*million*) | 34.2 | 12.2 | 13 million | 12.5 million | 13.7 | 18 |

On November 6, 2002 the SHPO concurred with SHA's eligibility evaluations for the archeological sites and confirmed the adverse effect determination on Site 18MO368. The SHPO also concurred that the site can be mitigated through data recovery. Section 4(f) does not apply as the SHPO's concurrence includes agreement that the site does not warrant preservation-in-place.

### b. Site 18MO387 (Pleasant Hill Plantation and Cemetery)

The No-Build, SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B would have no direct impacts to Site 18MO387. The SHPO concurred that Alternate 5C would avoid Site 18MO387, however, protective fencing and archeological monitoring during construction would be warranted to ensure protection from inadvertent disturbance. The ruins of the dwelling and outbuildings are located approximately 453 feet from the edge of the proposed ROW of Alternate 5C. The cemetery is located approximately 33 feet from the edge of the proposed ROW.

### c. Site 18MO460

Site 18MO460 is the remains of a 19th and 20th century domestic occupation associated with the historic village of Brookeville. No direct impacts would occur from the No-Build, SHA's Selected Alternate, Alternate 7, or Alternate 5C. Approximately 95 percent of the site would be impacted by Alternate 8A and Alternate 8B. Prior to the selection of Alternate 7 Modified, the SHPO concurred that Phase II evaluation of 18MO460 was warranted to conclusively determine its eligibility to the National Register.

Phase II evaluation of the site was conducted in March and April 2002. These investigations determined that 18MO460 does not qualify for inclusion on the National Register. Concurrence on these findings by the SHPO was received on November 6, 2002.

### 3. Conclusion

Four historic properties (Brookeville Historic District, Bordley's Choice, 18MO368, and 18MO387) within the APE are listed on, or eligible for, the National Register, or are presumed eligible for Section 106 purposes pending further evaluation under National Register Criterion D. Based upon the SHPO's April 16, 2001 comments, the No-Build Alternate, Alternate 7, Alternate 5C, Alternate 8A, and Alternate 8B, would have adverse effects on cultural resources, including historic standing structures and archeological sites as concurred on by the SHPO April 16, 2001.

Pursuant to 36 CFR 800.6, further consultation with the SHPO to develop modifications to the undertaking that could avoid, minimize, or mitigate adverse effects on historic properties was necessary. The ACHP was notified of the adverse effect finding by FHWA through the provision of documentation specified in 36 CFR 800.11(e).

Due to the adverse effects to historic properties, a Section 106 MOA between SHPO, FHWA, and SHA was drafted to address the effects of the SHA Selected Alternate 7 Modified **(Appendix A** in **Section V)**. The draft MOA was circulated by FHWA to the ACHP in April 2003. On June 3, 2003, the FHWA was notified that the ACHP does not believe that their participation to resolve adverse effects is needed. FHWA agreed with the ACHP. Stipulations of the MOA are as follows:

- SHA will design a landscape plan to reduce the visual intrusion of the SHA Selected Alternate 7 Modified on the historic district.
- SHA will ensure the continuity of the Oakley Cabin Trail in the design of the SHA Selected Alternate 7 Modified.

FHWA will submit a copy of the final MOA, to be processed pursuant to 36CFR800.6(b)(iv) with the ACHP prior to approving the undertaking in order to meet the requirements of Section 106. The executed MOA shall govern the undertaking and all its parts, and FHWA shall ensure that the undertaking is carried out in accordance with the MOA.

## C. TOPOGRAPHY, GEOLOGY, AND SOILS

### 1. Topography and Geology

The No-Build Alternate would not impact topography and geology within the project area. Topography would be moderately impacted by the implementation of the four Build Alternates, including SHA's Selected Alternate, since they all involve the construction of a roadway on a new alignment **(Figure III-10)**. Topography would be altered by the cuts and fills required for the construction of the road and waterway crossings. The amount of disturbance for each alternate approximately correlates to the amount of ROW that would be required for the construction crossings of the road and waterways. Subsequently, due to the length of proposed Alternate 5C and the amount of ROW that would be required, this alternate would impact topography more than the other alternates. The length of each alternate is summarized in **Table IV-2**.

***TABLE IV-2 Total Length and ROW to be Acquired by Alternate***

| Category | Alternate 5C | | Alternate 7 | | SHA's Selected Alternate | Alternate 8A | | Alternate 8B | |
|---|---|---|---|---|---|---|---|---|---|
| | Open Section | Closed Section | Open Section | Closed Section | Open Section | Open Section | Closed Section | Open Section | Closed Section |
| Total Length (miles) | 2.12 | 2.12 | 0.72 | 0.72 | 0.72 | 0.85 | 0.85 | 0.87 | 0.87 |
| ROW to be Acquired (Acres) | 42.40 | 38.98 | 11.70 | 10.97 | 14.57 | 15.30 | 14.19 | 16.82 | 15.24 |

Note: Excludes areas with current road ROWs. Includes M-NCPPC land reserved for transportation use.

Impacts associated with sloping topography are unavoidable as the project area is characterized as having slight to moderate slopes **(Figure III-10)**. Each alternate under consideration would make a crossing of Reddy Branch and its floodplain, which is flanked by slopes of varying degrees. Thus, it can be noted that impacts attributable to steeper slopes, would be generally confined to areas near stream crossings. For any alternate under consideration, impacts from moderate slopes would range from 2.51 to 4.28 acres, and impacts from slopes greater than 25 percent would range from 0.55 to 1.74 acres **(Table IV-3)**.

***TABLE IV-3 Steep Slopes Impacts***

| Category | Alternate 5C (acres) | | Alternate 7 (acres) | | SHA's Selected Alternate (acres) | Alternate 8A (acres) | | Alternate 8B (acres) | |
|---|---|---|---|---|---|---|---|---|---|
| **Steep Slope Percentage** | **Open Section** | **Closed Section** | **Open Section** | **Closed Section** | **Open Section** | **Open Section** | **Closed Section** | **Open Section** | **Closed Section** |
| 0-15% | 40.50 | 38.05 | 10.84 | 10.38 | 11.62 | 13.86 | 13.41 | 15.18 | 13.97 |
| 15-25% | 4.28 | 3.58 | 2.78 | 2.51 | 2.34 | 3.50 | 3.14 | 3.31 | 2.92 |
| 25% or greater | 1.74 | 1.21 | 0.56 | 0.55 | 0.61 | 0.88 | 0.87 | 0.80 | 0.79 |
| **Total** | **46.52** | **42.84** | **14.18** | **13.44** | **14.57** | **18.24** | **17.42** | **19.29** | **17.68** |

Note: Impacts based on ROW widths.

Erosion and sediment control techniques such as infiltration basins, sediment traps, and grass swales would be installed as part of the project. Silt fence would be used to control soil erosion. Areas of exposed soil would be stabilized, either vegetatively or structurally, following MDE sediment and erosion control guidelines. This project would also require a stormwater management plan approved by MDE.

### 2. Soils

The No-Build Alternate would have no effect on the soils of the project area. Each of the proposed Build Alternates, including SHA's Selected Alternate, would require earth disturbances for construction activities. Cut and fill requirements for each alternate would contribute to soil impacts. Approximate amounts of total soil disturbance correlate to the amount of ROW required for each alternate **(Table IV-2)**.

It is anticipated that the Build Alternates would not substantially impact soils. According to the Montgomery County Soil Survey, the only soil type that is considered to have severe erosion potential is 116E. Alternate 8A would intersect this soil type through a very narrow area as part of the westernmost terminus with existing Brookeville Road **(Figure III-11)**. The majority of soils through which SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B pass are defined as having only slight erosion potential. Three soils types (1C, 16D, 116D) are defined as having moderate erosion potential; however, none of these soil types are dominant within the project area. SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B are proposed through a variety of soil types **(Figure III-11)**. All three of these alternates are proposed through portions of soil type 16D, which are soils typically found on steeper slopes. Other soil features identified for soils intersecting these alternates should not significantly affect highway construction. With careful planning and design, soil features such as wetness, frost action, and steep slopes could be overcome so as not to pose major highway construction problems.

Alternate 5C is also proposed through several soil types, none of which is identified as having severe erosion potential. This alternate would pass through soil types 1C and 16D, soils typically found on steep slopes **(Figure III-11)**. Other soil features such as wetness, frost action, slopes, and shrink-swell potential should be carefully considered in the design phase of the project to avoid construction problems.

Because soil erosion and sedimentation may result from construction activities, implementation of erosion control techniques, including infiltration, sediment basins and traps, and silt fencing would assist in controlling run-off to sensitive features such as streams and wetlands. To minimize impacts in wet areas, a mud mat may be used to serve as a platform for construction activities in these areas. All areas of exposed soil would be stabilized as early as possible. MDE would require an approved stormwater management plan for this project, detailing minimization measures such as slope protection structures, stream channel stabilization measures, and establishment of temporary or permanent vegetative cover and mulch on exposed soils. The stormwater management plan would also include water quality considerations for stormwater runoff.

## D. CLIMATE

The climate of the Town of Brookeville and the project area would not be affected by the No-Build Alternate, or the construction of any of the Build Alternates, including SHA's Selected Alternate, associated with the MD 97 Brookeville Project.

## E. FARMLANDS

A farmland assessment was conducted to identify the potential impacts to farmland and Prime and Statewide Important Soils by the proposed Build Alternates. To comply with the Farmland Protection Policy Act of 1981, as amended in 1984, a Farmland Conversion Impact Rating Form (USDA Form AD-1006) has been completed and submitted to the USDA Natural Resources Conservation Service office in Derwood, Maryland for evaluation. A copy of this form along with the rationale for site assessment criteria is included in **Appendix A**.

The No-Build Alternate would not impact farmland. Productive farmland parcels, Prime Farmland Soils and Soils of Statewide Importance would be impacted by all of the proposed Build Alternates **(Figure III-12)**. **Table IV-4** is a summary of the farmland impacts by alternate.

***TABLE IV-4 Summary of Farmland Impacts***

| Category (acres) | Alternate 5C | | Alternate 7 | | SHA's Selected Alternate | Alternate 8A | | Alternate 8B | |
|---|---|---|---|---|---|---|---|---|---|
| | Open Section | Closed Section | Open Section | Closed Section | Open Section | Open Section | Closed Section | Open Section | Closed Section |
| Active Productive Farmland | 9.60 | 10.69 | 0.01 | <0.01 | 0.01 | 0.59 | 0.53 | 1.24 | 0.99 |
| Prime Farmland Soils | 24.19 | 23.21 | 4.84 | 4.25 | 4.53 | 4.90 | 4.75 | 4.64 | 4.33 |
| Soils of Statewide Importance | 5.63 | 4.74 | 1.79 | 1.24 | 1.63 | 3.96 | 3.72 | 5.28 | 4.73 |
| **Total** | **39.42** | **38.64** | **6.64** | **5.50** | **6.17** | **9.45** | **9.00** | **11.16** | **10.05** |

Note: Impacts are based on ROW widths.

The USDA Form AD-1006 provides an evaluation of farmland within the project area and determines if farmland is suitable for protection. The relative value of farmland within each alternate is based solely on the soils found within the area and is expressed on a scale of 0 to 100. The rating indicates if the parcel of farmland can provide sustained productivity compared to other farmland within the jurisdiction. This rating is then combined with the Site Assessment Criteria, based on a scale of 0 to 160, and found in Part VI of the USDA Form AD-1006. The combined score of the relative value and the site assessment criteria must be less than 160 for farmland to be given a minimal level of consideration for protection. All of the alternates fall below 160 and are not regarded as the most suitable farmlands for protection.

SHA's Selected Alternate and Alternate 7 would impact the least amount of active farmland, with 0.01 acre of impact to one farmland parcel - the Nash Farm. Active farmland impacts for SHA's Selected Alternate and Alternate 7 to the Nash Farm are limited to impacts along the farmland edge, and would not impact active farm operations. Farming operations during 2003 in this parcel include corn production.

Alternate 5C would impact the most acres of active farmland, with impacts ranging from 9.60 to 10.69 acres to one farmland parcel–Camp Bennett. Alternate 5C would traverse approximately through the middle of active farmland associated with Camp Bennett **(Figure III-12)**. Farming operations for this parcel are limited to agricultural crops, principally wheat and hay. Alternate 5C would not prevent the continuance of farm operations on this parcel, which is leased by Camp Bennett to a local farmer.

Alternate 8A and Alternate 8B would impact lesser amounts of active farmland, ranging from 0.53 to 1.24 acres to one farmland parcel - the Nash Farm. Active farmland impacts for Alternate 8A and Alternate 8B to the Nash Farm are limited to impacts along the farmland edge, and would not impact active farm operations **(Figure III-12)**. Farming operations for this parcel include corn and hay production.

SHA's Selected Alternate would impact the fewest acres of Prime Farmland Soils and Soils of Statewide Importance, with impacts of 4.53 acres and 1.63 acres, respectively.

Alternate 5C would impact the most acres of Prime Farmland Soils and Soils of Statewide Importance (23.21 to 24.19 acres and 4.74 to 5.63 acres, respectively). Alternate 7, Alternate 8A, and Alternate 8B would have impacts to Prime Farmland Soils and Soils of Statewide Importance ranging from 4.64 to 4.90 acres and 1.79 to 5.28 acres, respectively **(Figure III-12)**.

## F. GROUNDWATER RESOURCES

No impacts to groundwater resources would occur with the No-Build Alternate. The soil type in the project area is primarily silt loam, very deep to moderately deep, well drained to moderately drained, and has average moderate permeability. The runoff potential is varying from moderately low to moderately high with infiltration and transmission rates of moderate to slow. The closest aquifer to the project area is the Lower Peltic Schist of the western Wissahickon Formation, located east of the project area.

Due to the types and characteristics of the soils and the aquifer, it is unlikely that highway development will have major short-term potential impacts to groundwater resources. As discussed in **Section III-F**, the WSSC determined that approximately only one-third of the project area is served by private wells. Private households utilize a small portion of groundwater. Additionally, there are no major users of groundwater within the project area.

The long-term impacts may include reduction in groundwater recharge due to increased impervious surface and alternations of local surface drainage patterns because of construction. In addition, potential long-term impacts include the contamination of groundwater through the infiltration of pollutants in surface runoff. Earthwork activities associated with roadway construction present the potential for long-term impacts to the groundwater system within the project area. All practicable measures would be taken to minimize any potential impacts to the groundwater and surrounding water wells during the construction.

Impacts to groundwater quality during construction would be mitigated through strict adherence to MDE's erosion and sediment control procedures. The risk of groundwater contamination by spills would be reduced with stormwater management ponds. Runoff would be directed to inlets along the roadway shoulder, and drainage would convey this runoff to stormwater management ponds, where it could be collected and treated.

## G. SURFACE WATER RESOURCES

The No-Build Alternate would have no effect on the surface water resources in the project area. During construction of the Build Alternates, surface water quality may be temporarily impacted by increased erosion, sedimentation, and streambank destruction from grading operations. Temporary impacts would result from temporary stream crossings, dikes and cofferdams, temporary channel relocations, and suspended solids from increased erosion and sedimentation. Runoff from disturbed areas may contain high sediment loads, which could reduce both the diversity and numbers of organisms in the aquatic environment. Physical impacts such as temporary stream crossings and cofferdams disrupt the stream substrate and could affect fish migrations through these areas. This would negatively effect benthic macroinvertebrate populations in this portion of the stream during

the construction period, and for a short period after construction until migration and drift allow for the re-colonization of the area. Changes to the channel widths resulting from cofferdam construction may generate excessive scouring of the substrate and generate sediment impacts immediately downstream of the construction area.

Surface water resources within the project area are in watersheds associated with two major stream systems (Reddy Branch and Hawlings River), as well as their associated perennial and intermittent tributaries **(Figure III-13)**. Reddy Branch flows through the center of the project area, and most of the direct surface water impacts would occur to this stream system and to Meadow Branch, a tributary to Reddy Branch. The unnamed tributary to the Hawlings River, located on the northern project area boundary, would incur no direct stream impacts as no stream crossings to this stream system are proposed for any of the Build Alternates.

SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B, are proposed entirely within the Reddy Branch subwatershed. Temporary surface water impacts would result from SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B, as the construction of each of these alignments would require the crossing of Reddy Branch and Meadow Branch. SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B all cross Meadow Branch at a location west of MD 97 and south of Brookeville Road **(Figure III-13)** where a box culvert is proposed. The proposed culvert design will meet MDE standards and has been coordinated with the regulatory resource agencies and no objections have been received. Coordination will continue as part of project design.

Although the northern section of Alternate 5C is within the Hawlings River drainage area, the majority of this alternate falls within the Reddy Branch subwatershed. Alternate 5C has only one stream crossing along Reddy Branch **(Figure III-13)**.

The first order tributary to Meadow Branch, crossed in the southern portion of the project area where SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B share the same leg, is an intermittent watercourse presumably fed by groundwater discharge. The type of structure used to cross Meadow Branch will be determined during the project design phase.

Total area of proposed ROW within each watershed (or subwatershed) and the linear footage of stream crossing impacts are presented in **Table IV-5** for each alternate. SHA's Selected Alternate would have total linear stream impacts that are comparable to the western Build Alternates. Impacts for these western alternates range from 1,067.32 linear feet to 1,191.72 linear feet. Alternate 5C impacts would be **Figures II-11A** to **II-15B** show detailed impact locations.

The Code of Maryland Regulations (COMAR 26.08.02.11B) requires compliance with time of year restrictions for instream work, which helps to protect important aquatic species. Time of year restrictions for Class IV-P waters is from March 1 through May 31, inclusive.

The stream systems throughout the project area are part of the Patuxent River Watershed, a State Scenic and Wild River, and are therefore subject to review by DNR. DNR determined that the Scenic and Wild Rivers Program would not have any additional compliance requirements beyond the necessary permits (nontidal wetlands, forest conservation, etc.) on this project **(Section VI)**.

***TABLE IV-5 Stream Crossing and Watershed Impacts***

| Category | Alternate 5C | | Alternate 7 | | SHA's Selected Alternate | Alternate 8A | | Alternate 8B | |
|---|---|---|---|---|---|---|---|---|---|
| | Open Section | Closed Section | Open Section | Closed Section | Open Section | Open Section | Closed Section | Open Section | Closed Section |
| Reddy Branch Perennial Stream Impacts (feet) | 314.82 | 303.61 | 191.7 | 187.6 | 206.0 | 152.68 | 153.46 | 235.39 | 228.91 |
| Meadow Branch Perennial Stream Impacts (feet) | 0 | 0 | 377.8 | 376.5 | 368.3 | 315.54 | 313.61 | 333.13 | 328.42 |
| Total Perennial Stream Impacts (feet) | 314.82 | 303.61 | 569.5 | 564.1 | 574.3 | 468.22 | 467.07 | 568.52 | 557.33 |
| Intermittent Stream Impacts – Unnamed Tributary to Meadow Branch (feet) | 167.3 | 165.3 | 599.7 | 606.2 | 637.5 | 599.1 | 606.2 | 623.2 | 601.5 |
| Total Linear Stream Impacts (feet) | 482.12 | 468.91 | 1,169.2 | 1,170.3 | 1,211.8 | 1,067.32 | 1,073.27 | 1,191.72 | 1,158.83 |
| Reddy Branch Watershed ROW Impacts (acres) | 30.86 | 27.04 | 14.18 | 13.44 | 14.18 | 18.24 | 17.42 | 19.29 | 17.68 |
| Hawlings River Watershed ROW Impacts (acres) | 15.66 | 15.80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Note: Impacts based on ROW widths.

Surface runoff will also be addressed for each Build Alternate including SHA's Selected Alternate. The design of the MD 97 Brookeville Project would result in an increase in impervious surface and discharge volumes within the various subwatersheds. Stormwater management facilities would be required and would be located adjacent to the alignments to control runoff and provide quantity control. The stormwater management facilities would add very little additional ROW to the project.

Grass channels would be provided in areas where the runoff could not readily be treated with a pond facility. These grass channels, along with the roadside ditches within the project, could be utilized to enhance water quality and provide some ground water recharge. Though these channels and ditches could enhance water quality, they would not provide the quantity control that the project will also require. This would need to be controlled through the placement of the stormwater management ponds.

## H. FLOODPLAINS

The No-Build Alternate would not negatively affect the floodplains in the project area. The five proposed Build Alternates would traverse the 100-year floodplains associated with Reddy Branch, Meadow Branch or both. **Table IV-6** is a summary of the area of impact to the 100-year floodplains by each Build Alternate. All four DEIS Build Alternates have comparable floodplain impacts, ranging from 2.44 to 3.29 acres, with SHA's Selected Alternate impacting 3.2 acres. **Figure III-13** shows the location of the 100-year floodplains, and **Figures II-3A** to **II-7B** highlight the floodplain impact areas. These impact estimates are based on ROW boundaries.

Final determination of structure and sizes made during the design phase of this project may modify these preliminary estimates. Design of culverts or bridge structures would ensure that the 100-year flood flow would pass without causing flooding of the roadway. Crossing structures that will be considered will include box culverts with flood relief structures and short span bridges that allow for flood relief. In addition, each structure would be designed to provide for sufficient wildlife passage. Project design and construction would comply with state and local floodplain regulations.

***TABLE IV-6 Floodplain Impacts***

| Category | Alternate 5C | | Alternate 7 | | SHA's Selected Alternate | Alternate 8A | | Alternate 8B | |
|---|---|---|---|---|---|---|---|---|---|
| | Open Section | Closed Section | Open Section | Closed Section | Open Section | Open Section | Closed Section | Open Section | Closed Section |
| Floodplain Impacts (acres) | 2.80 | 2.44 | 3.34 | 3.27 | 3.22 | 2.98 | 2.93 | 3.29 | 3.17 |

Note: Impacts are based on ROW widths.

## I. WETLANDS

### 1. Impacts

Wetland identification was conducted in accordance with the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987). A functional assessment of the wetlands has been conducted using *The Highway Methodology Workbook Supplement: Wetland Functions and Values, A Descriptive Approach* (USACOE, 1993). The findings of this assessment are presented in **Section III-I** and are included in the Wetland Summary Table, **Table III-9**.

The No-Build Alternate would not impact wetlands in the project area. SHA's Selected Alternate would impact four wetlands: two palustrine forested wetlands, one palustrine emergent wetland, and one palustrine scrub-shrub wetland. Potential impacts to WUS and jurisdictional vegetated wetlands were determined based on ROW limits for each of the Build Alternates. Linear stream impacts as well as nontidal freshwater wetland impacts would result from all Build Alternates, including SHA's Selected Alternate. Impacts to both streams and wetlands would result from cut and fill activities and stream crossings, which may impair one or more of the wetland functions. For most wetlands, existing functions would continue to be provided by the remaining portions of the wetlands, although the magnitude of these functions may be reduced depending on the amount of wetland impacted and the size of the remaining wetland. Indirect wetland impacts may also occur to

some of the wetlands during construction as water quality may be diminished due to erosion and sedimentation into adjacent streams or wetlands.

Wetland locations were considered during the selection of alternates retained for detailed study phase of this project. When possible, alternates were located to avoid wetlands. Initially, wetlands were delineated in the field throughout the study area. Both agency personnel and SHA Project Planning staff attended a jurisdictional determination of the delineated wetlands to review the accuracy of the delineation. As part of the determination, agency personnel, including representatives from the USACOE and MDE provided SHA staff with recommendations on preferred areas for proposed alternate layouts. The recommendations included areas where wetlands were either absent or minimal as well as optimal areas for stream crossings. The Reddy Branch stream crossing for all the Build Alternates was unavoidable as this stream system flows in an east-west direction through the center of the project area.

**Figure III-14** shows the wetland locations, and **Figures II-3A** to **II-7B** highlight the limits of cut and fill and ROW for each Build Alternate. **Table IV-7** is a summary of wetland impacts for each Build Alternate based on ROW limits. Total impacts for all five Build Alternates would vary from 0.10 acre to 0.21 acre. SHA's Selected Alternate would impact four wetlands including two palustrine forested wetlands, impacted for a total of 0.03 acres, one palustrine emergent wetland, impacted for 0.06 acre, and one palustrine scrub-shrub wetland, impacted for 0.03 acres. Alternate 5C and Alternate 8B would have the potential for the greatest impacts (between 0.15 to 0.21 acre). Palustrine forested wetland impacts would account for approximately half of Alternate 5C impacts. Palustrine emergent impacts would be the same (0.06 acre) for Alternate 7, Alternate 8A, and Alternate 8B. Alternate 8B would have at least twice as many palustrine scrub-shrub impacts compared to the other Build Alternates.

### 2. Avoidance and Minimization

Wetland avoidance and minimization measures were considered throughout the planning phase. Wetlands were avoided for each Build Alternate whenever possible. Further efforts to reduce or avoid wetland impacts would occur during the final design phases. In general, minimization and avoidance measures may include maximizing slopes to reduce the amount of fill required, constructing culverts and bridges at perpendicular locations to streams to maintain existing stream channels and hydrologic connections, shifting roadways, and decreasing the degree of curvature.

Wetland impacts associated with SHA's Selected Alternate would be limited to between 0.10 and 0.16 acre. Minimization measures would include shifting the alignment east along Wetland 1C as well as maximizing slopes. Avoidance and minimization of impacts along Wetlands 12 and 13 would include shifting the alignments west as well as maximizing slopes. The cost associated with each minimization effort is considered negligible, particularly the ability to maximize slopes adjacent to each wetland.

Efforts have been made to minimize WUS impacts, primarily to the crossing of Reddy Branch and Meadow Branch. Upon coordination with USFWS, DNR, USACOE, and M-NCPPC, it was decided to incorporate a structure over Reddy Branch Stream near the roundabout located on Brookeville Road that will be designed to accommodate wildlife passage. This bridge alignment will meet the minimum requirements preferred by the review agencies that consisted initially of a

minimum of an 8-foot vertical clearance with a 25-foot embankment on the same side**.** The draft SACM Package dated February 2003 recommended the south side of Reddy Branch for wildlife passage based on non-surveyed contour mapping. In response to USACOE and USFWS comments for a north side passage, additional evaluations were made by SHA. It was concluded that the north side might be possible however a final decision will need to await accurate ground surveys as part of project design. The design goal will be the agreed to eight-foot vertical and 25-foot horizontal clearance on one side, preferably along the north side of Reddy Branch. Should topographic conditions not allow for adequate clearance along the north side, the south side passage will be pursued by SHA as part of final project design. The existing structure over Reddy Branch Stream would be removed in conjunction with the closing of this portion of MD 97. A box culvert has been proposed for the crossing of Meadow Branch.

***TABLE IV-7 Summary of Wetlands Impacts***

| Wetland No. | Wetland Classification | Total Wetland Area[1] (acres) | Alternate 5C (acres) | | Alternate 7 (acres) | | SHA's Selected Alternate (acres) | Alternate 8A (acres) | | Alternate 8B (acres) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Open Section | Closed Section | Open Section | Closed Section | Open Section | Open Section | Closed Section | Open Section | Closed Section |
| 1 | WUA | ---- | See Stream Impact Table **(Table IV-5)** | | | | | | | | |
| 1-A | PEM | 0.13 | 0.02 | 0.01 | --- | --- | --- | --- | --- | --- | --- |
| 1-A | PSS | 0.14 | 0.02 | 0.01 | --- | --- | --- | --- | --- | --- | --- |
| 1-B | PEM | 0.17 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1-C | PFO | 0.32 | --- | --- | 0.01 | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 | --- |
| 1-D | PFO | 0.14 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1-E | PEM | 0.15 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1-E | PFO | 0.12 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1-F | PFO | 2.30 | 0.10 | 0.09 | --- | --- | --- | --- | --- | --- | --- |
| 1-G | PFO | 0.19 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2 | WUS | --- | See Stream Impact Table **(Table IV-5)** | | | | | | | | |
| 2A | PEM | 0.46 | 0.07 | 0.04 | --- | --- | --- | --- | --- | --- | --- |
| 2A | PFO | 0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2B | PFO | 0.13 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2C | PFO | 0.13 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | PFO | 0.17 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4 | PEM | 0.05 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4 | PSS | 0.05 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7 | PEM | 0.38 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7 | PFO | 0.13 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | PFO | 0.05 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10 | PFO | 0.17 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11 | PFO | 0.05 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12 | PFO | 0.38 | --- | --- | 0.02 | 0.02 | 0.02 | <0.01 | <0.01 | 0.01 | 0.01 |
| 13 | PEM | 0.14 | --- | --- | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| 13 | PSS | 0.11 | --- | --- | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.07 | 0.07 |
| 18 | PEM | 0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 18 | PSS | 0.05 | --- | --- | --- | --- | --- | <0.01 | <0.01 | --- | --- |
| 19 | PFO | 0.02 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Total Impacts** | | | **0.21** | **0.15** | **0.12** | **0.13** | **0.12** | **0.10** | **0.11** | **0.16** | **0.14** |
| **Total Impacts per Classification** | | | | | | | | | | | |
| **Total PFO** | | | **0.10** | **0.09** | **0.03** | **0.04** | **0.03** | **0.01** | **0.02** | **0.03** | **0.01** |
| **Total PEM** | | | **0.09** | **0.05** | **0.06** | **0.06** | **0.06** | **0.06** | **0.06** | **0.06** | **0.06** |
| **Total PSS** | | | **0.02** | **0.01** | **0.03** | **0.03** | **0.03** | **0.03** | **0.03** | **0.07** | **0.07** |

Notes: Impacts are based on ROW widths.
[1] Total Wetland Area considers only that portion within the limits of the project area.
--- No wetland impact

### 3. Mitigation

Mitigation planning for unavoidable wetland impacts would follow the sequencing guidelines of the *Maryland Compensatory Mitigation Guidance* (1994). After avoidance and minimization alternates have been fully designed, the characteristics of the impacted wetlands (functions/values and areas) would be considered in the development of the goals of the mitigation plan. The functions/values and vegetative classification of the impacted wetlands would determine mitigation ratios. General guidelines for wetland replacement mitigation ratios are listed below. Compensation for stream impacts is currently determined on a case-by-case basis but typically follows a 1:1 ratio per linear foot of impact.

- Palustrine forested wetlands (PFO): 2:1
- Palustrine scrub/shrub (PSS): 2:1
- Palustrine emergent wetlands (PEM): 1:1

During the Summer of 2002, SHA met with M-NCPPC officials to discuss stream restoration as well as wetland and parkland mitigation. Potential areas for stream restoration and wetland mitigation within the parkland were evaluated by representatives of the resource agencies and M-NCPPC and written approval was received by SHA on May 1, 2003. Approved stream restoration locations include upstream and downstream of where SHA's Selected Alternate crosses Meadow Branch and along a section of Reddy Branch adjacent to Brighton Dam Road. Stream restoration techniques are likely to include riparian buffer plantings as well as in stream stabilization measures such as grading and stabilization of eroded stream banks.

This section of Reddy Branch is also adjacent to an open field that has been investigated and agreed to by M-NCPPC for use as a wetland creation mitigation site in their May 1, 2003 approval letter. SHA will continue to work closely with the agencies and M-NCPPC in the development of more detailed stream restoration and wetland mitigation design within the parkland. Coordination will also continue with M-NCPPC staff in identifying potential parkland replacement sites, storm water management ponds, archeology, and reforestation opportunities within Reddy Branch Stream Valley Park. Proposed mitigation is outlined in SHA's letter to M-NCPPC dated August 13, 2003, included in **Section V** and **Section VI** .

Replacement mitigation is proposed at a 2:1 ratio for 0.03 acre of palustrine forested and 0.03 acre of palustrine scrub shrub wetlands, and at a 1:1 ratio for 0.06 acre of palustrine emergent wetlands. Therefore, the wetland mitigation needed for this project totals approximately 0.18 acre. In addition, approximately 1,000 to 1,400 linear feet of stream restoration will be conducted.

## J. VEGETATION AND WILDLIFE

### 1. Vegetation

Impacts to the terrestrial habitat were calculated for each vegetative cover type identified throughout the project area. The No-Build Alternate would not negatively impact the vegetation in the project area. The impacts for each Build Alternate relevant to the existing terrestrial habitat are likely to affect all four primary components of habitat including foraging, breeding, nesting, and resting opportunities, especially for forest cover. The construction of each Build Alternate would result in

the loss of all forest cover types as well as cropland and grassland **(Figure III-15)**. The forest cover is the primary terrestrial habitat identified within the project area that would provide for the greatest diversity of wildlife species. Subsequently, loss of forest cover is given special consideration. Furthermore, due to several large contiguous forest stands throughout the project area, each Build Alternate would not only reduce forest cover but would fragment many of the large stands into two or more smaller stands. The effect of this form of impact is to create more forest edge along the new roadway that previously would have been considered forest interior. The DNR has described the project area, because of the large stands, as having FIDB habitat. Forested areas likely to serve as FIDB habitat include the riparian corridor along Reddy Branch, the large unfragmented upland forests east of MD 97, both north and south of Brighton Dam Road, and the forest cover evident along the northern portion of the project area. Subsequently, Alternate 5C, which continues much farther north than any other alternate, would impact more forested areas likely to serve as FIDB habitat. Indirect impacts from the Build Alternates include the loss of vegetation that may serve as a buffer to limit soil erosion and runoff into adjacent waterways and wetlands.

Impacts to the terrestrial habitat, including FIDB habitat, can be reduced by considering several forest protection guidelines as part of the planning and construction phases. These include maintaining forest habitat up to the edges of roads and minimizing use of mowed grassy berms. If possible, FIDB habitat should not be disturbed between May and August. Finally, any reforestation efforts should target riparian areas that lack woody vegetation, riparian areas less than 300 feet wide, and non-forested areas adjacent to FIDB habitat.
Impacts to specimen trees vary from one to three, depending on the alternate. SHA's Selected Alternate, Alternate 7, and Alternate 8B would impact one specimen tree each. Both Alternate 5C and Alternate 8A would have the greatest number of specimen tree impacts, estimated at three each.

Direct impacts calculated for each terrestrial habitat per alternate are shown in **Figure III-15** and listed in **Table IV-8**. SHA's Selected Alternate would disturb the least amount of terrestrial habitat with a total impact of 9.27 acres (open section). Alternate 5C would result in the greatest terrestrial habitat impacts, estimated at approximately 32.58 acres. Alternate 5C would have greater impacts to Tulip Poplar Association, cropland, and grasslands habitat cover types than the other alternates. Alternate 8A and Alternate 8B would result in a comparable amount of impacts for all habitat cover types of between 11.73 and 13.93 acres.

Mitigation for loss of vegetation would be addressed in compliance with reforestation requirements. The SHA complies with the Maryland Reforestation Law, which requires a one for one replacement. The SHA would coordinate with the M-NCPPC to identify viable areas for reforestation including areas within Reddy Branch Stream Valley Park. Approximately nine acres of tree plantings would be required.

***TABLE IV-8 Terrestrial Habitat Cover Type Impact***

| Habitat Cover Type | Alternate 5C (acres) | | Alternate 7 (acres) | | SHA's Selected Alternate (acres) | Alternate 8A (acres) | | Alternate 8B (acres) | |
|---|---|---|---|---|---|---|---|---|---|
| | Open Section | Closed Section | Open Section | Closed Section | Open Section | Open Section | Closed Section | Open Section | Closed Section |
| Tulip Poplar Association | 11.12 | 9.08 | 6.84 | 6.37 | 6.84 | 7.05 | 6.58 | 7.90 | 7.10 |
| Sycamore-Green Ash-Box Elder-Silver Maple Association | 0.59 | 0.48 | 1.78 | 1.67 | 1.78 | 3.36 | 3.31 | 3.83 | 3.70 |
| Oak-Hickory Forest Type | 0 | 0 | 0 | 0 | 0 | 0.54 | 0.44 | 0.06 | 0.05 |
| Total Forest Cover Impacts | 11.71 | 9.56 | 8.62 | 8.04 | 9.02 | 10.95 | 10.33 | 11.79 | 10.85 |
| Croplands | 9.60 | 10.69 | 0 | 0 | 0.01 | 0.59 | 0.53 | 1.24 | 0.99 |
| Grasslands | 11.27 | 9.55 | 0.64 | 0.58 | 0.64 | 0.94 | 0.87 | 0.90 | 0.77 |
| Habitat Cover Type Total | 32.58 | 29.80 | 9.27 | 8.62 | 9.27 | 12.48 | 11.73 | 13.93 | 12.61 |
| Specimen Trees Impacted (numbers) | 3 | 3 | 1 | 1 | 1 | 3 | 3 | 1 | 1 |

Note: Impacts are based on ROW widths.

## 2. Wildlife

### a. Terrestrial Wildlife

It is anticipated that all the alternates, with the exception of the No-Build, would reduce populations of those wildlife species sensitive to new roadways including certain avian species, reptiles, amphibians, and mammals. Primary impacts would involve loss of habitat, habitat fragmentation, and potential collisions with traffic. Other impacts would likely include changes to breeding and migratory patterns, change in plant community structure along the ROW, and isolation of wildlife populations. The No-Build Alternate would not impact wildlife in the project area.

The loss and alteration of existing wildlife habitat, primarily forest cover, would likely occur for all five Build Alternates. The forest throughout the project area serves as habitat for a diversity of herpetofauna, avian species, and mammals. Direct impacts to forest cover would be the elimination of habitat within the proposed ROW and the alteration of the adjacent forest edge. The loss of habitat would negatively affect the breeding and foraging success of a variety of wildlife species. Of particular concern is the loss of FIDBS and their habitat. These species are generally dependent on large mature stands in which to successfully breed. DNR and other conservation organizations are concerned about the rapid decline in FIDB habitat. Most FIDBS are area-sensitive species and include migratory songbirds such as scarlet tanagers, warblers, and gnatcatchers as well as various woodpeckers. These species require large, contiguous, undisturbed forest stands of approximately 100 acres (Robbins, 1989). Furthermore, these avian species typically only nest in portions of the forest that are 150 to 300 feet from the forest edge known as the forest interior. Each Build Alternate would likely eliminate forest interior habitat by fragmenting the larger forest into smaller stands with minimal interior or width from the forest edge.

Mortality for various biota would likely occur for each Build Alternate. Dead or injured species such as birds, rabbits, squirrels, turtles, snakes, and white-tailed deer (*Odocoileus virginianus*) are common sights along roadways with adjacent forest cover or farmland. Many edge dwelling species, such as white-tailed deer, are attracted to these areas and subject to the greater possibility of vehicular collisions. White-tailed deer are of concern due to their rapidly growing population in suburban areas and the danger associated with collisions between vehicles and this animal.

Each Build Alternate may negatively alter the adjacent forest immediately outside of the ROW by changing the forest structure and diversity. These changes to the existing plant community could result from the establishment and subsequent competition associated with exotic and invasive species. Furthermore, an increase in sunlight along the ROW would favor more pioneer (early colonizers) species. The change in plant species would include a change in the wildlife species that prefer the new habitat, in particular, edge dwelling species. Many of the wildlife species associated with forest edge habitat are considered generalists in their habitat needs. These species are commonly found in urban areas where there is an abundance of forest edge habitat. Wildlife species associated with forest interior habitat are more specific in their habitat requirements and are therefore more sensitive to disturbance and/or the loss of habitat than edge dwelling species.

The new roadway may also create a barrier separating one population from another thus reducing the opportunity for gene pool exchange. With the gene pool and exchange opportunities reduced, local extinctions (i.e., loss of local populations) may not be replaced by new colonizers. Species isolated from other populations are also vulnerable to inbreeding. Isolated populations are a particular concern for species with limited mobility such as amphibians and reptiles.

The loss of cropland and grassland habitat may also occur because of this project. The reasons for potential cropland/grassland habitat loss are similar to those described above, including fragmented wildlife habitat and corridors. DNR is concerned with the decline of grassland habitat throughout the state. The grasslands, especially along the eastern portion of the project area, are potential grassland breeding habitat for avian species including the savannah sparrow (*Passerculus sandwichensis*) and the Lincoln's sparrow (*Melospiza lincolnii*).

In summary, Alternate 5C has the potential to cause the most severe impacts to wildlife and wildlife habitat. The principal reason is that the stream valley and the park system are widest along the eastern portion of the project area. Impacts could be extensive in this area, including the permanent loss of FIDB habitat as well as permanent disturbances to plant and animal populations currently benefiting from large undisturbed forest cover. The eastern and northern portions of the project area maintain relatively large stands of mature forest cover and grassland habitat. The balance of the alternates, with the exception of the No-Build, would also result in the loss of mature forest.

The selection of an alternate that has the least habitat loss for mammals would result in avoidance or minimization of adverse impacts. Minor alignment shifts to avoid or minimize impacts to sensitive habitats would be considered during final design. Stormwater management designed to direct water to the median for bio-retention and infiltration would minimize the potential for environmental contamination or sedimentation of sensitive habitats. Bridging wetlands and stream valleys, or designing environmentally sensitive culverts can minimize the effects of habitat fragmentation.

It is anticipated that all five Build Alternates would be of sufficient height to allow large mammals to pass beneath each structure proposed over Reddy Branch. A minimum of eight feet would be

maintained between the top of the stream bank and the bottom of the bridge. For SHA's Selected Alternate, close coordination with USACOE and USFWS has occurred to ensure that sufficient clearance is provided for wildlife under Reddy Branch and proposed MD 97. Bridge design efforts include allowing for a minimum of eight feet vertical and 25 feet horizontal clearance preferably on the north side of Reddy Branch. The Meadow Branch crossing currently proposed is a two-cell culvert. One cell culvert during low base flows will be designated for wildlife passage.

The incidence of wildlife collisions with vehicles could be reduced by restricting or inhibiting wildlife access to the highway, or by enabling motorists to avoid collisions. These measures could include combinations of fencing, one-way gates, passageways, reflectors, lighting, etc. The associated loss of wildlife caused by alternates may be mitigated by the enhancement of the wildlife habitat through reforestation including vegetation with high wildlife food value (mast producing trees, seed, or berry producing shrubs, etc.), and plants which will provide cover for wildlife.

#### b. Aquatic Wildlife

The No-Build Alternate would not impact aquatic wildlife populations. All of the Build Alternates, including SHA's Selected Alternate, could potentially impact aquatic wildlife populations, including fish **(Table III-10)** and macroinvertebrates **(Appendix F)**. The impacts could include uncontrolled runoff, which increases the potential for excessive sedimentation and pollutants to enter a waterway. Excessive sediment entering the stream may impact spawning areas as well as reduce the overall aquatic habitat diversity. This is especially true along riffles where sediment, typically silt, fills in the voids between gravel and cobble, limiting opportunities for fish to successfully deposit eggs. Other impacts affecting overall water quality and habitat could include loss of vegetation along streambanks.

The likelihood of temporary and especially permanent impacts could be reduced by incorporating best management practices (BMPs), which are commonly used as part of construction activities adjacent to waterways and wetlands. The long-term impacts to water resources and the aquatic communities resulting from the proposed project would be negligible, given that proper BMPs would be incorporated. In addition, construction activities should be restricted, if possible, during the spawning seasons (generally between March and June).

All five Build Alternates would result in the crossing of Reddy Branch. SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B would require a stream crossing over Meadow Branch immediately south of Brookeville Road and west of MD 97. A box culvert design has been coordinated with the resource agencies for the SHA Selected Alternate's crossing of Meadow Branch. Differences in the impacts to the stream between each alternate are negligible, however, floodplain impacts vary as described in **Section IV-H**.

### 3. Rare, Threatened, and Endangered Species

Neither the No-Build, nor any of the Build Alternates, would impact any endangered or threatened plant or animal species. The USFWS confirmed that no federally-listed or proposed for listing endangered or threatened species are in the project area. In correspondence, DNR, Wildlife and Heritage Division reported no records for federal or state rare, threatened, or endangered plants or animals in the project area, however, several small American Chestnut trees and saplings are evident

particularly along the western portion of the study area, as described in **Section III.J.3**. The western alternates are anticipated to impact a small number of individual trees. Even though this species is listed as a state rare or uncommon plant species, only large mature flowering chestnut trees are commonly monitored by DNR.

### 4. Unique and Sensitive Areas

The portion of Reddy Branch Stream Valley Park designated as a protection area for DNR's watchlist species, shingle oak (*Quercus imbricaria*), would be impacted by SHA's Selected Alternate, Alternate 7 Alternate 8A, and Alternate 8B **(Figure III-15)**. The protection area impacts for these alternates are comparable and range between 4.39 and 5.98 acres. Shingle oaks are not found through the protection area as large stands but are instead evident as small-scattered groupings or only as individual trees.

In November 2002, 26 shingle oaks were identified within the ROW of SHA's Selected Alternate. The trees were found both individually and in clusters. The majority of the shingle oaks with diameters under one foot appeared to be stressed. Five larger species, with diameters of approximately one foot, appeared to be in satisfactory condition.

Alternate 5C and the No-Build Alternate would not impact the shingle oak protection area. Agency correspondence is included in **Section VI**. **Table IV-9** summarizes the proposed impacts to the shingle oak protection area. Since the shingle oak is not listed as either threatened or endangered, any protection measures are voluntarily. Unless a species is listed by DNR as either threatened or endangered, there are no legal or regulatory measures in which to protect the species. Subsequently, no mitigation is required for the shingle oak impacts. However, the SHA would include shingle oak plantings as part of the reforestation efforts as described under **Section J** (Vegetation and Wildlife).

***TABLE IV-9 Shingle Oak Protection Area Impacts***

| Category | Alternate 5C (acres) | | Alternate 7 (acres) | | SHA's Selected Alternate (acres) | Alternate 8A (acres) | | Alternate 8B (acres) | |
|---|---|---|---|---|---|---|---|---|---|
| | Open Section | Closed Section | Open Section | Closed Section | Open Section | Open Section | Closed Section | Open Section | Closed Section |
| Shingle Oak Area Impacts | 0.00 | 0.00 | 4.83 | 4.39 | 4.83 | 5.65 | 5.10 | 5.98 | 5.29 |

Note: Impacts are based on ROW widths.

## K. 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 USEPA, FHWA, and SHA guidelines. CO impacts are analyzed as the accepted indicator of vehicle-generated air pollution.

USEPA's CAL3QHC dispersion model was used to predict CO concentrations for air quality sensitive receptors for the design year (2020). The detailed analyses predict air quality impacts from

CO vehicular emissions for both the No-Build Alternate and the Build Alternates 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. Receptor Site Locations

Seventeen air quality receptors were selected to represent air quality sensitive locations within the study area. The receptor sites chosen for these receptors are single-family residences. In few cases, the edge of ROW was used if no receptor site was nearby. The locations of the air quality receptors are described in **Section III.K** and are identified in **Table IV-10** and **Table IV-11** and on **Figure III-17**.

### 3. Conformity with Regional Air Quality Planning

The MD 97 Brookeville Project is located in Montgomery County, Maryland. This county is not designated as non-attainment for CO, $NO_2$, $SO_2$, Pb, or $PM_{10}$, 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 (SIPs) is determined through a regional air quality analysis performed on the Transportation Improvement Plan (TIP) and transportation plan. This project conforms to the SIP as it originates from a conforming TIP and transportation plan. The 2003 Constrained Long Range Transportation Plan was approved by USEPA, FTA and FHWA. Also, the TIP was approved on February 23, 2004.

### 4. Analysis Input

#### a. Traffic Data

The traffic data used for this air quality analysis included ADTs, hourly AM and PM peak hour volumes, and percent daily distributions (diurnal traffic curves) for both the Build and No-Build Alternates. Traffic data and traffic speeds were provided by SHA for the years 2000 and 2020. Vehicle speeds were assumed the posted speed limits. This data was compiled for each alternate and each year of study.

One signalized intersection at Gold Mine Road and existing MD 97 was included in the analysis of all of the alternates. The signal timing was assumed to be optimized based on current and future traffic volumes.

The traffic flow on the roundabouts was assumed as free-flow and the posted speed was reduced to 10 mph. The traffic volumes circulating on a specific roundabout were determined by combining the traffic volume of those roads converging at the roundabout.

#### b. Vehicular Emissions

Mobile source emission factors were obtained for use in the CO prediction models using the latest version of the USEPA Mobile Source Emission Factors Model, MOBILE5b (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.

Vehicle CO emissions rates increase with decreasing ambient temperature. An ambient temperature of 20°F was used to determine peak hour impacts, while an average temperature of 35°F was selected to represent the composite hours that together make up the eight-hour average impact. Engine operating temperature is included in the emission rate calculation as the fraction of vehicles operating in the cold or hot modes. The Federal Test Procedure (FTP) operating mode (20.6 percent non-catalytic cold start vehicles, 27.3 percent catalytic hot start vehicles, and 20.6 percent catalytic cold start vehicles) was used to represent emissions from vehicles for MD 97. Vehicle maintenance is factored into the emissions rate calculation as the rate of compliance with the Maryland Vehicle Emissions Inspection Program (VEIP). The vehicle fleet mix and age also influence the average fleet emission rates. The vehicle mix for MD 97 was provided by SHA. The vehicle mix for other roads was assumed the same as MD 97. Regional average vehicle ages were assumed.

### c. Meteorological Factors

For direct comparison to the S/NAAQS, CO concentrations were estimated for worst-case 1-hour and 8-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 AM and PM peaks were analyzed. The maximum one-hour CO impact was obtained for each air quality sensitive receptor by adding the background concentration to the 1-hour CO receptor-specific concentration.

To estimate the maximum 8-hour average CO concentration, daily traffic distributions (diurnal curves) were used to breakdown the ADTs 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 USEPA's CAL3QHC dispersion model (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). Since no signalized intersections were modeled in this air quality analysis, all the links used are free flow links. Each of these can be one of four types based on the roadway geometry (at-grade, fill, bridge, or depressed). The required inputs for each link are the end points, traffic volume (vehicles/hour), and the emission factor (g/veh* mile for free flow links or g/veh* hour for queue links).

A free flow link is defined as a straight segment of roadway having a constant width, height, traffic volume and 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 the roadway width plus ten feet on each side of the roadway, to account for the dispersion of the plume generated by the wake of moving vehicles.

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 in **Table IV-10**.

CAL3QHC calculates the CO concentration at each receptor for a given wind direction. The wind direction was varied through a full 360 degrees in 5 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.

***TABLE IV-10 Air Quality Parameters***

| 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 |
| Mix Height | 1,000 meters |
| Scale Factor | 0.3048 meters/foot |
| Source Height | 0.0 meters (at grade Links)<br>5.0 meters (bridge Links) |

### e. Background Levels

In order to calculate the total concentration of CO that occurs at a particular receptor site during worst-case meteorological conditions; the background levels are considered in addition to the levels directly attributable to the facility under construction. The background levels shown in **Table IV-11** were derived from the application of rollback methodology to on-site monitoring conducted by the Maryland Air Management Administration at their Rockpike Air Monitoring Station in Montgomery County during the period of 1995.

***TABLE IV-11 Background Carbon Monoxide***

| Year | 1-Hour (ppm) | 8-Hour (ppm) |
|---|---|---|
| 2000 | 4.4 | 2.6 |
| 2020 | 4.4 | 2.6 |

ppm= parts per million
Data obtained from Maryland Air Quality Data Report 1995
MDE, Air Management Administration, 2500 Broening Highway Baltimore, MD 21224

## 5. Results of Microscale Analysis

A summary of the CO concentrations is shown in **Table IV-12** and **Table IV-13**. The receptor's concentrations at all alternates are below the S/NAAQS in the 1-hour and 8-hour analyses.

***TABLE IV-12 Carbon Monoxide Concentrations - Year 2000***

| Receptor | No-Build Alternate | | Alternate 5C | | Alternate 7 | | SHA's Selected Alternate | | Alternate 8A | | Alternate 8B | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1-hr | 8-hr | 1-hr | 8-hr | 1-hr | 8-hr | 1-hr | 8-hr | 1-hr | 8-hr | 1-hr | 8-hr |
| **AQ-1** | 4.8 | 2.7 | 4.7 | 2.7 | 5.1 | 2.8 | 5.1 | 2.8 | 5.1 | 2.8 | 5.1 | 2.8 |
| **AQ-2** | 5.3 | 3.0 | 4.7 | 2.7 | 4.8 | 2.7 | 4.8 | 2.7 | 4.9 | 2.7 | 4.7 | 2.7 |
| **AQ-3** | 4.8 | 2.7 | 4.5 | 2.6 | 5.2 | 2.7 | 5.2 | 2.7 | 5.3 | 2.7 | 5.0 | 2.8 |
| **AQ-4** | 6.3 | 3.5 | 5.0 | 2.8 | 6.4 | 3.4 | 6.4 | 3.4 | 6.4 | 3.4 | 6.4 | 3.4 |
| **AQ-5** | 7.9 | 4.6 | 7.7 | 4.3 | 7.7 | 4.3 | 7.7 | 4.3 | 7.7 | 4.2 | 7.7 | 4.3 |
| **AQ-6** | 5.2 | 2.9 | 5.2 | 2.8 | 6.2 | 3.0 | 6.2 | 3.0 | 6.2 | 3.0 | 6.2 | 3.0 |
| **AQ-7** | 5.5 | 3.0 | 5.3 | 2.8 | 7.2 | 3.4 | 7.2 | 3.4 | 7.2 | 3.4 | 7.2 | 3.4 |
| **AQ-8** | 4.9 | 2.8 | 4.6 | 2.7 | 5.0 | 2.8 | 5.0 | 2.8 | 5.0 | 2.8 | 5.0 | 2.8 |
| **AQ-9** | 4.8 | 2.8 | 5.0 | 2.8 | 4.9 | 2.7 | 4.9 | 2.7 | 4.9 | 2.7 | 4.9 | 2.7 |
| **AQ-10** | 4.6 | 2.7 | 4.9 | 2.7 | 4.5 | 2.7 | 4.5 | 2.7 | 4.5 | 2.7 | 4.5 | 2.7 |
| **AQ-11** | 4.8 | 2.7 | 4.8 | 2.7 | 4.7 | 2.7 | 4.7 | 2.7 | 4.6 | 2.7 | 4.6 | 2.7 |
| **AQ-12** | 4.6 | 2.7 | 4.9 | 2.8 | 4.5 | 2.6 | 4.5 | 2.6 | 4.5 | 2.6 | 4.5 | 2.6 |
| **AQ-13** | 6.4 | 3.5 | 5.1 | 2.9 | 5.1 | 2.9 | 5.1 | 2.9 | 5.1 | 2.9 | 5.2 | 2.9 |
| **AQ-14** | 4.5 | 2.6 | 4.4 | 2.6 | 4.6 | 2.6 | 4.6 | 2.6 | 4.8 | 2.7 | 4.6 | 2.6 |
| **AQ-15** | 4.8 | 2.8 | 4.5 | 2.6 | 4.7 | 2.7 | 4.7 | 2.7 | 4.9 | 2.7 | 4.9 | 2.8 |
| **AQ-16** | 4.5 | 2.6 | 5.4 | 2.9 | 4.5 | 2.6 | 4.5 | 2.6 | 4.5 | 2.6 | 4.5 | 2.6 |
| **AQ-17** | 4.6 | 2.7 | 5.3 | 2.9 | 4.6 | 2.7 | 4.6 | 2.7 | 4.6 | 2.7 | 4.6 | 2.7 |

Notes: 1-hour CO concentrations include a 4.4-ppm background concentration. Worst-case (am or pm) shown.
8-hour CO concentrations include a 2.6-ppm background concentration.
S/NAAQS for 1-hour average is 35.0 ppm.
S/NAAQS for 8-hour average is 9.0 ppm.

***TABLE IV-13 Carbon Monoxide Concentrations - Year 2020***

| Receptor | No-Build Alternate | | Alternate 5C | | Alternate 7 | | SHA's Selected Alternate | | Alternate 8A | | Alternate 8B | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1-hr | 8-hr | 1-hr | 8-hr | 1-hr | 8-hr | 1-hr | 8-hr | 1-hr | 8-hr | 1-hr | 8-hr |
| **AQ-1** | 5.0 | 2.8 | 4.9 | 2.8 | 5.5 | 3.0 | 5.5 | 3.0 | 5.5 | 3.0 | 5.5 | 3.0 |
| **AQ-2** | 5.6 | 3.2 | 4.8 | 2.7 | 5.1 | 2.8 | 5.1 | 2.8 | 5.1 | 2.8 | 5.1 | 2.8 |
| **AQ-3** | 4.9 | 2.8 | 4.7 | 2.7 | 5.3 | 2.9 | 5.3 | 2.9 | 5.3 | 2.9 | 5.4 | 2.9 |
| **AQ-4** | 7.1 | 3.8 | 5.3 | 2.9 | 7.0 | 3.7 | 7.0 | 3.7 | 7.0 | 3.7 | 7.1 | 4.9 |
| **AQ-5** | 8.7 | 4.9 | 9.1 | 5.1 | 9.2 | 5.2 | 9.2 | 5.2 | 9.2 | 5.2 | 9.2 | 5.2 |
| **AQ-6** | 5.9 | 3.1 | 5.7 | 3.0 | 6.7 | 3.3 | 6.7 | 3.3 | 6.7 | 3.3 | 6.7 | 3.3 |
| **AQ-7** | 6.1 | 3.2 | 6.0 | 3.1 | 7.9 | 3.9 | 7.9 | 3.9 | 7.9 | 3.9 | 7.9 | 3.9 |
| **AQ-8** | 5.1 | 2.9 | 4.9 | 2.7 | 5.7 | 2.9 | 5.7 | 2.9 | 5.7 | 2.9 | 5.7 | 2.9 |
| **AQ-9** | 5.3 | 2.9 | 5.4 | 3.0 | 5.2 | 3.0 | 5.2 | 3.0 | 5.2 | 3.0 | 5.2 | 3.0 |
| **AQ-10** | 5.0 | 2.7 | 5.3 | 2.9 | 4.9 | 2.7 | 4.9 | 2.7 | 4.9 | 2.7 | 4.9 | 2.7 |
| **AQ-11** | 5.1 | 2.8 | 4.9 | 2.7 | 4.8 | 2.7 | 4.8 | 2.7 | 4.8 | 2.7 | 4.8 | 2.7 |
| **AQ-12** | 4.9 | 2.7 | 5.3 | 2.9 | 4.6 | 2.7 | 4.6 | 2.7 | 4.6 | 2.7 | 4.6 | 2.7 |
| **AQ-13** | 7.0 | 3.9 | 5.4 | 3.0 | 5.3 | 3.0 | 5.3 | 3.0 | 5.3 | 3.0 | 5.6 | 3.0 |
| **AQ-14** | 4.7 | 2.7 | 4.6 | 2.7 | 4.8 | 2.7 | 4.8 | 2.7 | 5.2 | 2.8 | 5.0 | 2.7 |
| **AQ-15** | 5.0 | 2.8 | 4.7 | 2.7 | 4.9 | 2.8 | 4.9 | 2.8 | 5.4 | 2.9 | 5.8 | 2.9 |
| **AQ-16** | 4.7 | 2.7 | 5.6 | 3.0 | 4.6 | 2.7 | 4.6 | 2.7 | 4.6 | 2.7 | 4.6 | 2.7 |
| **AQ-17** | 4.7 | 2.7 | 5.4 | 2.9 | 4.6 | 2.7 | 4.6 | 2.7 | 4.6 | 2.7 | 4.6 | 2.7 |

Notes: 1-hour CO concentrations include a 4.4-ppm background concentration. Worst-case (am or pm) shown.
8-hour CO concentrations include a 2.6-ppm background concentration.
S/NAAQS for 1-hour average is 35.0 ppm.
S/NAAQS for 8-hour average is 9.0 ppm.

A relative comparison of the No-Build Alternate versus the Build Alternates shows a decrease in CO concentrations for receptors located in the Town of Brookeville for both years 2000 and 2020. These decreases can be attributed to the reduction of traffic volumes along the existing downtown area of MD 97. There is an increase in the CO values at receptors located along the bypass alignment for both years 2000 and 2020. These increases can be attributed to the construction of the roadway closer to these receptors. An increase in CO concentrations was also obtained at receptors located near the proposed roundabouts.

The maximum 1-hour increase is 1.7 ppm in 2000 and 1.8 ppm in 2020. The maximum 8-hour increase is 0.4 ppm in 2000 and 0.9 ppm in 2020. The maximum 1-hour decrease is 1.3 ppm in 2000 and 1.8 ppm in 2020. The maximum 8-hour decrease is 0.7 ppm in 2000 and 0.9 ppm in 2020.

### 6. 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. SHA has addressed this possibility by establishing "Standard Specifications for Construction and Materials," which specify 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.

## L. NOISE IMPACT ASSESSMENT

### 1. Impact Analysis

An impact analysis was performed in compliance with recommended FHWA and SHA methodologies. Noise abatement criteria for various land uses have been established by FHWA in 23 CFR, Part 772. The noise abatement criteria for land uses occurring in the study area, (Category B: picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals) is 67 dB(A) Leq. Future year 2020 noise levels for the project area were predicted using the FHWA Noise Prediction Model (TNM).

According to the procedures described in 23 CFR, Part 772, Table I, noise impacts occur when predicted traffic noise levels for the design year approach or exceed the noise abatement criterion prescribed for a particular land use category, or when the predicted noise levels are substantially higher than the existing ambient noise levels. SHA and FHWA define an approach as 66 dBA for Category B, and use a 10 dBA increase to define a substantial increase. This analysis was completed in accordance with federal procedures and evaluated in accordance with SHA's Sound Barrier Policy.

The SHA Noise Policy provides for the evaluation of sound barriers for communities adversely impacted by noise from state highways. Sound barriers are evaluated in two separate categories. The first category is for the construction of new highways or capacity additions to existing highways (Type I). The second category is for existing highways not being expanded (Type II). The proposed improvements developed for MD 97 would be considered a Type I project.

An impact analysis was performed for each of the Alternatives Retained for Detailed Study dated October 2000. The impacts identified for each alternate are listed in **Table IV-14** and described as follows:

***TABLE IV-14 Noise Analysis Summary***

| Noise Sensitive Area (NSA) | Receptor | Existing Modeled | Alternate 5C | Alternate 7 | SHA's Selected Alternate | Alternate 8A | Alternate 8B |
|---|---|---|---|---|---|---|---|
| 1 | 3 | 48 | 46 | 53 | 53 | 53 | 55 |
| | 1A | 45 | 44 | 56 | 56 | 56 | 55 |
| | 1B | 46 | 44 | 56 | 56 | 57 | 57 |
| | 1BB | 44 | 45 | 56 | 56 | 56 | 56 |
| | 1C | 39 | 38 | 46 | 46 | 47 | 47 |
| | 3B | 46 | 46 | 52 | 52 | 52 | 53 |
| | 3C | 47 | 47 | 52 | 52 | 54 | 55 |
| | 4A | 63 | 60 | ***66*** | ***66*** | ***66*** | ***66*** |
| | 4B | 62 | 60 | ***66*** | ***66*** | ***66*** | ***66*** |
| | 4C | ***68*** | 65 | ***72*** | ***72*** | ***72*** | ***72*** |
| | 5D | 59 | 62 | 62 | 62 | 62 | 62 |
| | 5E | 53 | 56 | 56 | 56 | 56 | 56 |
| | 5F | 52 | 55 | 56 | 56 | 56 | 56 |
| | 5G | 52 | 54 | 57 | 57 | 57 | 56 |
| | 5H | 63 | ***66*** | ***66*** | ***66*** | ***66*** | ***66*** |
| | 5I | 59 | 61 | 62 | 62 | 62 | 62 |
| | 7C | 52 | 53 | 58 | 58 | 59 | 58 |
| | 7D | 47 | 51 | 53 | 53 | 53 | 53 |
| | 7E | 59 | 58 | 65 | 65 | 64 | 64 |
| 2 | 1 | 41 | 55 | 42 | 42 | 42 | 43 |
| | R-02 | 63 | ***67*** | ***66*** | ***66*** | ***66*** | ***66*** |
| | 5A | 52 | 56 | 56 | 56 | 56 | 56 |
| | 5B | 45 | 48 | 50 | 50 | 49 | 48 |
| | 5C | 48 | 52 | 52 | 52 | 51 | 51 |
| | 9A | 51 | ***69*** | 56 | 56 | 55 | 54 |
| | 9B | 48 | 53 | 53 | 53 | 52 | 52 |
| | 9C | 42 | 50 | 46 | 46 | 45 | 45 |
| | 9D | 40 | 48 | 43 | 43 | 43 | 43 |
| | 10A | 48 | 55 | 43 | 43 | 42 | 43 |
| | 10B | 48 | 54 | 43 | 43 | 42 | 43 |
| | 10C | 47 | 52 | 43 | 43 | 42 | 42 |
| | 10D | 47 | 52 | 44 | 44 | 42 | 42 |
| | 10E | 47 | 51 | 44 | 44 | 42 | 42 |
| | 10F | 42 | 43 | 37 | 37 | 37 | 37 |
| | 10G | 42 | 46 | 37 | 37 | 37 | 37 |
| | 11G | 47 | 51 | 42 | 42 | 42 | 42 |
| | 12A | 48 | 61 | 44 | 44 | 44 | 43 |
| | 12B | 47 | 59 | 43 | 43 | 42 | 43 |
| | 12C | 46 | 53 | 41 | 41 | 41 | 42 |
| | 12D | 46 | 49 | 41 | 41 | 41 | 41 |
| | 12E | 47 | 49 | 41 | 41 | 41 | 41 |
| | 12F | 49 | 52 | 43 | 43 | 43 | 43 |
| | 12G | 44 | 51 | 41 | 41 | 40 | 40 |
| | 12H | 45 | 49 | 41 | 41 | 42 | 42 |
| | 12I | 46 | 58 | 42 | 42 | 42 | 43 |
| | 12J | 43 | 48 | 40 | 40 | 40 | 40 |
| | 12K | 43 | 47 | 39 | 39 | 39 | 39 |
| | 12L | 44 | 50 | 40 | 40 | 40 | 40 |

*TABLE IV-14 Noise Analysis Summary (Continued)*

| Noise Sensitive Area (NSA) | Receptor | Existing Modeled | Alternate 5C | Alternate 7 | SHA's Selected Alternate | Alternate 8A | Alternate 8B |
|---|---|---|---|---|---|---|---|
| 3 | 4 | 62 | 59 | 59 | 59 | 59 | 60 |
| | 5 | 64 | 61 | 61 | 61 | 61 | 61 |
| | 2A | 51 | 48 | 57 | 57 | 56 | 56 |
| | 2B | 63 | 59 | 60 | 60 | 60 | 60 |
| | 6A | 47 | 46 | 59 | 59 | 60 | 59 |
| | 6B | 47 | 46 | 56 | 56 | 56 | 56 |
| | 6C | ***67*** | 65 | 64 | 64 | 64 | 65 |
| | 6D | 53 | 51 | 52 | 52 | 53 | 53 |
| | 6E | 55 | 54 | 52 | 52 | 52 | 52 |
| | 6F | 63 | 60 | 59 | 59 | 59 | 60 |
| | 6G | 65 | 62 | 62 | 62 | 62 | 62 |
| | 7A | 61 | 58 | 60 | 60 | 60 | 60 |
| | 7B | 54 | 54 | 55 | 55 | 54 | 55 |
| | 7F | 63 | 61 | 65 | 65 | 63 | 62 |
| | 8A | 50 | 48 | 57 | 57 | 57 | 56 |
| | 8B* | 47 | 46 | 63 | 63 | 63 | 63 |
| | 9E | 50 | 58 | 49 | 49 | 48 | 49 |
| | 11A | 54 | 56 | 46 | 46 | 46 | 46 |
| | 11B | 52 | 56 | 47 | 47 | 47 | 47 |
| | 13A | 55 | 52 | 54 | 54 | 54 | 54 |
| | 13B | 53 | 51 | 54 | 54 | 54 | 54 |
| | 13C | 51 | 51 | 51 | 51 | 51 | 52 |
| | 13D | ***69*** | ***66*** | 65 | 65 | ***66*** | ***66*** |
| 4 | R-06 | 64 | 61 | ***67*** | ***67*** | ***67*** | ***67*** |
| | 4D | 53 | 50 | 56 | 56 | 56 | 57 |
| | 4E | 55 | 53 | 58 | 58 | 58 | 58 |
| | 4F | 45 | 47 | 48 | 48 | 48 | 48 |
| | 11C | 49 | 56 | 45 | 45 | 46 | 46 |
| | 11D | 48 | 54 | 45 | 45 | 44 | 45 |
| | 11E | 49 | 50 | 46 | 46 | 45 | 46 |
| | 11H | 47 | 55 | 43 | 43 | 44 | 44 |
| | 11I | 47 | 58 | 43 | 43 | 43 | 43 |
| | 11J | 48 | 50 | 45 | 45 | 44 | 45 |
| | 11K | 47 | 54 | 43 | 43 | 43 | 43 |
| | 11L | 46 | 59 | 43 | 43 | 42 | 42 |

Note: Bold Italic values meet or exceed 66 dBA impact threshold.

* = Data collection location, no noise sensitive receptors nearby.

### a. SHA's Selected Alternate and Alternate 7

During the impact analysis for SHA's Selected Alternate and Alternate 7, six of the modeled receptors identified noise levels greater than 66 dBA. Two of the receptors, 5H and R-02 (NSA-1 and NSA-2, respectively), were located in the southern end of the study area along existing MD 97 just north of the intersection with Gold Mine Road **(Figure III-18)**. The other four receptors (R-06, 4A, 4B, and 4C) with noise levels at or greater than 66 dBA were located in the northern end of the study area along existing MD 97. Receptor R-06 represents one residence located in NSA-4, while Receptors 4A, 4B, and 4C represent three residences located in NSA-1. Each of the impacted receptors at or exceeding 66 dBA were located along MD 97 and were influenced by the 2020 no-build traffic volumes on MD 97 and not as a result of SHA's Selected Alternate and Alternate 7.

In addition to the receptors at or exceeding 66 dBA, four receptors (1A, 1B, 1BB, and 6A), while below 66 dBA, were impacted resulting from a substantial increase of 10 dBA or more. Receptors 1A, 1B, and 1BB were located in NSA 1, while Receptor 6A was located in NSA-3. These receptors represent five residences located along Dubarry Drive and Rena Court in NSA-1 and one residence located along existing MD 97 in NSA-3, respectively **(Figure III-17)**.

### b. Alternate 5C

The TNM analysis for Alternate 5C identified four of the modeled receptors with noise levels equal to or greater than 66 dBA (5H, R-02, 9A, 13D). Two of the receptors, 5H and R-02 (NSA-1 and NSA-2, respectively), were located in the southern end of the study area along existing MD 97 just north of the intersection with Gold Mine Road **(Figure III-18)**. Receptor 9A was located along Alternate 5C and represents two residences located at a common drive off of Gold Mine Road in NSA-2. Receptor 13D, was located off of Market Street close to the intersection of Market and High Streets in NSA 3.

In addition to the receptors approaching or exceeding 66 dBA, four receptors (Receptors 12A and 12B in NSA-2, and Receptors 11I and 11L in NSA-4), while below 66 dBA, were impacted resulting from a substantial increase of 10 dBA or more. These receptors were located in the proposed residential subdivision located off the proposed Bordly Drive **(Figure III-17)**.

### c. Alternate 8A

As with SHA's Selected Alternate and Alternate 7, the TNM analysis for Alternate 8A identified seven receptors with noise levels at or greater than 66 dBA in the study area. Two of the receptors (R-02 and 5H) were located in the southern end of the study area along existing MD 97 just north of the intersection with Gold Mine Road. One (13D) was located off of Market Street close to the intersection of Market and High Streets in NSA 3. The other four receptors (R-06, 4A, 4B, and 4C) with noise levels at or greater than 66 dBA were located in the northern end of the study area along existing MD 97 **(Figure III-17)**. Receptor R-06 represents one residence located in NSA 4, while Receptors 4A, 4B, and 4C represent three residences located in NSA-1. All six of the impacted receptors at or exceeding 66 dBA were located along MD 97 and were influenced by the 2020 no-build traffic volumes on existing MD 97 and not as a result of Alternate 8A.

In addition to the receptors approaching or exceeding 66 dBA, four receptors (1A, 1B, 1BB, and 6A), while below 66 dBA, were impacted resulting from a substantial increase of 10 dBA or more. Receptors 1A, 1B, and 1BB were located in NSA 1, while Receptor 6A was located in NSA-3. These receptors represent five residences located along Dubarry Drive and Rena Court and one residence located along existing MD 97 **(Figure III-17)**. These receptors are impacted resulting from the location of Alternate 8A.

#### d. Alternate 8B

As with SHA's Selected Alternate, Alternate 7, and Alternate 8A, seven of the modeled receptors for Alternate 8B had noise levels at or greater than 66 dBA for the project area. Two of the receptors (R-02 and 5H) were located in the southern end of the project area along existing MD 97 just north of the intersection with Gold Mine Road. One (13D) was located off of Market Street close to the intersection of Market and High Streets in NSA 3. The other four receptors (R-06, 4A, 4B, and 4C) with noise levels at or greater than 66 dBA were located in the northern end of the project area along existing MD 97 **(Figure III-17)**. Each of the impacted receptors at or exceeding 66 dBA were located along MD 97 and were influenced by the 2020 no-build traffic volumes on MD 97 and not as a result of Alternate 8B.

In addition to the receptors approaching or exceeding 66 dBA, four receptors (1A, 1B, 1BB, and 6A), while below 66 dBA, were impacted resulting from a substantial increase of 10 dBA or more. Receptors 1A, 1B, and 1BB were located in NSA-1, while Receptor 6A was located in NSA-3. These receptors represent five residences located along Dubarry Drive and Rena Court and one residence along existing MD 97 **(Figure III-17)**. These receptors are impacted from the location of Alternate 8B.

### 2. Impact Assessment and Abatement Consideration

The need for consideration of mitigation measures was identified based upon the FHWA Noise Abatement Criteria (NAC) and the current SHA Noise Policy. Noise control for minimizing noise impacts may be warranted in those areas where noise levels from the roadway exceed the NAC, or where noise levels would substantially increase over existing ambient noise levels.

Where warranted as a result of the impact analysis, a detailed analysis of mitigation measures was conducted. Existing natural terrain and designed mitigation features, such as cut sections and/or retaining walls, were incorporated into the analysis of abatement and mitigation measures.

Decisions on the implementation of noise abatement measures were considered only after careful and thorough consideration of the feasibility and reasonableness of proposed noise abatement measures. Under the current SHA Noise Policy, several factors are evaluated to determine whether noise abatement is feasible and reasonable.

### 3. Sound Barrier Feasibility and Reasonableness

The determination of feasibility and reasonableness of providing sound barriers will consider the following for both the Type I and Type II elements of the sound barrier program.

### a. Feasibility

Sound barrier feasibility is defined as the engineering and acoustical ability to provide effective noise reduction. Sound barrier feasibility will be based upon the following.

- If noise levels cannot be reduced by at least 3 dBA at impacted receptors, a noise barrier will not be considered feasible. The noise reduction goal for receptors with the highest noise levels (first row receivers) is 7-10 dBA. If a noise reduction of 7-10 dBA cannot be achieved, the barrier will be considered not to be feasible.

- If the placement of a sound barrier will restrict pedestrian or vehicular access or would cause a safety problem, such as limiting sight distance or reduction of a vehicle recovery area, the barrier will not be considered feasible.

- If the construction of a sound barrier will result in significant utility impacts, the barrier will not be considered feasible. Significant utility adjustments can have a major impact on barrier design options and construction costs.

- If construction of a sound barrier will have an impact upon existing drainage, it could be considered not to be feasible. Drainage is an important element in the locations and design of a sound barrier. The potential for impact to drainage patterns and system and flooding will be considered in the overall decision on whether construction is feasible and reasonable.

### b. Reasonableness

Each individual impact area will also be evaluated to determine if construction of a sound barrier is reasonable. Reasonableness will be based upon the following:

- If 75 percent of the impacted residents do not approve the proposed sound barrier, the barrier could be considered not to be reasonable.

- For Type I projects, if existing noise levels are expected to increase by 10 dBA or more, but will be less than 57 dBA, a sound barrier will be considered not to be reasonable.

- For Type I projects, if a change over no-build levels of less than 3 dBA would result from a build condition, a sound barrier could be considered not to be reasonable. 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 at noise sensitive receivers that existed when prior improvements were made is equal to or greater than 3 dBA, noise abatement could be considered reasonable.

- If noise levels equal or exceeded 72 dBA at impacted noise sensitive receivers, SHA will consider a sound barrier reasonable for any proposed highway expansion that will increase noise levels provided that other feasibility and reasonableness criteria are met.

- If the cost of a sound barrier will exceed $50,000 per benefited residence, the barrier will be considered not to be reasonable. The cost per residence is determined by the dividing the cost of a sound barrier by the total number of benefited residences. The total number of benefited residences will be the sum of the following:

    (1) The number of impacted residences that would receive a 3 dBA or greater noise reduction.
    (2) The number of non-impacted residences (noise levels below 66 dBA Leq) that would receive a 5 dBA or greater noise reduction.
    (3) The number of impacted and non-impacted non-residential noise sensitive receivers (schools, churches, etc.) that would benefit from a sound barrier.

For Type I projects, SHA will look at both the cost/residence for individual noise sensitive areas and the average cost/residence for the entire project in determining reasonableness. Noise sensitive areas with a cost/residence of less than $100,000 would be included in the project cost averaging. If the average cost/residence for the project is less than $50,000, sound barriers will be considered reasonable. A total cost of $16.54 per square foot is assumed to estimate total barrier cost. This cost figure is based upon current costs experienced by SHA and includes the costs of panels, footings, drainage, landscaping, and overhead.

- If a very tall sound barrier would have to be located close to the impacted receptors, and would have a negative visual impact, construction of the barrier could be considered not to be feasible. The relationship of the location of a sound to the receptors to be protected will be considered in making a reasonableness determination.
- If the construction of a sound barrier will result in an impact to a Section 4(f) resource, it could be determined not to be reasonable. Section 4(f) resources include publicly owned recreation areas and parks, wildlife areas, conservation areas, and historic sites that either are on or considered eligible for the National Register.

Reasonableness will consider the significance of impact and the feasibility of avoidance. A Section 4(f) Evaluation **(Section V)** has been prepared as required by federal regulations and consultation and coordination with those responsible for the resource will be carried out and documented.

- The control of new development adjacent to state highways in high noise zones at the local level is critical to the overall abatement of highway noise. Sound barrier reasonableness will consider the local priority on approving new development adjacent to state highways in the determination of providing noise abatement for highway construction or reconstruction projects.

### 4. Detailed Analysis of Impacted Areas and Feasibility and Reasonableness

The following is a detailed analysis of the impacted areas identified and the feasibility of noise control for each alternate:

#### a. SHA Selected Alternate, Alternate 7M

As identified in the impact analysis section, the residences impacted are the same for SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B. While there are minor differences

with respect to the vertical and horizontal alignment for these alternates, there are no significant differences between the sound level predicted for the alternates at the impacted receptors. Therefore, the mitigation measures analyzed for SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B are the same.

Receptor 5H represents one residence located along the western side of MD 97 at the Gold Mine Road intersection. A noise abatement wall 400 feet long and 20 feet high would be required at a cost of approximately $132,000 per residence. This cost is well above the SHA reasonableness criteria of $50,000 per benefited residence. In addition, construction of a noise abatement wall would not be effective because of the noise contribution from Gold Mine Road.

Receptor R-02 represents one residence located along the east side of MD 97 at the Gold Mine Road intersection. Similar to the analysis for receptor 5H, a noise abatement wall 400 feet long, and 20 feet high would be necessary at a cost of approximately $132,000 per residence. This cost is well above the SHA reasonableness criteria of $50,000 per benefited residence.

Receptors 1A, 1B, and 1BB represent five residences located along Dubarry Drive and Rena Court in NSA-1. Construction of a noise abatement wall along the top of the slope of the proposed alignment would not be reasonable according to the SHA Noise Policy. The noise impact at these residence , while increasing by 10 dBA or more, does not exceed 57 dBAs. This area, while not qualifying for a noise barrier, was close enough to the SHA criteria that it will be reassessed in final design.

Receptor 6A is located within the historic boundary of Brookeville in NSA-3. Receptor 6A was placed in the back yard area of one residence, which has access to existing MD 97. As with receptors R-02 and 5H, a noise abatement wall 400 feet long and 20 feet high would be necessary for Receptor 6A. Sound mitigation is not reasonable based on a cost per residence of $132,000, which exceeds SHA's Noise Policy criteria of at or below $50,000 per residence.

### 5. Construction Noise

Land uses that would be sensitive to vehicular noise would also be sensitive to construction noise. Although highway construction is a short-term phenomenon, it can cause significant noise impacts. Additionally, it is likely that some construction may occur at night to avoid severe traffic impacts. The extent and severity of the noise impact would depend upon the phase of construction and the noise characteristics of the construction equipment in use. Construction would have direct impact on receptors located close to the construction site and would have an indirect impact on receptors located near roadways whose traffic flow characteristics are altered due to rerouting from the construction site.

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 construction equipment that would likely be sources of construction noise:

- Bulldozers and earthmovers
- Graders
- Front End Loaders

- Dump Trucks and other diesel trucks
- Compressors

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

## M. MUNICIPAL, INDUSTRIAL, AND HAZARDOUS WASTE SITES

The No-Build Alternate would not impact waste sites in the project area.

There is potential for each Build Alternate to impact one of the underground storage tanks (UST) listed in the ERIIS report. These sites are shown on **Figure III-17**. SHA's Selected Alternate, Alternate 7, Alternate 8A, and Alternate 8B could impact a currently active UST containing gasoline north of the proposed roundabout along MD 97. If impacted, formal Phase I and probably Phase II studies would be warranted to investigate potential liability issues. Alternate 5C would not impact a currently active UST containing gasoline along MD 97 at the northern end of the project area, near a pond on Camp Bennett property.

It is recommended that subsurface soil and groundwater samples be collected and analyzed as a part of a Phase II-Preliminary Site Investigation (PSI) prior to acquisition of property involving any of these sites. The purpose of the PSI would be to chemically characterize the sites in question and determine if hazardous materials would be encountered during construction of the roadway.

As part of final design, the area of contact with each of these sites would be thoroughly investigated and necessary site-specific measures to minimize impacts would be identified. This would most likely involve the removal and disposal of the waste at an authorized and permitted disposal facility.

## N. ENERGY

There would be no notable differences in energy usage requirements between the alternates. Initially, the No-Build Alternate would require the least amount of expended energy as compared to the construction of a Build Alternate. However, in the long term, the energy expended due to projected traffic congestion in the design year as a result of selecting the No-Build Alternate is likely to exceed the initial energy expenditure for construction of one of the Build Alternates.

## O. SECONDARY AND CUMULATIVE EFFECTS ANALYSIS

### 1. Introduction

Secondary impacts are defined by the Council on Environmental Quality (CEQ) as those that are "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable" (40 CFR 1508.8). The objective of the secondary impact evaluation is to identify potential areas that are likely to develop, or be induced to develop, because of the proposed alternates and to identify/assess the resultant secondary impacts.

Cumulative effects are defined by the CEQ as those, which result from "the incremental impact of the action when added to other past and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). The objective of the cumulative impact evaluation is to identify additional major infrastructure improvement projects that are either planned or have been recently completed in the project area and region within the secondary and cumulative effects analysis (SCEA) time frame; identify potential future land uses; and to identify/assess the resultant cumulative impacts to environmental resources.

### a. Boundary Development

The geographic boundary for conducting a SCEA is shown on **Figure IV-1.** The determination of the SCEA boundary is based on an overlay of census tract and planning area boundaries, the Area of Traffic Influence, sub-watershed boundaries, sewer and water service locations, and various environmental resources. Portions of the Rocky Gorge sub-watershed boundary were also considered in establishing the SCEA boundary.

All of the Build Alternates retained for detailed study would be located entirely within the Rocky Gorge sub-watershed (a sub-watershed of the Patuxent River). Rocky Gorge Dam is on the Patuxent River southeast of Brookeville. The dam is an effective sediment trap and is well downstream of the Brookeville area. Therefore, the dam is the downstream extent as well as the southeast limit of the SCEA boundary.

The Patuxent River State Park generally parallels the Patuxent River on both sides. Additionally, the Patuxent River is the boundary between Montgomery and Howard Counties. Western Howard County is zoned Rural Conservation and Rural Residential, and does not have the sewer and water infrastructure planned to accommodate large-scale residential development. Based on communication with the Howard County Department of Planning and Zoning, improvements to MD 97 in Brookeville would not have an effect on zoning in Howard County (Rutter, J., 1997). A review of MDP agricultural lands mapping for western Howard County reveals an abundance of properties already protected through various state and county easements. For these reasons, Howard County (other than the Howard County portion of the Patuxent River State Park) was not included in the SCEA boundary. The northern and eastern SCEA boundaries are coincident with Patuxent River State Park within Howard County from MD 108 to the Rocky Gorge Dam, 12 miles downstream of Brookeville.

In Montgomery County, north of the Brighton Dam, the limits of Patuxent River State Park are not within the Rocky Gorge sub-watershed. However, this section of the park is included within the SCEA boundary in order to address potential secondary and cumulative effects of the planned replacement of the MD 97 Bridge over the Patuxent River. Therefore, a large section of the park west of the MD 97 Bridge to MD 108 is included. At the request of resource agencies, the boundary was extended to include a section of the Patuxent River State Park in Montgomery County. The boundary connects to the Rocky Gorge sub-watershed near the intersection of MD 108 and MD 650, and generally follows the divide of the Rocky Gorge sub-watershed. The western boundary coincides with this divide extending to the southeast extending from MD 650 to the Patuxent River State Park. As in Howard County, the park limits are used as the SCEA boundary from MD 108 south to Rocky Gorge Dam.

### b. Secondary and Cumulative Effects Time Frame

The time frame for the SCEA takes into account past, present, and reasonably foreseeable future actions. As the traffic forecasting models incorporate future land use assumptions, 2020 is the future time frame for the SCEA.

Land use data was a key element in determining the time frame for the Brookeville SCEA. Readily available land use data included mapping from 1973, 1990, and 1997. Prior to 1970, land use data was limited. In addition, several events that affected Brookeville occurred in the early 1970's including accelerated urbanization in Olney and the construction of a sewer pumping station in Brookeville, which supported the development of larger subdivisions. Therefore, 1970 was selected as the starting point for the SCEA.

### c. Secondary and Cumulative Effects Methodology Overview

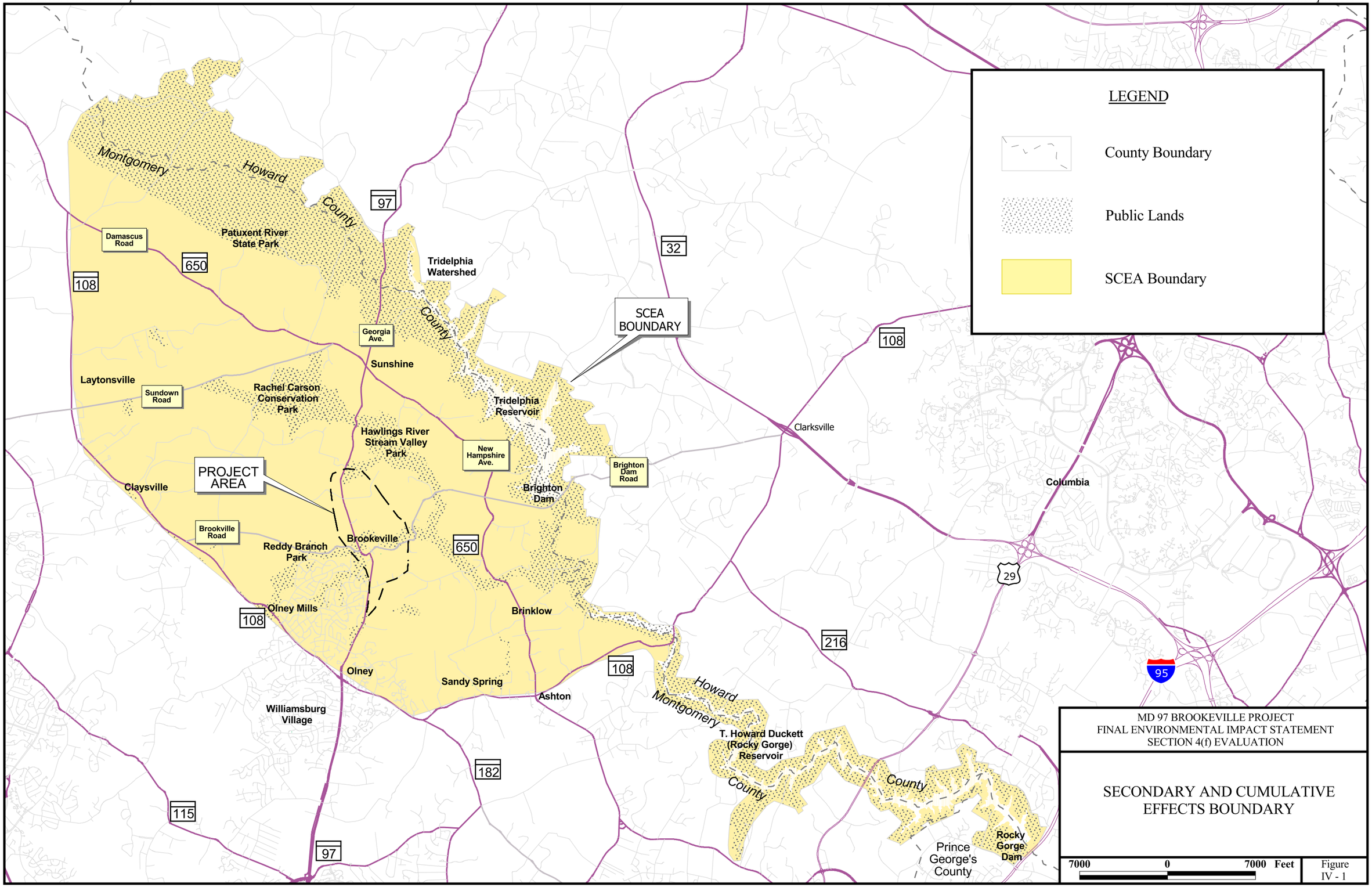
The assessment methodology incorporated past and present land use and socio-economic changes. In addition, future land use patterns that are foreseeable and may influence the project were considered. A series of trends analysis based on overlays of each resource were conducted. The trends analysis consisted of reviewing analytical and mapped data to identify past, present, and future effects.

Various overlay exercises, using a combination of paper maps and GIS technology, were conducted to identify relationships between resources. The boundary development and population analysis used census tracts, planning area boundaries, Washington Council of Government's Transportation Analysis Zones, zoning classification within the Olney Master Plan boundaries, and Rocky Gorge sub-watershed boundaries. Census Tracts 7001.03, 7013.04, 7013.09, 7013.10, and 7014.08 were overlaid with Montgomery County Planning Area 23. **Figure IV-2** illustrates the census tracts, the Transportation Analysis zones, and the Rocky Gorge sub-watershed boundaries. Planning Area 23 is shown on **Figure IV-3.**

## 2. Trends Analysis Overview

### a. Development and Infrastructure Trends

The land use along MD 97 in Montgomery County is primarily residential with little or no industrial or business development. Most of the recent residential development near the MD 97 Brookeville Project occurred in Olney from 1970 through 1995. During this time, northeast Olney changed from primarily agricultural land to residential land. North of the Town of Brookeville, zoning is primarily low density residential. According to M-NCPPC Development Review Division minimal development is planned north of the Town of Brookeville. Record plats and preliminary development plans were obtained. In general, there are few proposed developments with the majority typically being one to four lots per plat. Development is generally piecemeal, by individual owners selling parcels of land that are limited to low density development. Few major subdivisions were identified. Those that were evident, either recently built or proposed, were almost all south of the Town of Brookeville. One exception to this is the Abrams subdivision, recently constructed immediately northeast of the Town of Brookeville. This subdivision is part of the Brookeville Farms community. Part of the Abrams subdivision project includes the extension of Bordly Drive




MD 97 BROOKEVILLE PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT
SECTION 4(f) EVALUATION

SECONDARY AND CUMULATIVE EFFECTS BOUNDARY

7000 0 7000 Feet

Figure IV - 1

to existing MD 97. Montgomery County is extending Bordly Drive from MD 97 to a point where the developer responsible for the Abrams subdivision has completed its portion of Bordly Drive. The extension is expected to be completed in Fall 2003. The extension of the road is limited east of MD 97 and will not add additional through lanes along MD 97. Water for the Abrams subdivision has been provided by WSSC. There is no sewer capacity throughout the subdivision nor are there any long term sewer plans by WSSC for this area. Dellabrooke, a 44-lot subdivision is near completion along Gold Mine Road, just outside of Olney. It is in a rural neighborhood cluster zone, with and overall density of one unit per 2.2 acres, and is served by sewer. An overall density of one unit per five acres is permitted in this area. Development may be clustered into lots smaller than five acres and the remaining acreage may be used as open space.

Development in the northern portion of Planning Area 23 is fairly restricted because it is in a rural policy area and densities are limited to one unit per five acres or one unit per 25 acres. The Olney Policy Area, different than Planning Area 23, is under a development moratorium because traffic capacity cannot meet the demands of new development. It will take two to three years to increase road capacity that would allow new development.

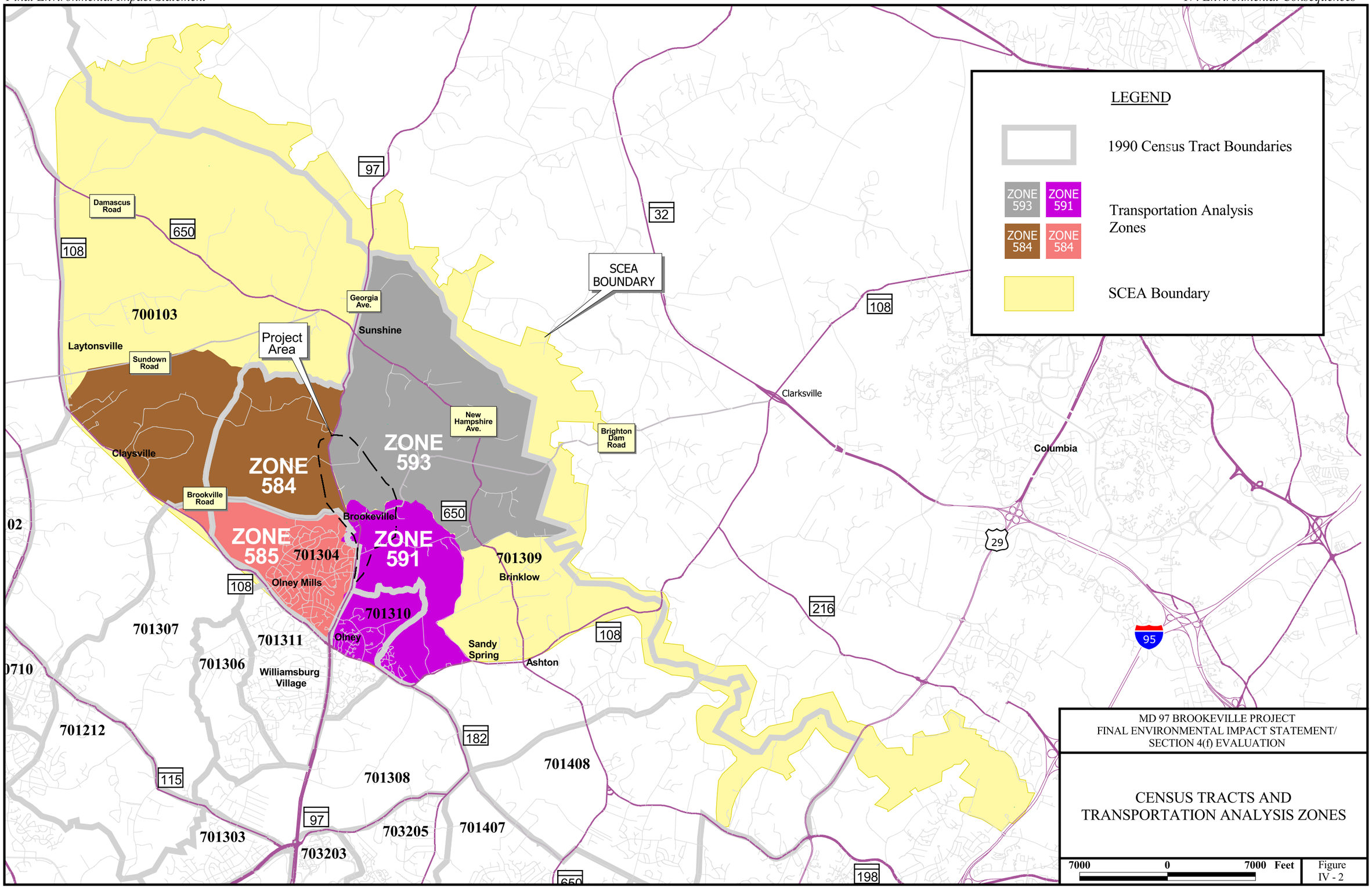
Sandy Spring/Ashton area is outside of the Olney Policy Area, east along Olney-Sandy Spring Road toward the reservoir. This area is a rural policy area, restricting density to one unit per five acres.

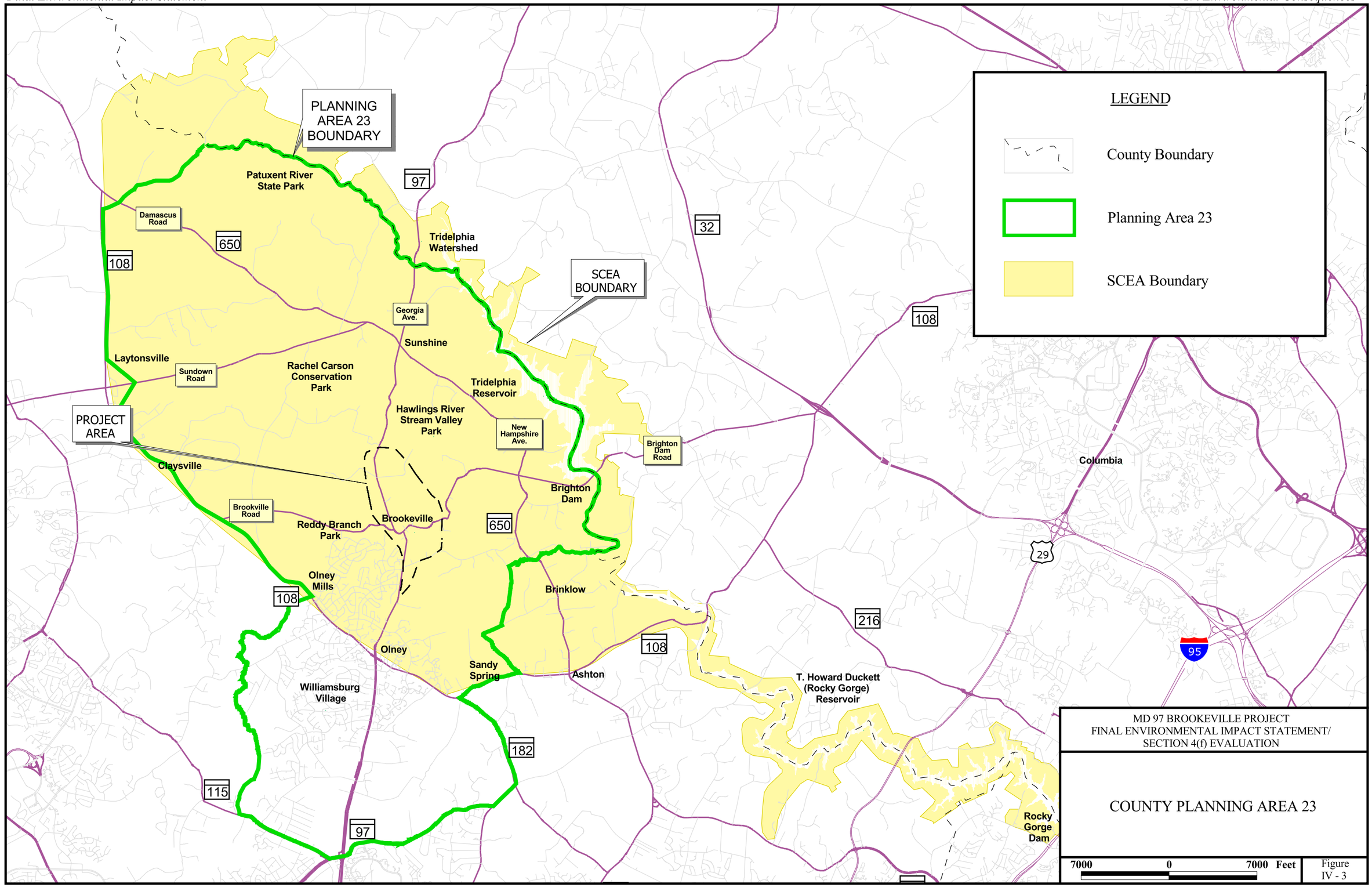
Sewer pumping stations and associated sewer lines were constructed in the Brookeville area in 1969. Sewer extensions have been limited to those areas south of Brookeville. Several metro stations are located in the vicinity of Brookeville including Glenmont (7.5 miles south of Brookeville), opened in 1998; Wheaton (11 miles south of Brookeville), opened in 1990; and Shady Grove (7.5 miles southwest of Brookeville), opened in 1984. Historic traffic volumes along MD 97 have not shown significant increases, growing at an average growth rate of two percent annually over the past 20 year period. No large employers are known to be present within the SCEA boundary. Commercial operations are limited to working farms and small businesses located within rural villages and within private homes.

### b. Zoning Trends

As discussed in **Section III.A.3.b**, the Town of Brookeville is using Montgomery County zoning categories to guide future residential development, and land use controls are in place. Current zoning limits the amount of development within the secondary and cumulative effects boundary. Areas north and west of Brookeville are primarily zoned RDT, which requires a minimum of 25 acre lots for residential use. The area east of Brookeville is zoned Rural Cluster, which allows one home per five acres with provisions for open space.

The construction of new roadways can often be the catalyst for challenging existing zoning, typically to an increase in density. However, the Build Alternates are not expected to spur development or additional public works projects that would alter the landscape outside of the proposed ROW lines. As discussed earlier in **Section IV**, there would be limited access along any of the proposed bypasses. To ensure this, permanent easements would be held along the entire roadway preventing future access, widening, or connections to the bypass. A large part of the SCEA boundary is also already protected as either state and county parkland or private lands protected through a variety of agricultural and conservation easements. These protected lands are exempt from any future changes to existing zoning.


LEGEND
1990 Census Tract Boundaries
ZONE 593
ZONE 591
ZONE 584
ZONE 584
Transportation Analysis Zones
SCEA Boundary
SCEA BOUNDARY
Project Area
ZONE 584
ZONE 593
ZONE 585
ZONE 591
97
650
32
108
Damascus Road
Georgia Ave.
Sunshine
Laytonsville
Sundown Road
New Hampshire Ave.
Brighton Dam Road
Clarksville
Columbia
Claysville
Brookville Road
Brookeville
Olney Mills
Brinklow
Olney
Sandy Spring
Ashton
Williamsburg Village
29
216
95
182
115
198
700103
701304
701309
701310
701307
701311
701306
701212
701308
701408
701303
703203
703205
701407
MD 97 BROOKEVILLE PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT/
SECTION 4(f) EVALUATION
CENSUS TRACTS AND
TRANSPORTATION ANALYSIS ZONES
7000 0 7000 Feet
Figure IV - 2


PLANNING AREA 23 BOUNDARY
SCEA BOUNDARY
PROJECT AREA
LEGEND
County Boundary
Planning Area 23
SCEA Boundary
Patuxent River State Park
Damascus Road
650
108
97
Tridelphia Watershed
Georgia Ave.
Sunshine
Laytonsville
Sundown Road
Rachel Carson Conservation Park
Tridelphia Reservoir
Hawlings River Stream Valley Park
New Hampshire Ave.
Brighton Dam Road
Claysville
Brookville Road
Reddy Branch Park
Brookville
Brighton Dam
Olney Mills
Brinklow
Olney
Sandy Spring
Ashton
Williamsburg Village
182
115
97
T. Howard Duckett (Rocky Gorge) Reservoir
Rocky Gorge Dam
32
108
Columbia
29
216
95
MD 97 BROOKEVILLE PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT/
SECTION 4(f) EVALUATION
COUNTY PLANNING AREA 23
7000 0 7000 Feet
Figure IV - 3

Olney and Olney Mill are the only two large residential growth areas within the SCEA boundaries. Olney is centered around the intersection of MD 97 and MD 108 and consists of both commercial development and residential subdivisions. Olney Mill consists entirely of several residential subdivisions and is located west of MD 97, north of MD 108, and south of Reddy Branch Stream Valley Park along Brookeville Road. The recently constructed Abrams subdivision, which is located east of Brookeville, required converting existing open space to alternative land uses within the SCEA boundaries. This could result in the loss of regulated and unregulated natural and cultural resources, which are characterized and discussed in Subsections 5 and 6. Any future land use changes would likely follow existing roadway corridors in or near areas that have already been developed, thereby minimizing potential impacts to the social or natural environment.

### c. Transportation Trends

The following traffic improvements have occurred, or are planned, within the SCEA boundary:

- The dualization of MD 97 from MD 28 to MD 108 was completed in 1988. The northern terminus of this project is two miles south of Brookeville immediately outside of the secondary and cumulative analysis area.

- The MD 97 Bridge over the Patuxent River, located four miles north of Brookeville, was replaced in 1999 in order to raise it above the floodplain level. This two-lane bridge replacement does not add capacity to MD 97.

- The Montgomery County Department of Public Works, in cooperation with M-NCPPC, initiated a study of Bordly Drive from Georgia Avenue to connect with the Brookeville Farm development located east of Holiday Drive. The county is currently extending the road to where the developer of the Abrams subdivision has completed its portion of Bordly Drive. The typical roadway section includes a pavement width of 24 feet with eight feet of shoulders on each side, and a bike path on the south side. The connecting road is expected to be completed in Fall 2003.

- Howard Chapel Road Bridge was replaced in 2001. The bridge, located over the Patuxent River on the Montgomery and Howard County line, has been reconstructed without additional lane widening.

- The SHA is in the process of preparing a draft environmental impact statement for the Intercounty Connector Project. This project is proposing to link existing and proposed development areas between the I-270 and I-95/US 1 corridors within central and eastern Montgomery County and northwestern Prince George's County with a multi-modal, east-west highway. The study area is roughly bounded by I-495 to the south, I-270 to the west, I-95 to the east, and the Patuxent River to the northeast.

### d. Upper Patuxent Watershed Rural Legacy Area

Montgomery County's Upper Patuxent River Reservoir Watershed (UPRRW) Rural Legacy Areas Program is a land conservation measure that ensures limited sprawl within the SCEA boundary. In 1999, the state approved the UPRRW as one of Maryland's designated Rural Legacy Areas. In addition, the county received $850,000 in funding to purchase and preserve properties within the watershed, primarily along Patuxent River State Park and Hawlings River Stream Valley Park

**(Figure IV-4)**. Howard County also has an approved Upper Patuxent River Rural Legacy Area which is adjacent to portions of Montgomery County's Rural Legacy Area. Approximately 70 percent of the SCEA boundary is covered by the UPRRW. As a designated Rural Legacy Area, development and infrastructure opportunities are substantially limited (Rural Legacy is discussed further in **Section IV.O.4.c**-Agricultural Lands), especially in the northern and western portions of the SCEA boundary.

### 3. Social Environment

#### a. Population

Montgomery County has experienced substantial growth over the last two decades and has been the state's most populous jurisdiction since 1989. The total household population for 2000 was estimated at 873,341, a 15.4 percent increase over 1990's total population of 757,027. The county's population is expected to increase over the next two decades, although the rate of increase is estimated to decline compared to the two previous decades.

Within the SCEA boundary, three population profiles were considered. All three population and household profiles reflect similar trends, namely that north of Brookeville both population and household increases since 1990 have been low. Estimates for population and household numbers south of Brookeville are more characteristic of urbanized areas within the county.

The majority of the SCEA boundary within Planning Area 23 experienced marginal growth. Planning Area 23 included major growth sections, especially to the south, that reflected greater increases than the more rural portions of the planning area.

The second population profile included population and household numbers associated with SHA's Area of Traffic Influence study **(Figure IV-2)**. Transportation Analysis Zones 584 and 593, located north of Brookeville and outside the PFA, showed minimal population change since 1990 (discussed further under Smart Growth and Neighborhood Conservation Act Compliance Section). Projected population for both zones is lower than 2,000 people and 1,000 households.

Transportation analysis zones 585 and 591 are located south of Brookeville, within the PFA. Zone 585 populations from 1990 to 2000 increased slightly from 5,430 to 5,554, yet are expected to decline to 5,282 by year 2020. Household numbers are generally the same from 1990 to 2000 and are expected to remain below 2,100 households through 2020. Transportation analysis zone 591, which includes Olney, experienced dramatic population growth from 1990 to 2000. During this timeframe, the numbers for households and population almost tripled. The current growth rate through 2020 anticipates an increase of approximately 1,300 people. Additional household increases will be slightly over half of the population, or 675 new households by 2020.

The construction of any of the Build Alternates is not anticipated to encourage secondary and cumulative growth because the proposed roadway would limit access to two locations north and south of Brookeville and the local land use controls preclude major development from occurring. In addition, based on the population projections, the need for housing is not anticipated throughout the majority of the SCEA boundary other than immediately surrounding Olney. The project is in response to a localized need and is not expected to induce regional population growth or interfere

with existing community facilities and services. The project is intended to improve the quality of life of the citizens and patrons of Brookeville by reducing the volumes of through traffic.

### b. Economic Profile

There are no major employment centers within the SCEA boundary and no major commercial developments or infrastructure improvements are planned. MD 97 is used by commuters who travel to Washington, D.C. and the surrounding area. Residential and commercial development is not anticipated to significantly increase because of the proposed Build Alternates due to its limited access and local land use controls. Employment opportunities and the local and regional tax base are not expected to notably change with or without the improvements to MD 97. No new commercial/business development is planned in the reasonably near future that would be dependent on MD 97 or its proposed improvements. In conjunction with the projects planned within the SCEA boundary, the Build Alternates are not anticipated to have an influence on the local or regional economy.

## 4. Natural Environment

***Secondary Effects***

Secondary development resulting from the improvements to MD 97 is not anticipated. Development along the proposed roadway is unlikely because the Build Alternates would be limited-access facilities, and because land use controls are in place. Furthermore, Montgomery County has amended their Annual Growth Policy to discourage sprawl around Brookeville. According to the amendment no capacity for new development will be counted beyond the boundary of Brookeville because of relocating MD 97 around the Town. Current zoning favoring rural to low-density development further reduces development pressures associated with the Build Alternates. The majority of development that has occurred throughout the SCEA boundary over the last 20 years has been primarily located south of the Town of Brookeville, in areas such as Olney, which are zoned for high density residential and commercial. As a result, each of the proposed Build Alternates would result in more localized or direct natural resource effects associated with the physical location of the alternates.

***Cumulative Effects***

Key environmental resources were evaluated to determine if cumulative impacts would occur because of the MD 97 Brookeville Project. More detailed cumulative effects analysis has been conducted on the following resources:

- Water Resources (includes surface water, groundwater, wetlands, and floodplains)
- Forest Habitat
- Agricultural Lands
- Endangered Species
- Historic and Archeological Sites

### a. Water Resources

#### (1) Surface Water

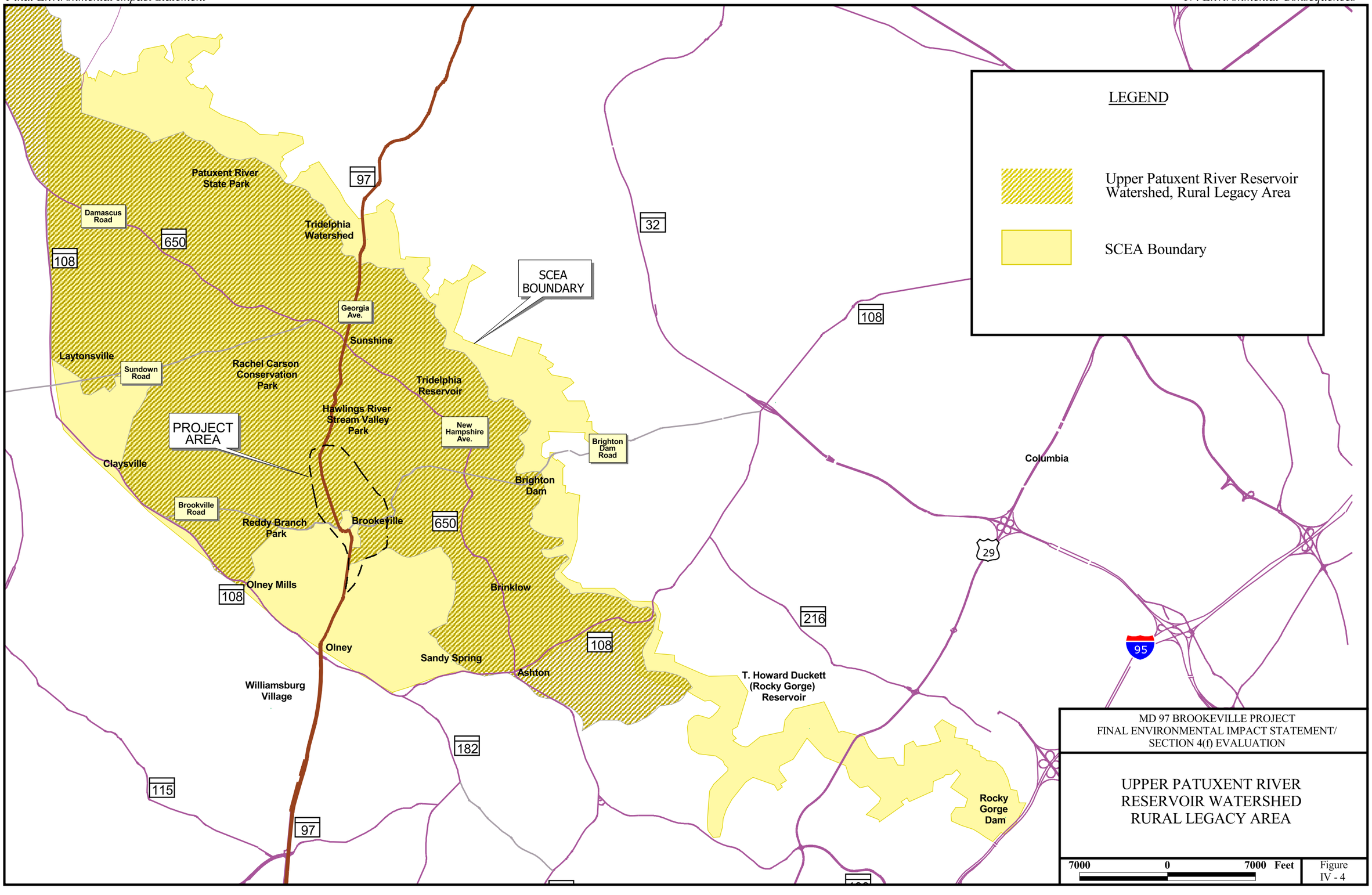
Current and historical surface water data for streams and reservoirs within the SCEA boundary were analyzed. Water quality data included physical parameters as pH, temperature, dissolved oxygen, and chemical parameters such as nutrient loading and toxics. Complementary data was also used to assess biological health of the streams including benthic macroinvertebrates and fish, habitat assessments, and watershed conditions. The time period from approximately 1970 to the present was researched; however; the most readily available and complete data was from 1990 to the present. Sources included the United States Geological Survey (USGS), USEPA, MDE, DNR, Howard County Government, and Montgomery County Government.

#### (1a) Laws and Regulations

Water quality regulations are stipulated and enforced by MDE in the Code of Maryland Annotated Regulations (COMAR) Title 26 Department of the Environment, Subtitle 08 Water Pollution, Chapter 02 Water Quality. To protect surface water quality the state has adopted water quality standards that protect public health and welfare, enhance the quality of water, and protect aquatic resources. Specific designated uses with applicable water quality criteria have been established for Maryland's tidal and non-tidal waters (COMAR 26.08.02.01-A).

According to COMAR, Use I-P, III-P and IV-P streams exist within the SCEA boundary. Specific designated uses for Use I-P streams include water contact recreation, protection of aquatic life, and public water supply. More specifically, they include water contact sports, fishing, growth and propagation of fish (other than trout), other aquatic life, wildlife and agricultural, and industrial water supply. Use I-P waters include the Patuxent River and all its tributaries from Rocky Gorge Dam to the upstream limit of Rocky Gorge Reservoir. Use III-P are natural trout waters and public water supply with waters suitable for the growth and propagation of trout and capable of supporting self-sustaining trout populations and their associated food organisms. The Patuxent River and its tributaries above Triadelphia Reservoir are considered Use III-P waters. Use IV-P streams are recreational trout waters and public water supply that include cold or warm waters which are capable of holding or supporting adult trout for put-and-take fishing or are managed as a special fishery by stocking. The Patuxent River and its tributaries between Rocky Gorge Reservoir and Triadelphia Reservoir, including Triadelphia Reservoir are considered Use IV-P.

The SCEA boundary is completely within the Patuxent River sub-basin. The Patuxent River flows generally in a southeasterly direction from its headwaters beyond the northwestern portion of the study area to its mouth at the Chesapeake Bay in southern Maryland. The Patuxent drains portions of seven Maryland counties including Montgomery, Howard, and Prince George's, which are partially included in the SCEA boundary. Land use in the Patuxent River basin is dominated by agriculture (44%) and forest (34%), with urban (16%) and wetland (6%) uses making up the remainder (MOP, 1997).


LEGEND
Upper Patuxent River Reservoir Watershed, Rural Legacy Area
SCEA Boundary
PROJECT AREA
SCEA BOUNDARY
Patuxent River State Park
Damascus Road
Tridelphia Watershed
Georgia Ave.
Sunshine
Laytonsville
Sundown Road
Rachel Carson Conservation Park
Tridelphia Reservoir
Hawlings River Stream Valley Park
New Hampshire Ave.
Brighton Dam Road
Brighton Dam
Claysville
Brookville Road
Reddy Branch Park
Brookeville
Olney Mills
Brinklow
Olney
Sandy Spring
Ashton
Williamsburg Village
T. Howard Duckett (Rocky Gorge) Reservoir
Rocky Gorge Dam
Columbia
97
650
108
32
216
182
115
29
95
MD 97 BROOKEVILLE PROJECT
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UPPER PATUXENT RIVER
RESERVOIR WATERSHED
RURAL LEGACY AREA
7000 0 7000 Feet
Figure
IV - 4

The SCEA boundary is in the upper portion of the Patuxent sub-basin and includes two Maryland eight digit watersheds, the Brighton Dam Watershed (02131108) and the Rocky Gorge Dam Watershed (02131107) (DNR, 2000). The Brighton Dam Watershed drains the northern portion of the SCEA study area and includes the Triadelphia Reservoir. Major tributaries to the Patuxent in this watershed include Cabin Branch and Cattail Creek in Howard County and Haights Branch in Montgomery County. The Rocky Gorge Dam Watershed drains the southern portion of the study area and includes the T. Howard Duckett Reservoir. Major tributaries to the Patuxent River in this watershed include Hawlings River, Reddy Branch, and James Creek, all in Montgomery County.

The Triadelphia and T. Howard Duckett Reservoirs are maintained and operated by the WSSC. Water from these reservoirs is pumped to the Patuxent Water Filtration Plant for processing and is a major water source for the Washington Metropolitan Area. Because of its importance in water supply, the Patuxent Reservoir Protection Group issued a Patuxent Reservoir Protection Strategy in 1995. By 1996, an agreement between Howard, Montgomery, and Prince George's Counties, M-NCPPC, WSSC, and the Howard and Montgomery Soil Conservation Districts committed to develop and implement initiatives for long term protection of the watershed.

Much of the SCEA study area is within the Patuxent Primary Management Area (PMA). According to the Montgomery County Department of Environmental Protection (MC-DEP), the PMA is a stream buffer within which land use and development is monitored to reduce nonpoint source pollution, and improve and protect stream conditions. Goals of the PMA are to maintain low-density, low intensity land uses within 1/4 mile of the Hawlings and Patuxent Rivers' mainstem, and within 1/8 mile of associated tributaries, and to actively establish a minimum 50 foot forested buffer strip immediately adjacent to all streams. The PMA guidelines are applied to development projects submitted to M-NCPPC for subdivision and/or site plan review, and are otherwise voluntarily implemented and strongly encouraged on remaining parcels throughout the watersheds (MC-DEP, 1998). Montgomery County also developed a Strategic Plan for Water Quality Protection in 1996 to identify water quality goals and objectives including proactive measures such as best management practices, watershed project inventories, and feasibility planning studies.

Historically, nutrient loading has not been regularly observed in most Montgomery County streams. This is due in large part to the high gradient and flow observed in most County streams. Recent concerns have arisen about nutrient loading in the impounded waters at the Triadelphia and T. Howard Duckett Reservoirs. This has led to an interjurisdictional Patuxent Reservoirs Agreement in October 1996 to address nitrogen and phosphorous loadings from contributory watersheds. National Pollutant Discharge Elimination System (NPDES) permits in both Montgomery and Howard Counties are also addressing these concerns. In addition, Maryland's Total Maximum Daily Load (TMDL) Program has established maximum allowable pollutant loading for specific water bodies to meet water quality standards (Smith, 2001). Surface waters on Maryland's 303(d) list for TMDL's were approved by USEPA Region III. They include the Patuxent River, immediately downstream of the Rocky Gorge Dam to MD Route 214, for nutrients and suspended sediments due to nonpoint sources and natural sources. Additions to Maryland's 303(d) list in 1998 include the Triadelphia Reservoir Impoundment for both nutrients and sedimentation due to non-point sources. The Rocky Gorge Reservoir Impoundment was also listed for nutrients due to non-point sources. There is currently no draft TMDLs in the study area.

### (1b) Trends Analysis

The MC-DEP developed its Countywide Stream Protection Strategy (CSPS) in 1998 based on an intensive multi-agency and volunteer evaluation of aquatic life, stream channel habitat, and water chemistry data from over 200 monitoring stations. Results from this study indicate that nearly all

Montgomery County streams meet, and historically have met, Maryland water quality standards for dissolved oxygen, temperature, and pH (MC-DEP, 1998). Biological assessment revealed more variance and classifications of county stream miles fell into the following categories: 8 percent in excellent condition, 46 percent in good condition, 26 percent in fair condition and 9 percent in poor condition. Stream erosion and sedimentation due to inadequately controlled stormwater were the dominant impacts to habitat condition. The impairment appears to be a factor of the transition from natural land cover to impervious surfaces (MC-DEP, 1998).

Due to the complexity of the watersheds within the SCEA boundary, the study area and results have been divided into three watersheds, the Upper Patuxent River Watershed, the Lower Patuxent River Watershed, and the Hawlings River Watershed. This approach was utilized by the MC-DEP in its CSPS. The following sections rely heavily on the CSPS results.

### *Upper Patuxent Watershed*

The Upper Patuxent River Watershed includes the drainage area for the Patuxent River upstream of the Triadelphia Reservoir, in addition to large forested areas with agricultural cropland and large-lot residential development. The reservoir itself is a Use IV-P waterbody while the Haights Branch and Cattail Creek tributaries are Use III-P. The Upper Patuxent has a naturally reproducing brown trout population and cold water fish community. Much of the watershed is in the Patuxent River State Park, containing mature floodplains, upland forests, and many of the highest quality streams in the County. **Table IV-15** lists sub-watershed ratings based on Montgomery County CSPS research.

***TABLE IV-15 Upper Patuxent Watershed Stream Condition Summary***

| Sub-watershed | Stream Condition | Habitat Condition |
|---|---|---|
| Upper Middle Tributaries | Good | Good |
| Lower Middle Tributaries | Excellent | Excellent |
| Upper Hipsley Mill Run | Fair | Fair |
| Lower Hipsley Mill Run | Excellent | Excellent |
| Haights Branch | Fair | Fair |
| Mt. Carmel Branch | Excellent | no data available |
| Greenstone Branch | Excellent | Good |

Note: All tributaries are within the SCEA boundary.

Additional data was also compiled from the DNR Monitoring and Non-Tidal Assessment Division (MANTA) in their Maryland Biological Stream Survey (MBSS). Spring and summer sampling results from 1997 indicate three sampling stations in Montgomery County and 12 stations in Howard County in the Upper Patuxent River Watershed. The results indicate water quality within COMAR parameters for temperature, pH, and dissolved oxygen. The Physical Habitat Index (PHI), which uses a scale of 0-100, showed much variation and ranged from 24.4 to 93.5. The Benthic Index of Biotic Integrity (BIBI) rated streams as generally fair with a few stations in the good range. The Fish Index of Biotic Integrity (FIBI) is also good to fair with a few poor stations.

### *Hawlings River Watershed*

The Hawlings River Watershed flows into the Patuxent River between the Triadelphia and T. Howard Duckett Reservoirs. According to MC-DEP, much of the watershed is agricultural land, parkland and newer large lot residential areas. All of the streams in the watershed, including

Hawlings River, Reddy Branch, and James Creek, are classified in COMAR as Use IV-P. The Hawlings River upper tributaries, located in the Rachel Carson Conservation Park and adjacent agricultural lands, have very good stream conditions. The southern tributaries, including James Creek and Olney Mill tributary in Reddy Branch are in higher density development and deliver uncontrolled storm flows to the system. Much of the watershed supports a cold-water fishery. **Table IV-16** lists sub-watershed ratings based on Montgomery County CSPS research, M-NCPPC data, land use characteristics, and DNR monitoring in 1993.

***TABLE IV-16 Hawlings River Watershed Stream Condition Summary***

| Sub-watershed | Stream Condition | Habitat Condition |
|---|---|---|
| Upper Hawlings | Good | Good |
| Middle Hawlings | Good | Excellent |
| Lower Hawlings | Good | Fair |
| Upper Mt. Zion Tributary | Poor | Poor |
| Middle Mt. Zion Tributary | Fair | Fair |
| Lower Mt. Zion Tributary | Good | Excellent |
| Reddy Branch | Fair | Fair |
| Upper Olney Mill Tributary | Poor | Poor |
| Lower Olney Mill Tributary | Fair | Fair |
| Upper James Creek | Poor | Poor |
| Lower James Creek | Fair | Fair |

Note: All tributaries are within the SCEA boundary.

Additional data was collected by the MBSS in Spring/Summer 1997 at four sampling stations in Montgomery County on the Hawlings River. The results indicate water quality within COMAR parameters for temperature, pH, and dissolved oxygen. The PHI ranged from 35.9 to 90.3 but averaged 72.7. The BIBI and FIBI rated streams as generally fair with one station in the good range for both indices.

### *Lower Patuxent Watershed*

The Lower Patuxent watershed consists of the mainstem of the Patuxent River and many small tributary systems that drain agricultural and large-lot residential areas in both Montgomery and Howard Counties. The mainstem and lower reaches are largely protected by state parks and the WSSC reservoir buffer. Streams in this watershed are all Use I-P waters and tend to show higher levels of impairment than in the Upper Patuxent and Hawlings due to forest cover loss in upstream reaches (MC-DEP, 1998). **Table IV-17** lists sub-watershed ratings based on Montgomery County CSPS research.

Additional data was collected by the MBSS in Spring/Summer 1997 at two sampling stations in the Lower Patuxent Watershed. The results indicate water quality within COMAR parameters for temperature, pH, and dissolved oxygen. The PHI results were 36.4 for the Montgomery station and 69.7 for the Howard station. The BIBI was fair to good while the FIBI rated streams fair in Howard with the Montgomery station in the poor range.

*TABLE IV-17 Lower Patuxent Watershed Stream Condition Summary*

| Sub-watershed | Stream Condition | Habitat Condition |
|---|---|---|
| Quail Hill Tributary | No data | no data |
| Ashland Tributary * | Fair | Fair |
| Patuxent Drive Tributary* | Excellent | Excellent |
| North Ednor Tributary* | Fair | Fair |
| Ednor Tributary * | Fair | Good |
| Foxes Branch * | Good | Good |
| Kruhm Tributary * | Fair | Fair |
| Dustin Road Tributary * | Good | Excellent |
| Ousler Road Tributary | Fair | Good |
| Lower Patuxent Mainstem* | No data | no data |

Note: *Those tributaries or streams partially within the SCEA boundary.
All other tributaries are entirely within the SCEA boundary.

### (1c) Potential Cumulative Effects - Surface Water

The MD 97 Brookeville Project is anticipated to result in direct impacts to surface waters. These impacts are likely to include culvert extensions, forest clearing for placement of bridges, floodplain loss, and sedimentation associated with roadway construction. Erosion and sediment control measures would minimize short and long term water quality degradation. SHA's Selected Alternate, Alternate 8A, and Alternate 8B would result in two stream crossings (Reddy Branch and Meadow Branch), whereas Alternate 5C would require one crossing (Reddy Branch).

There is little historical data available as far back as 1970. However, a review of land use maps provided some perspective on the relationship between land use and the effect on adjacent surface waters. Based on a comparison of 1973 and 1997 land use maps, the general character of the SCEA boundary remains the same, with agricultural and forest cover serving as the dominant land cover. Urban uses are more common along the southern portion of the boundary, especially development radiating from the Olney area. More degraded streams, such as Upper and Lower Jones Creeks located in the surrounding Olney area, are examples of streams within more urban areas.

Based on past and present trends, the cumulative effects to surface water from proposed development would be more likely to occur along the southern portion of the SCEA boundary. Development around Olney includes high density residential, whereas development within the rest of the SCEA boundary is limited to small lots, due largely to zoning control.

Cumulative effects are projected to be minimal as a result of watershed level protection measures including the Patuxent Reservoir Protection, the Patuxent Primary Management Area, and Montgomery County's Strategic Plan for Water Quality Protection. Other protection measures related to surface water include the County's strong agricultural lands preservation goals. Montgomery County has taken steps to protect and preserve the agricultural community that exists within the SCEA boundary (see Agricultural Lands Section). Restrictive zoning throughout the boundary supports this goal, as does the county's commitment to preserve rural lands through a variety of easement protection programs.

### (2) Groundwater

General groundwater information was obtained through communication with WSSC.

### (2a) Laws and Regulations

Groundwater withdrawals and discharges are regulated by WSSC, Montgomery County, and MDE. COMAR regulations, in particular Title 26 Department of the Environment, Subtitle 08 Water Pollution, Section 02 Water Quality, contains "Ground Water Quality Standards" that identify and define types of aquifers, regulated activities, and requirements for activities including discharge of effluent, underground injection, discharge to ground waters, and discharge quality criteria.

Montgomery County exercises protection of groundwater resources as well. Although all state regulations are in effect for activities relating to groundwater resources, Montgomery County increases the standard for some of them. Specifically, all construction of new wells within the County must receive a County Well Location permit, in which the purpose is to protect the public health and ground water by assuring that wells are properly sited with respect to the improvements and the sewage disposal system on a property (Montgomery County Department of Permitting Services website (www.co.mo.md.us/services/permitting).

### (2b) Trends Analysis

A review of WSSC records revealed that most of the SCEA area is served by private wells for water and septic systems for sewage disposal. WSSC provides public sewer and water service south of Brookeville. Water supply comes from the Potomac and Patuxent Rivers via WSSC's Patuxent Water Infiltration Plants. Wastewater is treated at the Blue Plains Wastewater Treatment Plant in the District of Columbia. The estimated water consumption for the Brookeville area served by WSSC is approximately 600,000 gallons per day. No significant expansion of either system is currently planned in the Brookeville area (Fricke, 2001).

The MDE Water/Wastewater Permits Division was also contacted to determine the occurrence of wells within the study area (Smith, 2001). The well records obtained from this division confirmed that most of the study area is served by private wells. The dominant water use from extraction of the wells is for domestic use. A small number of wells within or nearby the SCEA boundary extract water for farming or test, observation, and monitoring purposes. Groundwater quality data were requested from Montgomery County Department of Permitting Services; however, a response from this department revealed no groundwater monitoring information (Stephens, 2001).

### (2c) Potential Cumulative Effects - Groundwater

Based on the land use patterns from 1973 to 1997, groundwater quality and quantity within the SCEA boundary do not appear to have been substantially affected. Low-density residential land use throughout the SCEA boundary suggests that pressure from groundwater withdrawals is not a concern. Key land protection measures are in place, such as agricultural zoning, to ensure groundwater resources are not threatened.

Implementation of any of the proposed Build Alternates is not anticipated to cause future groundwater-related impacts. The SCEA boundary is within the county's Agricultural Wedge, where development and infrastructure necessary for large-scale development are not proposed. Agriculture is the intended primary land use within the Agricultural Wedge. No sewer or water extensions are proposed beyond the current limits. Additional protection is provided through other land conservation measures such as the area's designation as a state approved Rural Legacy Area. Limited population and therefore limited groundwater withdraws are anticipated since the area is to remain primarily an agricultural community. Further ensuring the protection of groundwater resources, are the regulatory steps required by WSSC, MDE, and the county as it relates to groundwater withdrawal and discharges permits.

### (3) Wetlands

As part of the wetlands trends analysis, quantitative and qualitative sources of information were identified. From a historic perspective, the only available data was 1981 National Wetland Inventory (NWI) Maps. Prior data is limited to generalized wetlands on historical land use maps. For the SCEA, available wetland data was obtained from the DNR Technology Toolbox, which provided both 1981 NWI data (USFWS, 1981) and DNR wetlands data (DNR, 1993).

Ideally, a trends analysis comparing changes in a resource from one period to another should utilize the same data collection methodology. The USFWS and DNR determination of wetlands utilized different scales; 1" = 2000' and 1" = 1000' respectively.

However, the comparisons between both data sets are still useful for the purposes of determining a trend, and for approximating estimates of wetland loss over time, if any. Another reason that the comparison is useful is because of the rolling topography within the SCEA boundary. It is notable that the majority of the wetlands are associated with stream valleys and floodplains, including those areas within parkland.

### (3a) Laws and Regulations

Wetlands delineated as part of proposed development activities are subject to review, approval, and comment by various federal and state agencies in accordance with Section 404 of the US Clean Water Act. These agencies include, but are not limited to, the USACOE, MDE, USFWS, and DNR. The federal/state wetland and waterway permit process in Maryland is a combination of different permit authorization categories, and depending upon the type and category of the proposed activity, may include and necessitate review by different federal and/or state agencies. In Maryland, the permit process is a joint process between the USACOE and MDE, and is known as the Maryland State Programmatic General Permit (MSPGP).

State wetland and waterway permits are typically included in the MSPGP authorization. A MDE Water Quality Certification (WQC), governed under Section 401 of the US Clean Water Act, may be required, particularly if a Section 404 permit is necessary. MDE permits, for non-tidal or tidal wetland impacts and/or waterway construction activities, may be required depending upon the extent of impacts, either independently or as part of the overall MSPGP process.

Wetlands within the project area were identified and field delineated in October 1995. A Jurisdictional Determination of the wetland boundaries was conducted with USACOE and USFWS

agency representatives on December 5, 1995. The wetland identification/delineation and the jurisdictional field review determined a total of 20 nontidal wetland areas, two large unvegetated WUS systems, and several open water ponds within the project area. Proposed direct impacts from all the Build Alternates were based upon ROW limits for both open and closed typical sections.

Impacts for the five Build Alternates are shown below in **Table IV-18** and are discussed in **Section O.4.a.3c** – Potential Cumulative Effects - Wetlands.

***TABLE IV-18 Summary of Wetlands Impacts***

| | Alternate 5C (acres) | | Alternate 7 (acres) | | SHA's Selected Alternate (acres) | Alternate 8A (acres) | | Alternate 8B (acres) | |
|---|---|---|---|---|---|---|---|---|---|
| | Open Section | Closed Section | Open Section | Closed Section | Open Section | Open Section | Closed Section | Open Section | Closed Section |
| **Total Wetland Impacts[1]** | **0.21** | **0.15** | **0.12** | **0.13** | **0.12** | **0.10** | **0.11** | **0.16** | **0.14** |
| **Total Impacts per Classification** | | | | | | | | | |
| **Total PFO** | **0.10** | **0.09** | **0.03** | **0.04** | **0.03** | **0.01** | **0.02** | **0.03** | **0.01** |
| **Total PEM** | **0.09** | **0.05** | **0.06** | **0.06** | **0.06** | **0.06** | **0.06** | **0.06** | **0.06** |
| **Total PSS** | **0.02** | **0.01** | **0.03** | **0.03** | **0.03** | **0.03** | **0.03** | **0.07** | **0.07** |

Notes: Impacts are based on ROW widths.
[1] Total Wetland Area considers only that portion within the limits of the project area.

### (3b) Trends Analysis

*GIS Analysis of Wetlands Trends in the SCEA Boundary – 1981 to 1993*

Wetlands within the SCEA boundary include palustrine, lacustrine, and riverine wetlands systems. Palustrine wetlands are evident primarily along the streams valleys and broad floodplains. The lacustrine wetlands are associated with the section of Triadelphia Reservoir, and the riverine systems are the streams throughout the SCEA boundary. Relevant to palustrine wetlands, forested wetlands are dominant for both 1981 and 1993. A smaller percentage of palustrine open water wetlands were also identified throughout the SCEA and are typically associated with open water ponds. **Figure IV-5** illustrates the approximate distribution of wetlands throughout the SCEA boundary as of 1993 based on DNR's Technology Toolbox Data.

The results of the trends analysis suggest little change in wetland loss. As **Table IV-19** shows, over the 24-year period there are both gains and losses depending on the wetland classification. Several factors need to be considered as part of the results of the analysis. The loss of PSS wetlands may be due to a change to PFO wetlands over time. Within the SCEA boundary, the majority of the wetlands are associated with stream valleys and broad floodplains. These are areas where development is typically limited or discouraged. Furthermore, differences may be attributed to the differences in data interpretation and scale between the two data sources. Nevertheless, the data suggests that there has been minimal wetland loss throughout the SCEA boundary between 1981 and 1993.

***TABLE IV-19 Wetland Changes within SCEA Boundary from 1981 to 1993***

| Wetland Classification | Data Year 1981 (acres) | Data Year 1993 (acres) | Net Difference |
|---|---|---|---|
| Lacustrine | 1,386.3 | 1,444.9 | + 58.6 |
| Palustrine Forested | 636.5 | 836.2 | + 199.7 |
| Palustrine Scrub-shrub | 235.6 | 76.4 | - 159.2 |
| Palustrine Emergent | 195.6 | 156.9 | - 38.7 |
| Palustrine Open Water | 90.7 | 122.2 | + 31.5 |
| **Totals** | **2,544.7** | **2,635.9** | **+ 91.9** |

### (3c) Potential Cumulative Effects - Wetlands

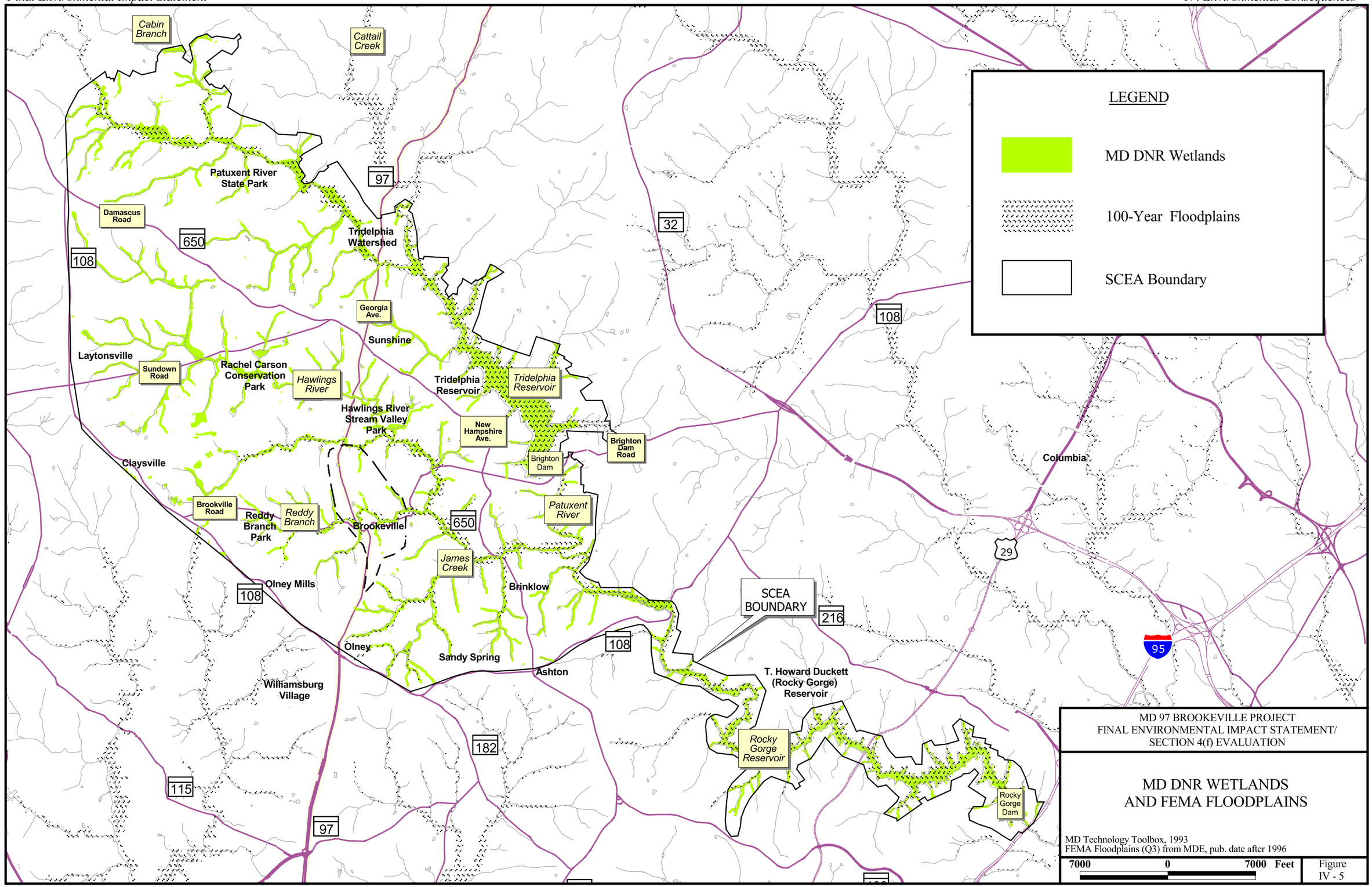
Total impacts for all five Build Alternates would vary from 0.10 acre to 0.21 acre. SHA's Selected Alternate would impact four wetlands including two palustrine forested wetlands, impacted for a total of 0.03 acres, one palustrine emergent wetland, impacted for 0.06 acre, and one palustrine scrub-shrub wetland, impacted for 0.03 acres. Alternate 5C and Alternate 8B would have the potential for the greatest impacts (between 0.15 to 0.21 acre). Palustrine forested wetland impacts would account for approximately half of Alternate 5C impacts. Palustrine emergent impacts would be the same (0.06 acre) for Alternate 7, Alternate 8A, and Alternate 8B. Alternate 8B would have at least twice as many palustrine scrub-shrub impacts compared to the other Build Alternates.

Based on the trends analysis of the 1973 and 1997 land use/land cover mapping, wetland losses are predominantly associated with PSS and PEM within the SCEA boundary. Reasons for these losses could be attributed to several causes. An undetermined percentage is assumed to be from development activities. Other factors may include a conversion of emergent and scrub-shrub wetlands to forested wetland or upland system. The trends for SCEA reflect a smaller change in wetland resources over time when compared to the statewide trends. Smaller changes, at least since the early 1970s, are primarily a result of limited land use changes (e.g., rural to urban) and location of wetlands in relation to topography.

The majority of the forested wetland systems are located in places where development has been limited for various regulatory and non-regulatory reasons, such as broad floodplains or stream valleys. Emergent wetlands are common along portions of low-lying fields and have traditionally either been drained, farmed or built upon. With the implementation of many wetland protection regulations and the associated permitting process, wetland impacts have been minimized and minimal impacts are expected in the future.

Major federal and state wetland protection programs are provided below: The most substantial regulatory programs at the federal level are the following:

- "Section 10" program (authorized by Section 10 of the Rivers and Harbors Act of 1899) administered by USACOE.
- "Section 404" program (authorized by Section 404 of the Federal Water Pollution Control Act of 1972, as amended by the Clean Water Act of 1977 and later amendments) administered jointly by USACOE and USEPA.


Cabin Branch
Cattail Creek
Patuxent River State Park
97
Damascus Road
650
108
Tridelphia Watershed
32
Georgia Ave.
Sunshine
Laytonsville
Sundown Road
Rachel Carson Conservation Park
Hawlings River
Tridelphia Reservoir
Tridelphia Reservoir
Hawlings River Stream Valley Park
New Hampshire Ave.
Brighton Dam Road
Brighton Dam
108
Columbia
Claysville
Brookville Road
Reddy Branch Park
Reddy Branch
Brookeville
650
Patuxent River
James Creek
29
Olney Mills
108
Brinklow
SCEA BOUNDARY
216
Olney
Sandy Spring
Ashton
108
95
T. Howard Duckett (Rocky Gorge) Reservoir
Williamsburg Village
182
Rocky Gorge Reservoir
Rocky Gorge Dam
115
97
LEGEND
MD DNR Wetlands
100-Year Floodplains
SCEA Boundary
MD 97 BROOKEVILLE PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT/
SECTION 4(f) EVALUATION
MD DNR WETLANDS
AND FEMA FLOODPLAINS
MD Technology Toolbox, 1993
FEMA Floodplains (Q3) from MDE, pub. date after 1996
7000 0 7000 Feet
Figure IV - 5

The most substantial regulatory programs at the state level include:

- Tidal wetlands licensing and permitting program (authorized by the 1970 Tidal Wetlands Act) administered by the MDE.
- Nontidal wetlands management and permitting program (authorized by the 1989 Nontidal Wetlands Protection Act, effective January 1991) administered by MDE.
- "Section 401" Water Quality Certification program (authorized under Section 401 of the Clean Water Act) administered by MDE.
- "Section 307" Coastal Zone Consistency determination (authorized in Section 307 of the Coastal Zone Management Act of 1972, pursuant to Maryland's federally approved Coastal Zone Management Plan) administered by MDE.

### (4) Floodplains

The Montgomery County Division of Permitting Services was contacted to determine if specific and quantitative floodplain impacts were available. Present floodplain data was derived from FEMA. Any future (2020) floodplain impacts were predicted based on the assumption of ongoing land protection from both existing regulatory controls and to some extent the presence of significant parkland throughout the SCEA boundary. Part of the functions provided by Reddy Branch Stream Valley Park, Hawlings River Stream Valley Park, and Patuxent River State Park include extensive forested floodplains.

### (4a) Laws and Regulations

At the federal and state level, floodplains are protected through the wetland permitting process. Proposed development within the 100-year floodplain requires that the joint federal and state wetland permit application be submitted to the MDE. Before a permit is granted, specific information is required documenting that no other options that do not result in impacts to the 100-year floodplain are available to meet the purpose of the project.

Floodplains are also protected under Montgomery County floodplain regulations 108-92, Bill No. 18-89, 33-92. Under these regulations, Montgomery County has the authority under the Flood Control and Watershed Management Act, Section 8-9A-01 et seq., Natural Resources Article of Annotated Code of Maryland, to control floodplain development in order to protect persons and property from damage and destruction as well as to preserve the biological values and the environmental quality of watersheds or portions thereof under its jurisdiction.

The establishment of a floodplain district determines the extent of the 100-year floodplain. The district includes all areas subject to inundation by the waters of the 100-year flood. This also includes all waterways for drainage areas as small as necessary to produce actual inundation limits. For Montgomery County, the drainage areas meeting this criteria are typically 30 acres or greater. Regulations prohibit any new residential development within a 100-year floodplain. Other development proposals must meet a series of very stringent requirements. Development, when approved, must have the elevation of the lowest floor, as defined in codes, of new structures at/above one foot above elevation of 100-year floodplain.

Current 100-year floodplain zones were identified using the Flood Insurance Rate Maps (FIRM). Montgomery County FIRM Panel 150 of 200 was consulted. Within the SCEA boundary, 100-year floodplains are present along Reddy Branch, Meadow Branch, and Hawlings River and most tributaries **(Figure IV-5)**.

#### (4b) Potential Cumulative Effects - Floodplains

Direct floodplain impacts associated with the MD 97 Brookeville Project range from 2.44 to 3.29 acres. Project-related floodplain impacts are unavoidable since each Build Alternate must either cross Reddy Branch and/or Meadow Branch. Future secondary and cumulative floodplain impacts are anticipated to be negligible based on both protection measures and land ownership. Protection measures include both strong county floodplain regulations preventing floodplain encroachment from development, and to a lesser extent, restrictive zoning.

Development is discouraged on steep slopes adjacent to waterways and floodplains throughout the SCEA. Furthermore, approximately 70 percent of the FIRM floodplain boundaries throughout the SCEA boundary are within county or state parkland boundaries (either Reddy Branch Stream Valley Park or Patuxent State Park). Subsequently, no future development is anticipated within parkland boundaries including floodplains.

### b. Forest Habitat

Readily available data used for the SCEA boundary relevant to forested areas consisted of historic (1973 and 1990) and present (1997) MDP land use maps. All three maps were overlaid to develop approximate forest cover acreage lost over a 24-year period. Potential future impacts were developed by considering proposed land uses, zoning, and environmental regulations.

The 1973 land use maps were not available in digital format and therefore, required forest cover estimates to be determined manually. Estimates are more approximate than the acreages determined for 1997. Potential future impacts were estimated by considering proposed land uses, increased population projections, zoning, and environmental regulations. Forest fragmentation trends from 1973 to 1990 were determined by estimating the contiguity of forest cover and the number of isolated forest blocks. Forest fragmentation estimates between 1990 and 1997 were compared digitally.

Between 1950 and 1985, land use for commercial and residential development within the Chesapeake Bay watershed increased by 180 percent. Between 1955 and 1989, a half million acres of forest throughout the state were converted to other uses such as urban and agricultural use. In addition to actual losses, the quality of remaining forest has been diminished by fragmentation of large forested properties.

#### (1) Laws and Regulations

In 1999, forested lands within Montgomery County were estimated at 86,000 acres or only 27 percent of the county. During the last 25 years, Montgomery County has experienced one of the highest rates of forest loss in the Washington, D.C. Region. In response to the statewide loss of forest, the state Forest Conservation Act of 1991 (Annotated Code of Maryland, Natural Resources

Article, Sections 5-1601 through 5-1613) was enacted to protect Maryland's forest resources. The goal of the Act is to protect existing forest resources and reduce the loss of forests from unplanned growth. Compliance with the regulations involves delineating existing forest resources within a proposed project. From the delineation, high value forests or "priority areas" are to be preserved with development directed towards low value forest areas. Value includes the functions provided by the forest including, but not limited to, wildlife habitat, timber, stream buffer, and aesthetics. A conservation plan, which includes reforestation measures, is required depending on the amount of forest proposed for clearing. The state law is regulated by DNR but administered by each county or municipality.

In 1991, Montgomery County implemented a program for conserving forest and tree resources. The County Forest Conservation Program applies to applications for development activities, and sediment and erosion control permits. Under the law, a forest conservation plan must be developed, which includes a delineation of the forest resources throughout the proposed project area. The County Planning Board reviews and approves forest conservation plans for development projects that require Planning Board approval. The Planning Director reviews all projects not requiring Planning Board approval.

### (2) Trends Analysis

Comparisons between the 1973, 1990, and 1997 land use/land cover maps identified several changes in forest cover (losses and/or gains). Forest cover throughout the SCEA boundary is predominantly deciduous forest, with mixed forest (deciduous and evergreen) to a smaller extent. Larger forest blocks are evident along the parklands and within the western portion of the SCEA boundary. More fragmented parcels are evident along roadways, along more urbanized sections, and the southeastern portion of the SCEA boundary.

Forest cover within the SCEA boundary accounts for approximately 16,500 acres, based on the 1973 land use/land cover map (approximately 45% of the SCEA boundary). In 1990, 13,836 acres of forest cover were evident. In 1997, however, forest cover increased to 15,604 acres (an increase of 1,768 acres). State and county parks within the SCEA boundary represent slightly more than 50 percent of the total forest cover (**Figure IV-6**, based on DNR's Technology Toolbox Data). Reddy Branch Stream Valley Park, Hawlings River Stream Valley Park, and Patuxent River State Park are almost entirely forested.

In total, from 1973 to 1997, approximately 900 acres of forest cover were estimated to have been converted to urban or agricultural use (**Figure IV-7**, Maryland Office of Planning Land Use/Land Cover Data for 1997). Differences in the development of digital files between both years may also be a contributing factor. The majority of the forest loss over the 24-year time frame has occurred along the southern portion of the SCEA boundary. Along the southern section of the boundary, forest was primarily converted to urban use. Forest conversion to cropland was more dominant in the western end of the boundary. Large forest blocks within the western and northern boundary are almost identical from 1973 to the present. **Table IV-20** provides a comparison between the three time frames.

***TABLE IV-20 Forest Cover Changes within SCEA Boundary - Years 1973, 1990 and 1997***

| Forest Cover within SCEA Boundary | Forest Cover (acres) |
|---|---|
| 1973 | 16,500 |
| 1990 | 13,836 |
| 1997 | 15,604 |

Another trends analysis conducted was the degree of forest fragmentation that has occurred over time. The fragmenting of forest reduces the interior of larger forest block. Forest interior species require the safety of large undivided forest habitat for critical life cycle aspects including breeding. Many are in decline because of both forest cover loss and fragmentation.

The forest fragmentation for 1973 was estimated by overlaying available mapping to 1990 and 1997. In general, there has been some fragmentation, especially along the southern portion of the SCEA boundary, from 1973 to 1990. Large privately owned contiguous forest blocks are evident throughout the SCEA boundary as well as the forested parkland areas. From 1990 to 1997, digital computation of the data was conducted. In general, land uses greater than ten acres in size were identified through the land use maps. For the comparison, forest blocks of certain sizes were grouped. Over the seven-year period, there was a decline, especially in forest blocks between 101 and 200 acres **(Table IV-21)**. The numbers for 200 acres or greater, however, actually increased. Some of the difference may be a result of initial data collection and processing.

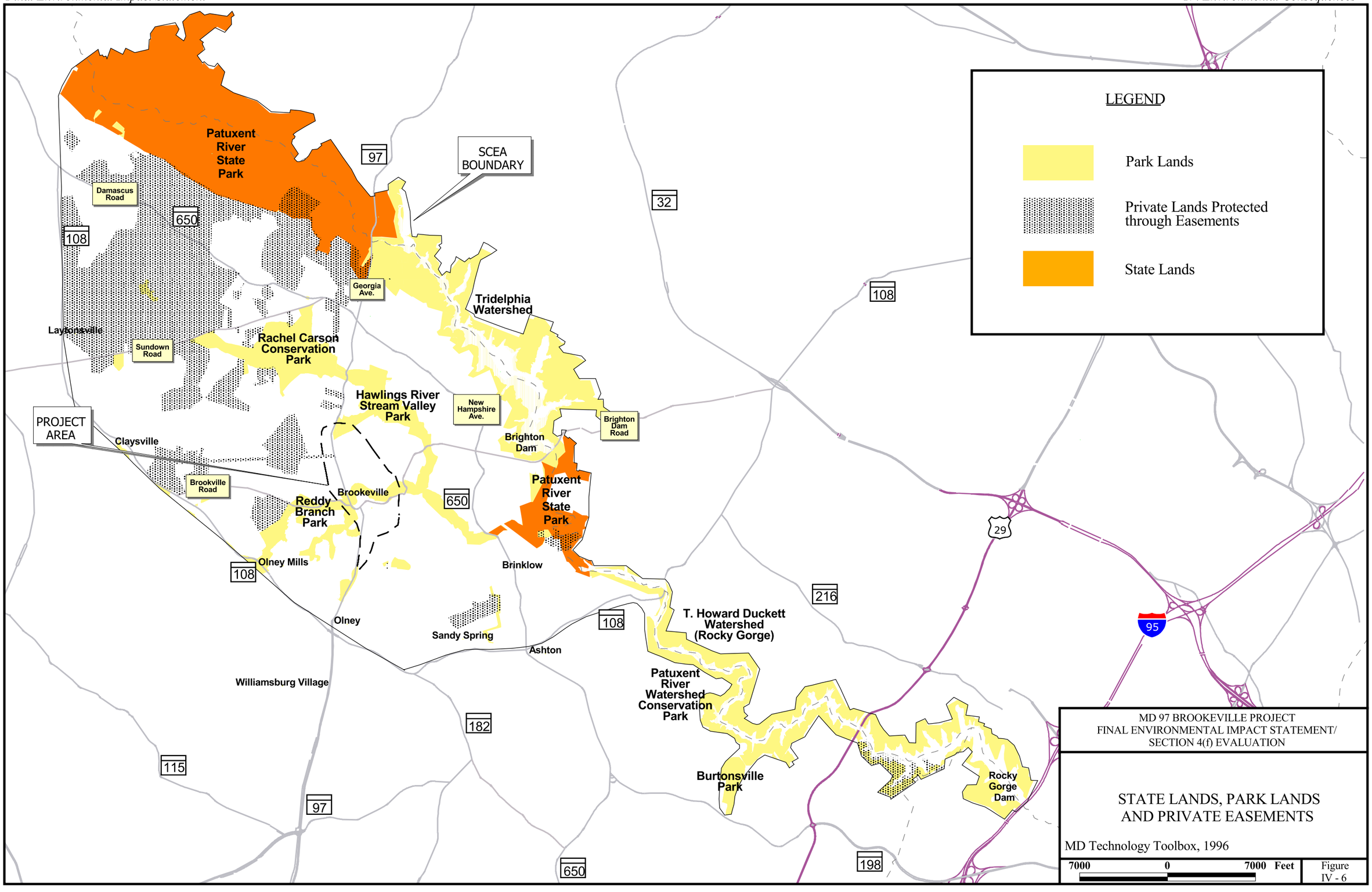
***TABLE IV-21 Forest Size Comparison from 1990 to 1997***

| Acre Range | 1990 Forest Cover (number of parcels) | 1997 Forest Cover (number of parcels) |
|---|---|---|
| 0-50 | 114 | 102 |
| 51-100 | 25 | 20 |
| 101-200 | 16 | 6 |
| 200+ | 14 | 17 |

### (3) Potential Cumulative Effects – Forest Habitat

Direct forest impacts for all five Build Alternates including SHA's Selected Alternate are similar, ranging from 8.62 acres to 10.69 acres. Forest impacts are unavoidable with each Build Alternate crossing one or more forested stream sections. Cumulative effects associated with forest habitat, because of MD 97, are projected to be negligible through the year 2020. Current proposed developments are limited. Some isolated forest loss will occur but will be limited to individual lots or small developments.

Forest fragmentation is anticipated to be limited mostly to sections along the southern SCEA boundary (adjacent to other development). Private timber harvests throughout the SCEA boundary are likely. Timber harvests require coordination with Montgomery County and DNR as well as the preparation of a timber harvest management plan. Each plan incorporates restrictions to protect surrounding resources such as wetlands and streams.


LEGEND
Park Lands
Private Lands Protected through Easements
State Lands
Patuxent River State Park
SCEA BOUNDARY
97
32
108
650
Damascus Road
Georgia Ave.
Tridelphia Watershed
Laytonsville
Sundown Road
Rachel Carson Conservation Park
Hawlings River Stream Valley Park
New Hampshire Ave.
Brighton Dam
Brighton Dam Road
PROJECT AREA
Claysville
Brookville Road
Brookville
Reddy Branch Park
Patuxent River State Park
Olney Mills
Brinklow
29
216
Olney
Sandy Spring
Ashton
T. Howard Duckett Watershed (Rocky Gorge)
95
Williamsburg Village
Patuxent River Watershed Conservation Park
182
115
Burtonsville Park
Rocky Gorge Dam
198
MD 97 BROOKEVILLE PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT/
SECTION 4(f) EVALUATION
STATE LANDS, PARK LANDS AND PRIVATE EASEMENTS
MD Technology Toolbox, 1996
7000 0 7000 Feet
Figure IV - 6

There are several land protection measures in place throughout the SCEA boundary. Current zoning restricts most development to one lot per 25 acres. Rural Cluster zoning, limited to areas east of MD 97, allows one house per five acres but requires 60 percent open space as part of a development plan. Forest loss is also minimized by the county's commitment to protect environmental resources within the Agricultural Wedge as described in the county Master Plan. The SCEA boundary is part of the agricultural wedge, which is a preferential agricultural zone geared towards the protection of agriculture and sensitive resources, such as forest habitat. A transferable development rights system and other county and state easement purchase programs provides further protection within the wedge.

Another protection measure that directly or indirectly protects forest habitat is the county's Upper Patuxent Rural Legacy Area Program. As mentioned, the majority of the SCEA boundary falls within the Rural Legacy Area. Through the Legacy program, landowners have the ability to either place conservation easements on their property or transfer their development rights. These two easement measures protect the properties in perpetuity from development activities. Additionally, the county is targeting acquisition of properties through the Legacy Area that border along existing parkland. Forest fragmentation may be reduced through increasing the contiguity of forest cover along the parks. The SCEA boundary includes areas outside of the PFA where sewer and water expansion are not planned. Lastly, other federal, state and county regulations protecting forests add additional protection.

### c. Agricultural Lands

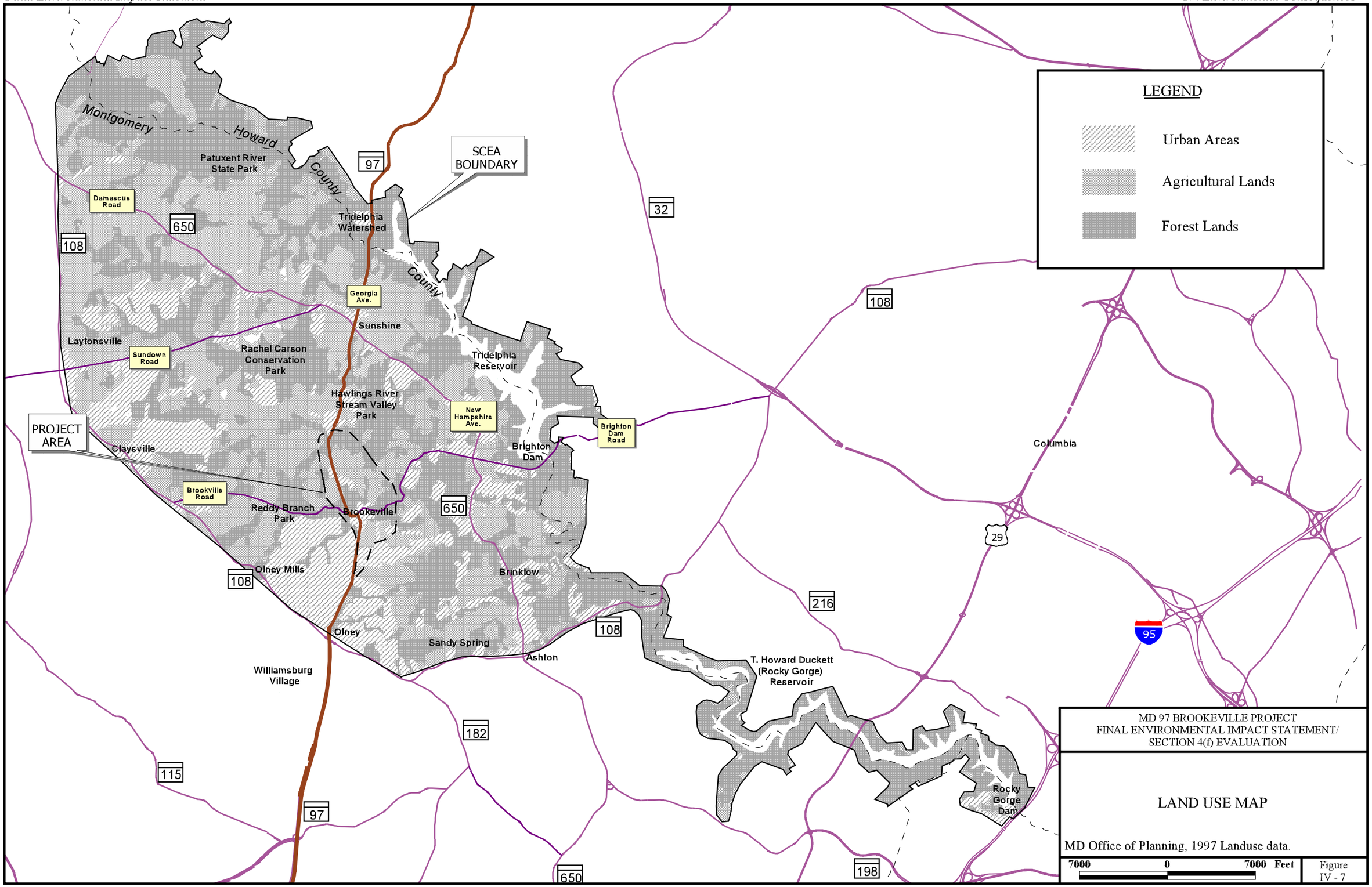
Available data used for the SCEA boundary relevant to active farmland considered both historic (1973 and 1990) and present (1997) MDP land use maps. Both maps were overlaid to develop approximate active farmland acreage lost over a 24-year period. Potential future impacts were predicted by considering proposed land uses, zoning, and environmental regulations.

The farmland type and total acreage are based on Anderson Level I classification. Two digit codes that were included are cropland (21), pasture (22), and orchards/vineyards/horticulture (23). Other data sources consulted included the DNR GIS Rural Legacy Area Maps and Montgomery County's Land Preservation Map and database.

#### (1) Laws and Regulations

Agricultural lands are protected in Montgomery County through five different programs including the Montgomery County Agricultural Easement Program (AEP), Maryland Agricultural Land Preservation Foundation (MALPF), MET, and other private trust organizations, Montgomery County Transfer of Development Rights (TDR) Program, and the Montgomery County Rural Legacy Program (RLP).

The Montgomery County AEP gives Montgomery County the ability to purchase agricultural land preservation easements to preserve land for agricultural production. This is contingent upon the land being zoned Rural, Rural Cluster, or Rural Density Transfer, or subject to the land being designated as an approved state or county Agricultural Preservation District.


LEGEND
Urban Areas
Agricultural Lands
Forest Lands
PROJECT AREA
SCEA BOUNDARY
Montgomery County
Howard County
Patuxent River State Park
Damascus Road
650
108
97
Tridelphia Watershed
Georgia Ave.
Sunshine
Laytonsville
Sundown Road
Rachel Carson Conservation Park
Tridelphia Reservoir
Hawlings River Stream Valley Park
New Hampshire Ave.
Brighton Dam Road
Brighton Dam
Claysville
Brookville Road
Reddy Branch Park
Brookeville
Olney Mills
Brinklow
Olney
Sandy Spring
Ashton
Williamsburg Village
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Rocky Gorge Dam
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Columbia
MD 97 BROOKEVILLE PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT/
SECTION 4(f) EVALUATION
LAND USE MAP
MD Office of Planning, 1997 Landuse data.
7000 0 7000 Feet
Figure IV - 7

The MALPF was established in 1977 by the state legislature because of concern over decreasing farmland acreage caused by development. The MALPF purchases agricultural land preservation easements directly from the landowner for cash. Following sale of the easement, agricultural uses of the property are still permitted and are encouraged.

The MET was established by the state legislature in 1967 to encourage landowners to donate an easement on their property to protect scenic open areas, including farm and forest land, wildlife habitat, waterfront, unique or rare areas, and historic sites. These donations are accepted by the MET. In return, the landowners are eligible for certain income, estate, gift, and property tax benefits. Other private land trusts may also offer farmland preservation options that are flexible and advantageous to landowners. In 1981, Montgomery County established the TDR Program as part of the functional Master Plan for Preservation of Agricultural and Rural Open Space. Approximately 93,000 acres of County land are designated as the Agricultural Reserve and have Rural Density Transfer zoning. The Rural Density Transfer Zone gives strong preferences to agriculture, forestry, and other open space uses, as well as allowing a variety of agriculturally related commercial and industrial uses. Housing density in the Agricultural Reserve limits development to one house per 25 acres with a minimum one acre lot size. Furthermore, the properties in the Agricultural Reserve have TDR at the rate of one TDR per five acres. These TDRs can be sold to developers who want to use them to construct houses in designated county TDR receiving areas.

In 1997, the RLP was enacted as part of the Governor's Smart Growth and Neighborhood Conservation initiative to protect natural resources. The RLP is aimed to protect areas that are rich in multiple agricultural, forestry, natural and cultural resources, which if protected, will promote resource-based economics, protect greenbelts and greenways, and maintain the fabric of rural life. The majority of the SCEA boundary falls within the county's Upper Patuxent Watershed Rural Legacy Area.

### (2) Trends Analysis

Agricultural land acreage for 1973 was determined by placing a 1990 overlay onto the 1973 land use map. Cursory estimates were then determined by identifying key parcels that have been converted from agricultural to urban use. This exercise revealed that of the approximate 15,600 acres identified in 1973, an estimated 800 to 900 acres has been lost from 1973 to 1990 (14,867 acres) within the SCEA boundary **(Table IV-22)**.

***TABLE IV-22 Agricultural Loss within the SCEA Boundary from 1973 to 1997***

| Land Use Year | Active Farmland within SCEA Boundary | Change in Total Acreage (% loss or gain) |
|---|---|---|
| 1973 | 15,600 to 16,000 | - |
| 1990 | 14,867 | - 5 to 8 % |
| 1997 | 13,326 | - 11 % |

From 1990 to 1997, an estimated 1,631 acres of farmland was lost. Based on the 1997 land use MDP maps, there are approximately 13,326 acres of active farmland within the SCEA boundary. The loss of agricultural lands from 1990 to 1997 coincided with a comparable gain in forest cover within the SCEA boundary. The small difference may be explained by some loss due to development and by natural conversion of fallow fields to forest.

Cropland throughout the 24-year period has been the dominant agricultural resource (for 1997 cropland totaled over 10,000 acres). The majority of the cropland is located along the northern portions of MD 97 and to the west **(Figure IV-7)**. Much of the cropland consists of large, contiguous farmland parcels. Pasture lands are scattered throughout the SCEA boundary and account for approximately 25 percent or 3,200 acres.

#### (3) Potential Cumulative Effects – Agricultural Lands

All five Build Alternates would directly impact active farmland. As mentioned earlier in **Section III**, SHA's Selected Alternate, Alternate 8A, and Alternate 8B impacts would be limited to the edge of a farm field along MD 97. Farmland impacts from SHA's Selected Alternate are negligible and estimated to be less than 0.01 acre. Active farmland impacts for Alternate 8A and Alternate 8B range from 0.53 and 1.24 acres. Farms could still be operational from either alternate. These impacts are minimal and not a threat to the farmland resources within the SCEA boundary. Alternate 5C would result in greater farmland impacts, which range from 9.6 to 10.69 acres. Alternate 5C would bisect a working farm into two sections; both sections would be of viable size for future farming operations.

Future impacts are likely, especially within areas designated as Rural Cluster Zones (RCZ), where lot size can be as small as five acres. Based on current proposed development over the last several years, projected future impacts are estimated at a minimum of 100 to 200 acres annually. This figure is based on a review of available development information and past development trends.

### d. Rare, Threatened, and Endangered Species

Information on rare, threatened, and endangered species (RTEs) was obtained through coordination with DNR and USFWS. Both agencies provided data on federal and/or state RTEs within the SCEA boundary. Past records describing the location of RTEs in the SCEA boundary were not available. Projected or future impacts to RTEs can be assumed by likely development activities within and adjacent to sensitive areas serving as habitat for RTEs.

The loss of RTEs can occur because of both direct and indirect impacts. Direct impacts include loss of habitat from land conversion activities (forest clearing as part of development), poaching, and mortality from development pressures or human activity (vehicular collisions). More indirect stresses can include human disturbance, especially during sensitive life cycle periods such as breeding, changes in drainage or hydrology in general, forest or habitat fragmentation, and noise pollution.

#### (1) Laws and Regulations

Several federal, state and local regulations protect RTEs. At the federal and state level, RTEs are regulated pursuant to the Endangered Species Act of 1973 (State. 884), and the state of Maryland pursuant to the Maryland Endangered Species Act of 1973 (Annotated Code of Maryland, Natural Resources Article, Section 10-210).

Other state protection laws, such as the Maryland Nongame and Endangered Species Conservation Act of 1975 (Annotated Code of Maryland, Natural Resources Article, Section 10-2A01 et. Seq.), require that the state identify, manage, and protect both nongame wildlife, as well as RTEs. The DNR Wildlife and Heritage Division is responsible for overseeing the requirements of this law. Land development projects with federal and state funding that require wetland permit approval and hazardous waste discharge permits are reviewed by federal, state and local environmental agencies. Private development activities are typically not reviewed for the presence of RTEs.

#### (2) Trends Analysis

Data obtained from DNR indicated that 13 different species of concern exist within the SCEA boundary. For the protection of the species and any suitable RTE habitat, DNR only provides a species name and general location. Therefore, a map illustrating specific locations of each species was not available. Based on the description, however, the majority of the species appear to be identified along stream valleys within parkland. Three species appear to be within more urban areas, namely Olney and Brinklow. **Table IV-23** provides the name and general location for each species.

#### (3) Potential Cumulative Effects - Rare, Threatened, and Endangered Species

Minor cumulative impacts to RTEs are anticipated, primarily in more developed areas. More specific analysis is difficult due to the lack of exact locations and the date of the most recent sightings, on each species. Most of the species, if still present, are associated with riparian or stream valley habitat and were identified in areas protected as either state or county parklands. Three species, wood sedge, big shellbark hickory, and regal fritillary, were identified in areas currently experiencing developmental pressure and are unrelated to the proposed MD 97 Brookeville Project.

### 5. Cultural Resources

Preliminary information on cultural resources was obtained from the Montgomery County Master Plan, 1993. The Master Plan included a map showing historic sites considered important by the county. Maryland Historic Trust (MHT) digital data, the National Register of Historic Places and the Maryland Inventory of Historic Properties, was used to identify the resources shown on the master plan map. Feature locations and feature attributes in the MHT data layers were used to determine the potential for secondary and cumulative effects within the SCEA boundary.

Cultural resources within the APE for the MD 97 Brookeville Project were also identified as part of the historic resources survey and Section 106 Determination of Eligibility Report. Historic districts and individually designated sites in the MD 97 project area are located on **Figure IV-8** and listed in **Table IV-24**. Only the Brookeville Historic District would be impacted by the project alternates and the impact acreage varies according to alternate.

***TABLE IV-23 Maryland Department of the Environment Record of Rare, Threatened, and Endangered Species within the SCEA Boundary***

| Common Name | Scientific Name | Type of Species | Status | Comments |
|---|---|---|---|---|
| Bald eagle | *Haliaeetus leucocephalus* | Animal | Federal and State Threatened | Sandy Spring Quad - Along the Howard County portion of Tridelphia Reservoir |
| Small flowered hemicarpha | *Lipocarpha Micrantha* | Herbaceous Plant | State Endangered | Clarksville Quad -Within T. Howard Reservoir |
| Wood's sedge | *Carex woodii* | Herbaceous Plant | State Rare | Sandy Spring Quad - Olney area |
| Big shellbark hickory | *Carya laciniosa* | Tree | State Endangered | Sandy Spring Quad - Brinklow area |
| Regal Fritillary | *Speyeria idalia* | Butterfly | State Endangered | Sandy Spring Quad - Brinklow area |
| Gray birch | *Betula populifolia* | Tree | Uncertain State Status | Sandy Springs Quad - Banks of Triadelphia Reservoir |
| Yellow lance | *Elliptio lanceolata* | Freshwater mussel | Uncertain State Status | Sandy Spring Quad - Patuxent River near confluence with Hawlings River |
| Squawfoot | *Strophitus undulatus* | Freshwater mussel | State Rare/Watchlist | Sandy Spring Quad- Hawlings River, west of Brighton |
| Atlantic spike | *Elliptio producta* | Freshwater mussel | State Rare/Watchlist | Sandy Spring Quad - Hawlings River, west of Brighton |
| American chestnut | *Castanea dentata* | Tree | State Rare/Watchlist | Sandy Spring Quad - Banks of Hawlings River, north of Gregg Road |
| Featherbells | *Stenanthium gramineum* | Herbaceous plant | State Threatened | Sandy Spring Quad - Known from the area near MD 97 and Patuxent River; Woodbine Quad - Tributary to Patuxent River across from Cabin Branch |
| Blunt- leaved Gerardia | *Agalinus obtusifolia* | Herbaceous plant | State Endangered | Sandy Spring Quad - Known from the area near MD 97 and Patuxent River |
| Trailing Stitchwort | *Stellaria alsine* | Herbaceous plant | State Endangered | Woodbine Quad -Known from the Hipsley's Mill area along Cabin Branch |

Attempts to retrieve data on those resources lost since 1970 were unsuccessful. Communication with MHT revealed that there are no readily available files on the loss of resources dating back to 1970.

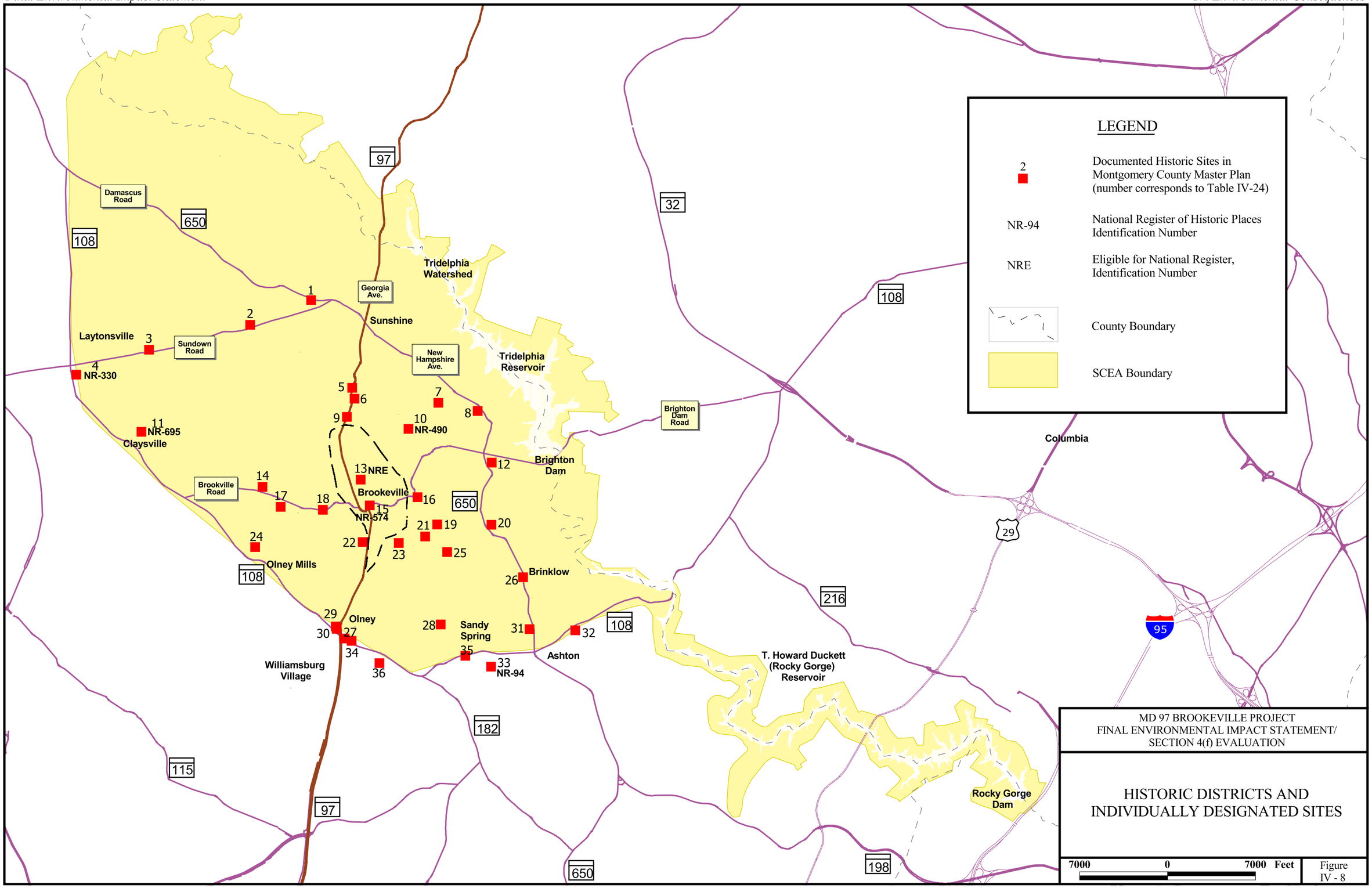
Cumulative impacts to historic structures within the SCEA boundary were determined by overlaying the approximate locations of National Register and Maryland Inventory of Historic Places with approved preliminary development plans. The exact locations of archeological sites are known by MHT but by law are confidential and protected from being released to the public. Instead of the exact location, an archeological site is shown as part of a grid or cell measuring approximately 121 acres.

*TABLE IV-24 Historic Districts and Individually Designated Sites*

| Master Plan Site No. | MIHP No. | Name | Address | Town |
|---|---|---|---|---|
| 1 | M: 23-033 | Dr. Dwyer House (Bleakwood) | 3730 Damascus Road (MD 650) | Laytonsville |
| 2 | M: 23-031 | Pleasant Fields (Sundown Hills, Henry Chew Gaither House) | 4615 Sundown Road | Laytonsville |
| 3 | M: 23-029 | Fair Hill II (Bowman's Store and House) | 5929 Sundown Road | Laytonsville |
| 4 | M: 14-37 [NR] | Laytonsville Historic District | | Laytonsville |
| 5 | M: 23-045 | Greenwood Mills Site (Greenwood Millers Cottage & Mill Site) | Georgia Avenue (MD 97) | Brookeville |
| 6 | M: 23-046 | Greenwood and Cemetery | 21315 Georgia Avenue (MD 97) | Brookeville |
| 7 | M: 23-071 | Far View | 21450 New Hampshire Avenue (MD 650) | Brookeville |
| 8 | M: 23-073 | Gittings Ha-Ha and Cemetery | 21030 New Hampshire Avenue (MD 650) | Brookeville |
| 9 | M: 23-047 | Pleasant View | 21000 Georgia Avenue (MD 97) | Brookeville |
| 10 | M: 23-069 [NR] | Brookeville Woolen Mill & House (Riggs House) | Shipe Road | Brookeville |
| 11 | M: 23-026 [NR] | Oaks II (Riggs Farm) | 6010 Riggs Road | Laytonsville |
| 12 | M: 23-079 | Roslyn (Henry Stabler House, Roslyn Bank Barn) | 20401 New Hampshire Avenue (MD 650) | Brinklow |
| 13 | M: 23-066 [NRE] | Bordley's Choice (Merrywood, Brookeville Academy) | 20015 Georgia Avenue (MD 97) | Brookeville |
| 14 | M: 23-059 | Locust Hill | 4415 Brookeville Road | Brookeville |
| 15 | M: 23-065 [NR] | Brookeville Historic District | | Brookeville |
| 16 | M: 23-082 | Grafton Holland Farm (Sunnymeade Farm) | 2222 Brighton Dam Road | Brookeville |
| 17 | M: 23-058 | Gustavus Jones Farm and Cemetery | 4112 Brookeville Road | Brookeville |
| 18 | M: 23-060 | Oakley Log House | Brookeville Road | Brookeville |
| 19 | M: 23-084 | Brooke Meadow | 1711 Gold Mine Road | Brookeville |
| 20 | M: 23-089 | Walnut Hill (Rivermist Kennels) | 19515 New Hampshire Avenue (MD 650) | Brinklow |
| 21 | M: 23-084-01 | Ellicott Mine | 2201 Gold Mine Road | Brookeville |
| 22 | M: 23-063 | Longwood | 2900 Dubarry Lane | Brookeville |
| 23 | M: 23-064 | Oak Grove | 19201 Georgia Avenue (MD 97) | Brookeville |
| 24 | M: 23-057 | Falling Green | 4501 Olney-Laytonsville Road (MD 108) | Olney |
| 25 | M: 23-092 | Della Brooke (Brother's Content) | Gold Mine Road | Brookeville |
| 26 | M: 28-01 | Mary Chandlee House | 18820 New Hampshire Avenue (MD 650) | Brinklow |
| 27 | M: 23-098 | Olney Historic District | | Olney |
| 28 | M: 23-093 | Sharon (Brooke Grove Nursing Home) | 1630 Hickory Knoll Road | Sandy Spring |
| 29 | M: 23-098-03 | St. John's Episcopal Church | 3427 Olney-Laytonsville Road (MD 108) | Olney |
| 30 | M: 23-098-04 | St. John's Rectory | 3423 Olney-Laytonsville Road (MD 108) | Olney |
| 31 | M: 28-03 | Mt. Airy | 18120 New Hampshire Avenue (MD 650) | Ashton |
| 32 | M: 15-37 | Tanglewood | 315 Ashton Road (MD 108) | Ashton |
| 33 | M: 28-11 [NR] | Sandy Spring Historic District | | Sandy Spring |
| 34 | M: 23-098-02 | Olney House (Little Olney, Olney) | 3308 Olney Sandy Spring Road (MD 108) | Olney |
| 35 | M: 23-094 | Avalon | 1601 Olney Sandy Spring Road (MD 108) | Sandy Spring |
| 36 | M: 23-097 | Rockland | Olney Sandy Spring Road (MD 108) | Olney |

NR Listed on the National Register of Historic Places
NRE Eligible for the National Register of Historic Places

All other listings are on the Maryland Inventory of Historic Places


LEGEND
2
Documented Historic Sites in Montgomery County Master Plan (number corresponds to Table IV-24)
NR-94
National Register of Historic Places Identification Number
NRE
Eligible for National Register, Identification Number
County Boundary
SCEA Boundary
97
650
108
32
216
182
115
198
29
95
Damascus Road
Georgia Ave.
Sundown Road
New Hampshire Ave.
Brookville Road
Brighton Dam Road
Tridelphia Watershed
Tridelphia Reservoir
Sunshine
Laytonsville
NR-330
Claysville
NR-695
NR-490
Brookville
NRE
NR-574
Brighton Dam
Olney Mills
Brinklow
Olney
Sandy Spring
Ashton
Williamsburg Village
NR-94
Columbia
T. Howard Duckett (Rocky Gorge) Reservoir
Rocky Gorge Dam
MD 97 BROOKEVILLE PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT/
SECTION 4(f) EVALUATION
HISTORIC DISTRICTS AND INDIVIDUALLY DESIGNATED SITES
7000 0 7000 Feet
Figure IV - 8

### a. Laws and Regulations

The National Historic Preservation Act of 1966, as amended, the NEPA of 1969, and other applicable federal, state, and local legislation govern the identification, analysis, and treatment of cultural (historic) resources. The lead agency for this project (FHWA) is required to take into account, during the planning process, the effect of its proposed project on historic properties which are listed on, or eligible for, the National Register prior to the issuance of a permit or license, or before the approval of funds.

At the county level, Chapter 24 A of the Montgomery County Code, the Historic Preservation Ordinance (1979) provides the legal authority for protecting cultural resources. The county's Historic Preservation Commission (HPC) evaluates each proposed designation to see whether it meets HPC criteria for historical, cultural, or archeological design significance. Approved resources are placed on the Master Plan for Historic Preservation, the official listing of all the protected places and structures in the county. Changes to designated resources can be made but there are restrictions. Most changes require a Historic Area Work Permit (HAWP) and include plans to move, demolish, or alter the exterior of the structure (even if the changes are not visible from the street).

For new developments affecting cultural resources, a HAWP is required in addition to other permits required by the Montgomery County Department of Environmental Protection (DEP). HPC must approve a developers application before the DEP can issue other permits. Consideration for existing structures adjacent to proposed new development must include appropriate setback distances as well as other mitigation measures.

### b. Trends Analysis

Numerous potential archeological areas and Maryland Inventory of Historic Places were identified throughout the SCEA boundary. Archeological grids were especially evident along the Patuxent River, surrounding the Towns of Brookeville and Claysville (western portion of the boundary). Clusters of Maryland Inventory of Historic Places were identified primary along roadways and within historic districts. Several National Register sites were also identified.

Coordination with the Montgomery County's Historic Preservation Commission revealed the presence of approximately fifty individually designated sites throughout the SCEA boundary as part of the county's Master Plan of Historic Sites. These sites are those recorded by the county as designated historic sites and are protected by County Historic Preservation Ordinances.

As described above, the DEP and HPC must grant the necessary permits prior to any proposed development that is either adjacent to a designated site or requiring the demolishment of a site. The majority of the designated sites are located north of the Town of Brookeville, in areas zoned either one lot per 25 acres (west of MD 97) or one lot per five acres (east of MD 97).

### c. Potential Cumulative Effects – Historic and Archeological Sites

All the alternates, including the SHA's Selected Alternate would affect the cultural resources in the study area. The MHT states that there is the potential for adverse impacts to the historic district under the No-Build Alternate. For the SHA's Selected Alternate, and Alternates 8A, and Alternate 8B, acquisition of property within the Brookeville Historic District as the result of the construction of the MD 97 Brookeville Project Bypass will adversely affect the District. Opportunities to landscape will help minimize impacts on the Brookeville Historic District associated with Alternate 5C. In addition, a nearby archeology site should be fenced during construction. The SHPO concurred that a Phase II evaluation was warranted on the archeological site (Site 18MO368) associated with a mill complex to conclusively determine its their eligibility. Phase II evaluation of the site was conducted in March and April 2002. These investigations determined that Site 18MO368 is significant both individually and as a contributing resource to the Brookeville Historic District. An MOA has been processed to address the effects of Alternate 7 Modified **(Section VI)**. Phase III data recovery is recommended in the appended draft MOA if the site cannot be avoided during final design.

Potential future impacts were determined by overlaying known proposed subdivision plans over the appropriate location of each cultural resource. Based on the review, the limited developments proposed in the area would not result in direct impacts to cultural resources. The majority of the designated sites are scattered throughout the SCEA boundary, most in areas with land use and zoning classifications compatible with the preservation of cultural resources.

There is the potential for future impacts, especially in areas of the SCEA boundary where development is more prevalent, principally around the Olney area and along portions of MD 108 east of Olney. These areas are within the PFA and new development is likely to result in an adverse effect on some structures, at least visibly.

Protecting cultural resources on a large scale throughout the SCEA boundary are various degrees of zoning and planning restrictions placed by the County and State and county including the necessary permits required by HPC and DEP. The County's historic preservation regulations serve to minimize the loss of historic sites by ensuring that proposed development plans are in compliance with County Historic Preservation Ordinances.

## 6. Conclusions

Direct impacts with each Build Alternate are unavoidable. SHA will comply with the environmental requirements to mitigate for the direct impacts. Through the planning process, steps have been taken to minimize impacts through changes in geometry and layout of alternates, and consideration of both open and closed sections, as well as spanning streams.

Secondary impacts are not expected to occur due to the MD 97 Brookeville Project. Based on the SCEA analysis, there are minor cumulative effects to resources in the SCEA boundary. There are four factors that support these findings (1) the project purpose and need; (2) SHA's commitment to limited access; (3) strong state and county protection of resources and an aggressive commitment to agricultural protection, within the SCEA boundary and beyond; and, (4) the results of the detailed resource studies provided in this section.

SHA's commitment to the four conditions described earlier in this section place unprecedented restrictions on future "loosening" of the project's initial purpose and need. The placement of permanent easements along SHA's Selected Alternate alignment closes any future attempt to provide access, widening, or other connections to it. In addition, any capacity that the Build Alternate might add to the network cannot be used to allow development outside the current boundaries of the Town of Brookeville. These conditions are an effort to successfully comply with Smart Growth requirements and at the same time meet the viable traffic concerns associated with existing MD 97 through the historic Town of Brookeville.

Complimenting SHA's efforts to comply with Smart Growth is Montgomery County's commitment to preserve areas within the SCEA boundary for generations to come as an agricultural community. The county has in place a series of land use designations and conservation efforts within the SCEA boundary conductive with long-term agricultural land and open space preservation. These efforts by the county demonstrate a consistency in land protection measures that practically negate cumulative effects. These include:

- High level of protection relevant to agricultural zoning (one dwelling unit per 25 acres)
- High overall effectiveness of zoning
- TDR, Purchase of Development Rights (PDR) and other easement programs (over 6,090 acres protected in SCEA boundary)
- State designated Rural Legacy Area
- SCEA boundary within county designated Agricultural Wedge as discussed in General Plan Refinement, 1993
- Proximity to and inclusion of state and county park systems within SCEA boundary

Using the current approved development plans as a precursor of future development pressures, cumulative resource impacts such as wetlands, forest, and farmland, will be minimal. Some development will occur, typically consisting of a small number of lots and will place some pressure on farming resources, especially active farming operations. Two local bridge and roadway projects, the MD 97 at Patuxent River Bridge and Bordly Drive, as described in **Section IV.O.2.c**, may also result in additional cumulative effects to wetlands, forest, and farmland. Many resources are protected through more than one set of regulations. For instance, many forested areas are also considered wetlands or are located within floodplains or steep slopes, areas usually not appropriate to development activities. Conversely, this has also been the pattern of land use and land use changes within the SCEA boundary throughout the SCEA time frame to date, a period of over 32 years. With the level of land protection mechanisms in place, land use changes are anticipated to be minimal through the year 2020.

## P. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE HUMAN ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The long-term benefits of the Build Alternates would accrue at the expense of the short-term construction impacts in the immediate vicinity of the project area. These short-term effects would include localized noise and air pollution, and minor traffic delays. With proper controls, they would not have a lasting effect on the environment.

The local short-term impacts by the construction of the various Build Alternates are similar in nature and are consistent with the maintenance an enhancement of long-term productivity for the local area, state and region. The Comprehensive Plan for Brookeville identifies MD 97 as a key element of the regional arterial highway system. The plan emphasizes the need to remove the through-traffic from the center of town to preserve the integrity of the historic district, as well as to improve safety for motorists. The transportation improvements addressed in this document have been considered and proposed in accordance with the Comprehensive Plan.

## Q. ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES THAT WOULD BE INVOLVED IN THE PROPOSED ACTION

The construction of any of the Build Alternates involves the irreversible and irretrievable commitment of various natural, human, and fiscal resources. The Build Alternates require the commitment of land to new highway construction, which is considered an irreversible commitment during the time period that the land is used for a highway facility. If a greater need for the land is proven, or the highway is proven no longer necessary, it is possible to re-convert the property to another use. It is not anticipated, however, that either of these two situations would occur.

Fossil fuels, labor, and natural resources are also used in the quarrying, manufacturing, mixing, and transporting of construction materials. The materials used in the highway construction process are irretrievable, however, they are not in short supply and their use should not have an adverse effect on continued availability of these resources.

Selection of a Build Alternate would require an irretrievable commitment of federal and state funds for ROW acquisition, materials, and construction. Funds for annual maintenance would also be required. Any loss of tax revenues from private land taken for highway use would be an irretrievable revenue loss for Montgomery County; however, this is not anticipated.

The commitment of these resources is established on the premise that the local and regional residents, commuters, and business communities would benefit from the proposed highway improvements. Benefits, which are anticipated to outweigh the loss of these resources, would include increased safety, accident reduction, improvements to traffic flow, reduction in travel time, and protection of the integrity of the Town of Brookeville Historic District.